



Milne Dam Conservation Park, Markham, Ontario

INVESTING IN THE FUTURE OF ONTARIO'S GREENBELT

A CONSERVATION FINANCE BLUEPRINT FOR
SOUTHERN ONTARIO

DECEMBER 2022



**Smart Prosperity
Institute**

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KEY MESSAGES

Investing in Greenbelt ecosystems offers several low-risk, high-reward opportunities to enhance key regional ecosystems, generate economic value for local communities, and reduce the risk of costly environmental impacts. A few immediate opportunities include:

- **Investments in near-urban ecosystems** to reverse habitat loss and improve the resilience of more than 3 million households. These ecosystems are highly productive, contributing \$509 million annually to regional GDP, but are also some of the most under threat.
- **Investments in new large-scale parks** and improvements to manage existing outdoor recreation areas. The Greenbelt has the highest recreation demand in Canada, generating more than \$2.1 billion annually. By 2051, a minimum of 32,000 ha of new parkland will be needed to maintain per capita levels.
- **Investments in forest and wetlands** to reduce the impacts of climate change and improve the mitigation capacity of regional ecosystems. The Greater Golden Horseshoe is considered 'shovel-ready' to plant 54 million trees on 54,000 ha, providing substantial carbon storage benefits, cleaner air, greater flood mitigation, and a reduction in exposure to extreme heat.
- **Investments in regional farmlands** to support continued local food production and tourism opportunities. Sectors that are directly linked to the integrity of these ecosystems, such as agriculture, agri-food, tourism, and outdoor recreation, contribute more than \$2.9 billion in annual revenues.

Conservation finance projects can help build long-term regional prosperity by unlocking the value of natural assets to increase greater public and private investments in nature. Our Blueprint highlights a few of these opportunities:

- **Insurance products to incentivize investments in nature-based infrastructure.** Public and private land in the Greenbelt is vulnerable to an increasing number of economic losses and liabilities due to climate change. Calibrating insurance products to incentivize investments in climate resilient infrastructure presents a clear opportunity to minimize future risks.
- **Recreation bonds to improve the health and well-being of local communities.** More work is needed to connect conservation and restoration to specific health outcomes in the Greenbelt, but there is significant potential to design conservation finance projects using health-based value streams.
- **Resilience bonds to mitigate flooding and improve source water protection.** These types of projects can generate significant revenue streams by boosting the value of key economic sectors and helping municipalities avoid costly infrastructure upgrades and recurrent damage from flooding.
- **Revolving funds to help mitigate the impact of habitat loss** on ecological function and economic productivity in the Greenbelt. With diverse ecosystems in the Greenbelt already generating substantial revenues from tourism and agriculture, a coordinated approach could represent an opportunity to develop further low-risk, high-impact investments at scale.
- **Carbon offset potential in regional forests.** With 120,000 hectares of forest cover in the Greenbelt, using a voluntary offset protocol, revenues from a carbon offset project could amount to an additional \$17 million in annual revenues.

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INTRODUCTION: BUILDING CAPACITY FOR CONSERVATION FINANCE IN ONTARIO'S GREENBELT

Ontario's Greenbelt is adjacent to Canada's most densely populated region, providing vital ecosystem services and access to nature for more than 10.2 million residents.¹ Yet, as of 2020, only 2.6% of the Greater Golden Horseshoe (GGH) is designated as protected areas under Canada's Pathway to Target 1.² Population growth and regional development are anticipated to continue applying pressure on the integrity of Greenbelt ecosystems and the benefits they provide to local communities—e.g., opportunities for recreation, clean drinking water, and climate regulation. With a regional population projected to hit 15 million by 2051, there is a substantial opportunity to accelerate investment in the Greenbelt to leverage the \$3.2 billion per year already being generated by regional ecosystem services (**Figure 1**).³ A few high-value investment opportunities include:

- Investment in near-urban ecosystems to reverse habitat loss and improve community resilience for more than 3 million households that are dependent on key ecosystem services.

- Investments in new large-scale parks and improvements to manage existing outdoor recreation areas. The Greenbelt has the highest recreation demand in Canada, generating more than \$2.1 billion annually. By 2051, a minimum of 32,000 ha of new parkland will be needed to maintain per capita levels.⁴
- Investments in forest and wetland conservation and restoration to reduce the impacts of climate change and improve the mitigation capacity of regional ecosystems. The Greater Golden Horseshoe is considered 'shovel-ready' to plant 54 million trees on 54,000 ha, providing substantial carbon storage benefits, cleaner air, greater flood mitigation, and a reduction in exposure to extreme heat.⁵

Investments in greater conservation and restoration efforts in the Greenbelt offer an opportunity to catalyze regional prosperity while enhancing existing ecosystems to meet the demands of a growing population. A conservation finance approach

provides the opportunity to design projects that better account for the value of maintaining healthy regional ecosystems and communicate these values in terms of cost savings or increases in nature-based revenues (e.g., food production and outdoor recreation opportunities). Conservation finance projects can be designed to account for the value of natural assets, connect these values to project outcomes, and express the investment value of project-initiated changes to different stakeholders. These outcomes are central to understanding the potential for a conservation finance approach to incentivize greater public and private investments in regional ecosystems.

A growing number of private landowners, municipalities, and communities across the Greenbelt are recognizing the potential economic benefits from investing in regional ecosystems. However, despite the recognition that conserving and restoring natural systems makes economic sense, supports sustainable food production, and builds resilience in a changing climate, advancing these types of projects has proven challenging in practice. The main challenges for growing investments in nature continue to be:

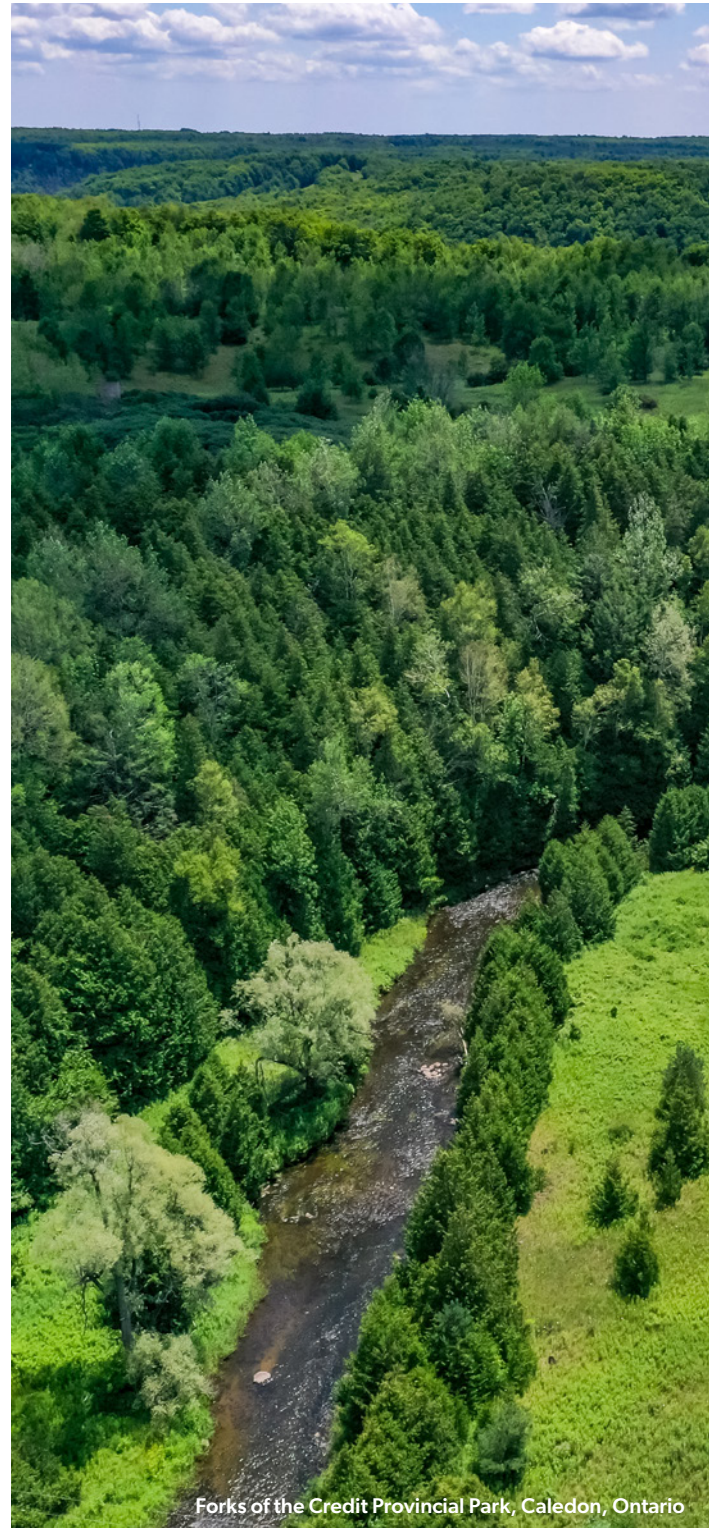
- A lack of clarity on the necessary data requirements,
- Types of processes associated with conservation finance,
- Aligning necessary and interested stakeholders to connect alternative funding sources with value streams generated by conservation and restoration projects.

Over the next 30 years, the livelihoods of more than 15 million people will increasingly depend on how we invest in conserving and restoring vital ecosystem services in Ontario's Greenbelt.^{6,7} The purpose of this report is to provide clarity on what is needed to attract new forms of financing to conservation and restoration initiatives to support key ecosystems so that Ontario's Greenbelt region can continue to provide clean water, reduce flood risks, and enhance food security and for its surrounding population. We achieve this by:

1. **Enabling a range of potential stakeholders and participants** in the Greenbelt to achieve a common understanding of conservation finance, which instruments most readily apply, and the various roles necessary to advance conservation finance projects (**Section 1**);
2. **Identifying key opportunities and value streams** in Ontario's Greenbelt to illustrate where potential exists for conservation finance mechanisms to support conservation and restoration initiatives across the region (**Section 2**);
3. **Developing a stepwise blueprint** to apply conservation finance mechanisms for conservation and restoration projects in Ontario's Greenbelt. Considerations covered in our blueprint include, highlighting underlying data requirements, outlining the roles and responsibilities of key stakeholders for advancing conservation finance projects, and identifying appropriate performance measurement tools to better connect conservation efforts with public and private investments (**Section 3**);

4. **Identifying conservation finance hotspots** to advance projects in the Greenbelt (**Section 4**).

There are several conservation finance mechanisms that can be readily applied to enhance conservation and restoration projects across the Greenbelt. By developing a *Conservation Finance Blueprint* for Ontario's Greenbelt, we aim to provide the necessary support for organizations to identify the types of financial models and partnerships that are needed to support project implementation.



Forks of the Credit Provincial Park, Caledon, Ontario

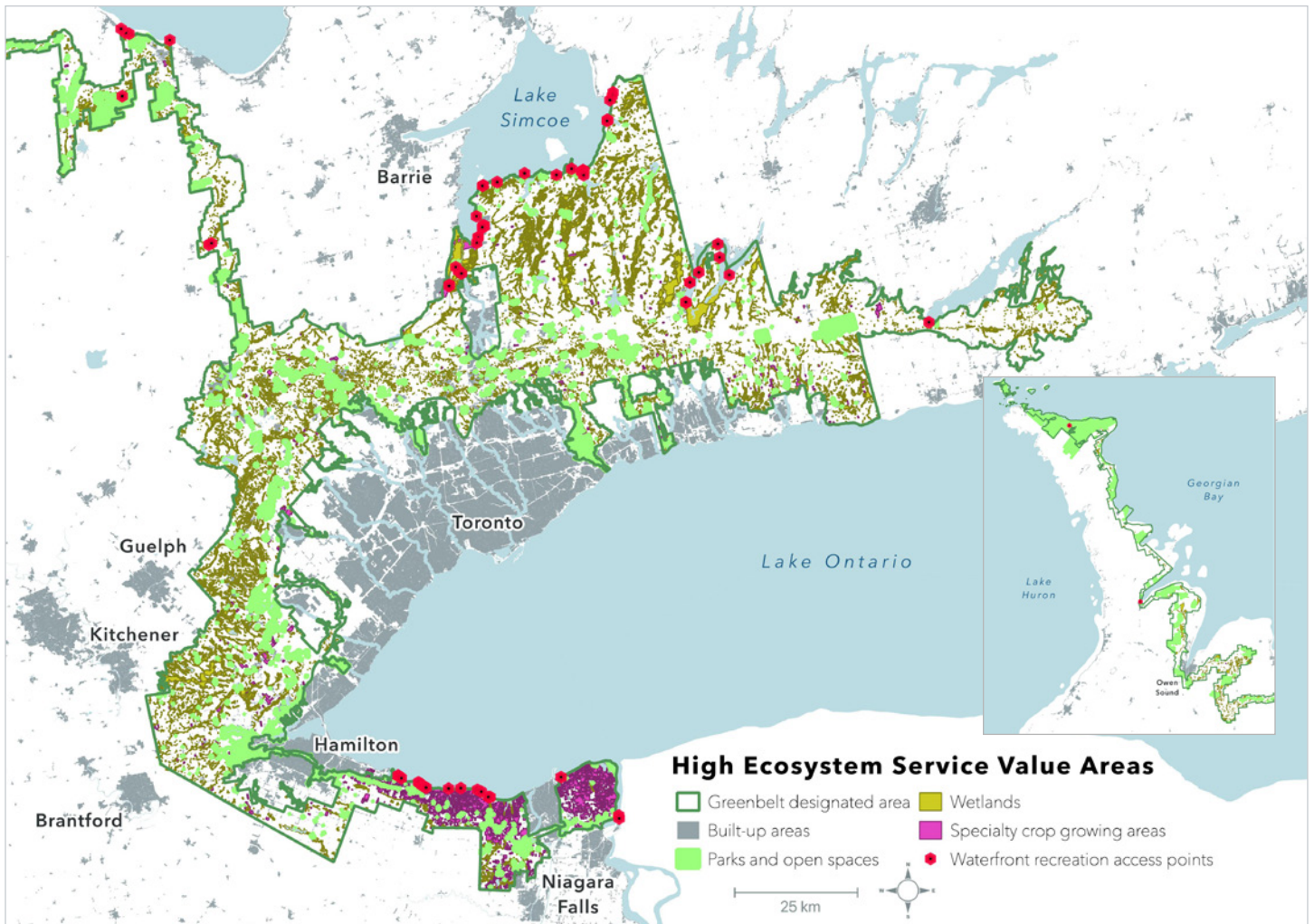


Figure 1. Distribution of high-ecosystem service value areas in Ontario’s Greenbelt by land use type.

Specialty crop growing areas include high value crops like cherries, peaches, berries, field vegetables and vineyards. Waterfront recreation access points include activities like beaches, boat caches, camping sites, and picnic sites (Source: Ontario Ministry of Agriculture and Rural Affairs, Ontario Ministry of Natural Resources, Statistics Canada, and DMTI Spatial Inc.)





Forks of the Credit Provincial Park, Caledon, Ontario

1 CLOSING THE CONSERVATION FINANCE GAP

Current investments for conservation and restoration in Ontario fall short of what is required to sustain regional biodiversity, protect against floods and extreme events, and support healthy natural environments for the surrounding urban and rural population. Where there is pressure to expand urban boundaries into the Greenbelt, degradation and land removal from the key ecosystems will increase the risk and cost of expected environmental challenges in the years to come. A recent report by the Smart Prosperity Institute (SPI) cited the need to expand investments in nature conservation across Canada by \$20-25 billion per year until 2030 to achieve our climate and biodiversity commitments.⁸ At the current rate, and without further investment, the conservation finance gap in Ontario is estimated to grow to \$13.5 billion by 2030.⁹

The immediate need to expand investments in Ontario's Greenbelt is well articulated in many reports, such as the Near-Urban Nature Network's "A Solution to Climate Change and Biodiversity Loss"¹⁰ in Southern Ontario; "Appreciating the Greenbelt's Natural Capital"¹¹ prepared by Green Analytics; and "Appreciating the value of the Greenbelt's Eco-services"¹²

prepared by the David Suzuki Foundation. These reports identify the value of key ecosystem services that underpin the ability of the region to sustainably accommodate further growth—namely, recreation opportunities (\$2.1 billion yr⁻¹), drinking water for regional households (\$358 million yr⁻¹), and flood protection (\$224 million yr⁻¹).

The findings also highlight that investing in the conservation and restoration of near-urban ecosystems—i.e., ecosystems in and around high-density urban areas like those in the Greenbelt—carries an ever-higher potential for generating substantial economic returns, while improving community resilience.¹³ These ecosystems are currently facing the biggest pressures from urbanization and habitat fragmentation in the Greenbelt region but are also some of the most economically productive, directly contributing \$509 million every year to regional GDP. These contributions are additional to the value of regional ecosystem services and are primarily drawn from agriculture, forestry, ecotourism, and an emerging native plant industry that is supporting the proliferation of nature-based solutions across the region.¹⁴ By 2030, expanding investments

to maintain and enhance these ecosystems, Ontario's Greenbelt would be able to sustainably accommodate an additional 22% in regional economic growth, primarily in the agricultural, agri-food, and ecotourism industries.¹⁵

Investing in Ontario's Greenbelt offers a relatively low-risk opportunity to enhance and maintain ecosystem services that are already directly generating considerable economic value for local communities (e.g., urban agriculture) and are reducing risk of costly environmental impacts (e.g., enhancing stormwater management). Establishing investment opportunities, in conjunction with traditional conservation and restoration funding sources, can extend the reach of existing funds. Advancing a conservation finance approach in the Greenbelt provides the opportunity to leverage new forms of investments in nature to reduce the growing gap between conservation needs and current funding levels, and ensure these investments continue to generate benefits for communities and ecosystems across Ontario.

1.1 What is conservation finance?

Conservation finance refers to investments that conserve, restore, and support sustainable management of natural systems. The overarching goal of conservation finance is to raise and manage funds for nature that result in **both** ecological and

financial returns. This can be achieved by capturing the value of benefits that are delivered by improved ecosystem service delivery and function and ensuring that the cost-savings are connected to those who benefit. **Figure 2** highlights a generic model of the various ways that financial actors can contribute to conservation and restoration projects and how they are repaid. Specific tools and instruments are discussed in the following section in more detail.

Conservation finance mechanisms are distinct from traditional conservation funding models in the following ways:

- **They provide more sustainable financing.** By connecting revenue and value streams from ecosystem services to those who benefit from them, there is a clear business case for investment. By generating returns, cost savings, or cost recuperation, capital providers are motivated to continue to provide financial support, rather than as a one-off grant or contribution.
- **They attract new or novel sources of funding.** Funding models that can generate no net-loss or returns can bring different types of participants to a project that would not otherwise engage in charitable contributions to nature. This can enable grant funds to go further or be allocated to projects that do not generate revenue or cost savings.

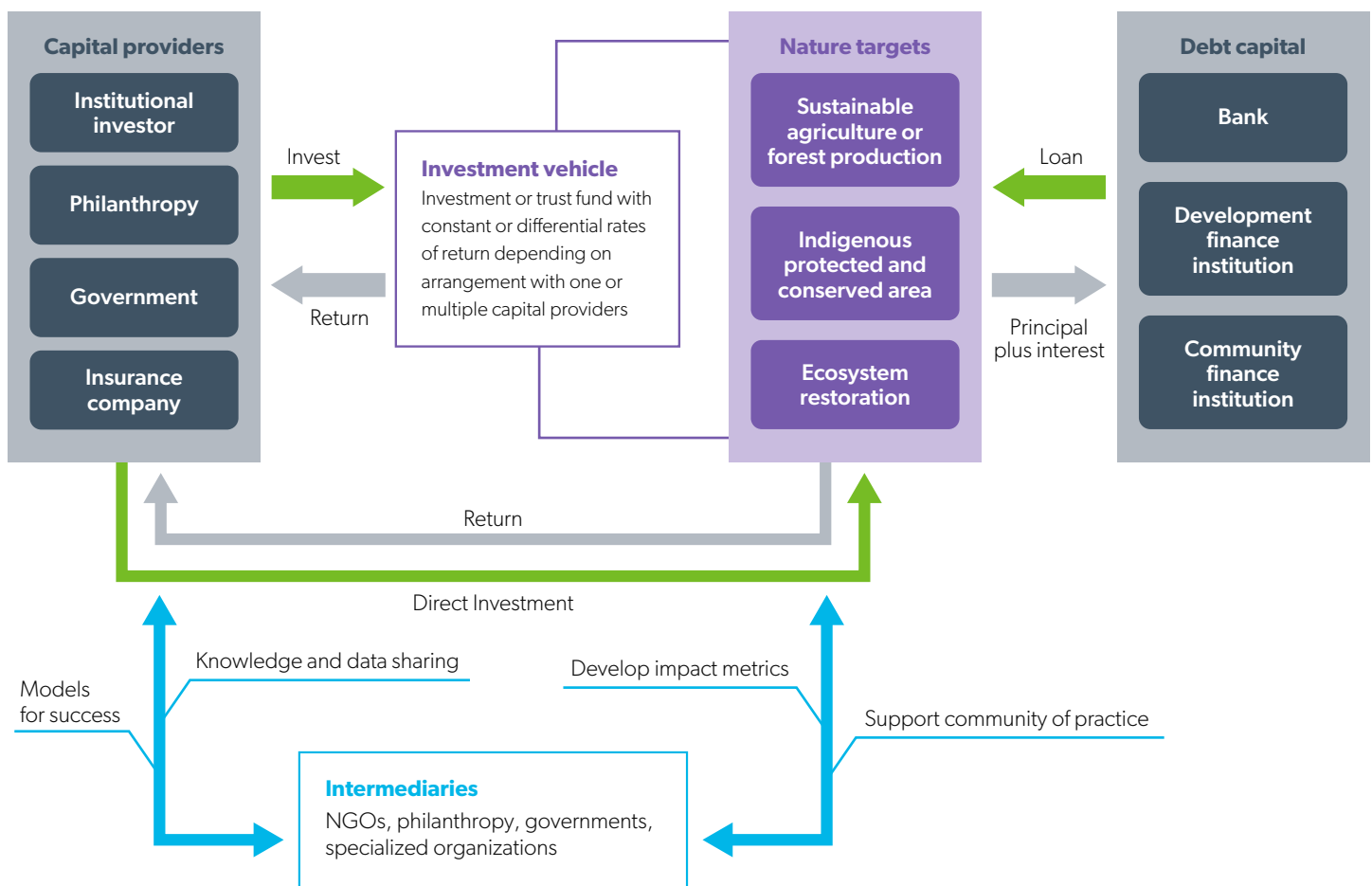


Figure 2. General Financial flows in a conservation finance transaction model

It is important to note that not all conservation and restoration activities are appropriate to adapt to conservation finance funding models. Indeed, there are many projects, such as protection of species-at-risk, that are not revenue generating but play a pivotal role in the ecological balance of an ecosystem. These projects are better suited to receive grant funding or philanthropic dollars. By creating financial arrangements that capture the value of ecosystem services and attract investors who directly benefit from conservation and restoration, the objective of conservation finance projects is to increase the overall pool of funds available for nature. This can make more funds available to projects that can only be funded through philanthropic sources.

1.2 What types of conservation finance mechanisms are available?

Different conservation finance mechanisms are not suitable in all contexts on the ground. Some mechanisms may be better suited for restoration projects and natural resource management schemes, whereas others are better suited to advance long-term conservation goals. **Table 1** provides an overview of key project considerations and how they intersect with the suitability of different conservation finance mechanisms

In each case, the suitability of specific conservation finance mechanisms depends on the level and type of stakeholder participation (See **Section 1.3**), as well as two key factors for identifying the link between changes in ecosystem service outcomes and the scope of possible benefits:

1. **Type and availability of data** determines how changes in ecosystem services are being quantified, how the changes influence the decisions of potential investors, and how data points may differ depending on the types of ecosystem services, financial mechanisms, or project types being considered.
2. **Who is benefiting and by how much?** As a general guide, ecosystem service values for individual conservation finance projects are drawn from either their direct (e.g., cost savings from reducing flood damage) or indirect (e.g., the value of sequestered carbon) impact on target beneficiaries, the scale of which are largely determined by the following considerations:
 - a. Proximity of services to nearby populations,
 - b. Proportional impact of benefits for different populations,
 - c. Total value of proximal economic activity and,
 - d. Scarcity of similar services in the target area.

Based on the considerations outlined in the **Table 1**, we highlight below the conservation finance mechanisms we consider to be most applicable for Ontario's Greenbelt. Additional mechanisms can be found in **Appendix 1**.

For further information on how different conservation finance mechanisms could be applied in the Canadian context, see SPI's [Invest in Nature](#) report.

Green Bonds are debt instruments that can involve one project or a bundle of projects in which up-front capital is provided by investors who receive a predetermined rate of return after an identified period. Since 2015 green bond issuance has grown at an average annual rate of 60%, totaling \$1.05 trillion USD in 2020. What counts as "green" can be loosely defined and often includes renewable energy, transportation, and commodity-based investments such as forestry and agriculture. Conservation-specific green bonds are less common since the return on investment can be more challenging to calculate and difficult to translate into a value stream. To enable nature-based projects, there are further design considerations to connect investors and beneficiaries, as seen in resilience bonds, recreation bonds, and environmental impact bonds (or pay-for-performance bonds), which include conservation impact bonds.

- **Resilience Bonds** have buyers provide an initial capital investment for an activity that is intended to enhance a specific type of ecosystem service—e.g., vegetation restoration on river embankment. Following the conclusion of the bond agreement (e.g., 10 years) investors are repaid with interest based on the anticipated cost savings the project delivers to target beneficiaries (e.g., municipalities—improved water quality). These bonds can benefit individuals or collections of organizations and are relatively straightforward instruments to implement. The main challenge for establishing a resilience bond is determining an appropriate return on investment to create an incentive or participation.
- **Recreation Bonds** are typically designed using pay-for-performance measures, which are similar to the structure of Resilience Bonds, but financing is based on capital revenues generated by the project. Bond buyers provide an initial capital investment with a coupon repayment rate (e.g., 2%) that is triggered after the achievement of a predetermined outcome on recreational activities. Establishing target outcomes for repayment can be direct to project outcomes (e.g., 25% increase in the collection of annual user fees), or indirect whereby investing in better recreation opportunities encourages more tourism-based economic activity (e.g., an increase of 10,000 non-resident visitors to local businesses).
- **Conservation Impact Bonds (CIB)** are performance-based bonds that are privately financed with payouts occurring based on the achievement of pre-established project objectives. Similar to an EIB, CIBs consist of an up-front investment that is used to finance a project with well-defined anticipated outcomes—see **Box 1**. The payout to bondholders is typically the responsibility of project beneficiaries that are designated as "outcome payers" that benefit from reaching the established objectives. With the sustainability of a transactional model dependent on relationships between willing investors and "outcome payers" this model has both the advantage of being able to scale easily, if there are projects available, and the disadvantage

of needing extra steps to mitigate potential risk for investors (e.g., requiring a bond guarantor).

Credits and Offsets can be generated through conservation and restoration activities that improve a diversity of ecosystem service outcomes. Generally, these two types of market mechanisms are intended to finance conservation and restoration activities by incentivizing organizations and individuals to adopt practices that generate credits (e.g., wetland restoration), to exchange credits to maximize abatement of ecologically damaging activities, or purchase offsets to mitigate unavoidable ecological damage.

- **Carbon Offsets** are either voluntary or regulatory. Voluntary offsets are sold to buyers based on their interest in acquiring offsets, rather than buyers seeking to meet legal requirements set out under an established regulatory framework. In response to net-zero targets, the *Taskforce on Scaling Voluntary Carbon Markets* estimates demand for voluntary carbon offsets could increase by a factor of 15x and be worth over US\$50 billion by 2030. The recent development of Canada’s *Greenhouse Gas Offset Credit System* provides project proponents with a solid regulatory

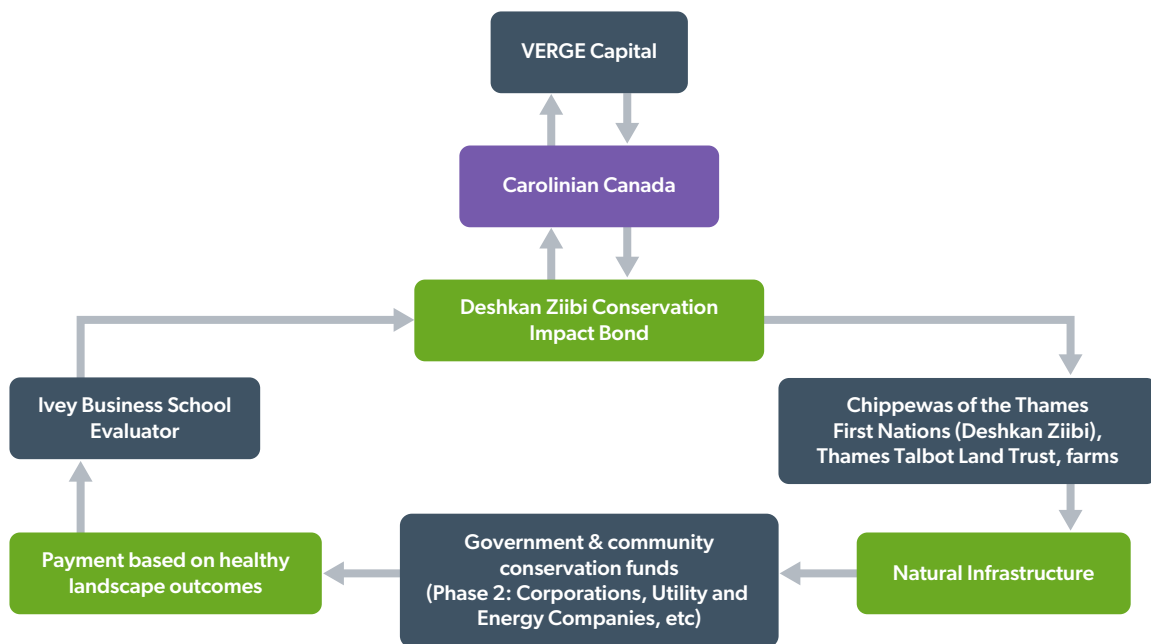
foundation on which projects can be developed to generate revenues from federal offset credits. Additional offset protocols for ‘enhanced soil organic carbon’ are now under development and present an opportunity to expand the types of projects that may be able to generate additional revenues from carbon offset programs.

- **Biodiversity credits** are similar in concept to carbon offsets in that it involves conserving or restoring lands that would otherwise be at risk of degradation. While an offset project can produce credits, biodiversity credits do not necessarily need to be tied to a regulatory arrangement and thus can be bought by anyone interested in supporting conservation and supporting net positive goals. Currently, the demand for biodiversity credits in Canada is limited, however, with recent advancements in the development of voluntary markets for biodiversity credits, there is a substantial opportunity drive further investments. [Toronto Region Conservation Authority](#) and [Credit Valley Conservation Authority](#) have each released guidelines for ecological offsetting that contain protocols for establishing tradeable (biodiversity) credit programs.

Box 1: Deshkan Ziibi Conservation Impact Bond

VERGE Capital (impact investor) and Carolinian Canada (project facilitator) collaborated to launch the Deshkan Ziibi Conservation Impact Bond in Southern Ontario in 2020. Under this bond structure, investors provide capital up-front to support a series of projects that focus on enhancing ecosystem services and improving human well-being. The Bond is designed to attract a variety of project implementing partners, including land trusts, conservation authorities,

nature-based businesses, and First Nations. Upon completion of the project, and verification of the outcomes by an independent evaluation partner, investors are repaid with interest by the predetermined outcome payer (i.e., the direct or indirect project beneficiary). In 2021, ECCC invested \$300,000 to match private sector contributions.



Insurance products can be designed to encourage investment in natural infrastructure that reduces the risks associated with natural disasters such as floods. Insurance products may also be used to protect natural assets themselves. Large valuable natural assets, such as forests, can also be insured against future damages caused by fires, invasive species, floods, and windstorms.

- **Best management practice insurance (Risk Transfer)** provides assurances for private landowners to adopt specific practices that promote conservation or restoration efforts. These types of insurance arrangements can incentivize agricultural producers to adopt positive practices that enhance local ecosystem functioning while serving to mitigate the risk of changing operations by bridging the revenue gap during the establishment period.
- **Premium reductions** may be tailored to reward insured parties for implementing specific restoration or conservation activities that result in reduced property risk. Large-scale projects, such as wetland restoration, could lower insurance premiums for municipalities or groups of property owners. These types of large-scale projects could incorporate a resilience fund to enable participation of multiple stakeholders.

Investment Funds generally produce returns between 8% and 10%.¹⁶ The assets under management by these funds are typically in the hundreds of millions. They are appealing to investors due to low volatility and low correlation to other asset classes, providing diversification in an investment portfolio.

- **Impact investment funds** function like any large investment fund in that they include a bundle of companies or projects. They tend to apply to the forestry or agricultural sectors where there are a range of revenue-generating activities (e.g., timber sales, offset generation, land value appreciation) that deliver returns to investors alongside conservation outcomes. There are net improvements to environmental conditions, but traditional revenue-generating (e.g., forestry, development) activities tend to be needed to generate market-rate returns.
- **Revolving funds** are large funds that loan to multiple projects on an ongoing basis. The fund may specify the type of projects that are eligible, and the funding supports the capital cost of nature-based projects. The recipient pays back the loan with interest over time, which they can do through cost savings generated by the project.



Dyer's Bay, Bruce Peninsula, Ontario

Table 1. Applicability of conservation finance mechanisms for the Greenbelt based on key project considerations

1 – Significant limitations
 2 – Some limitations
 3 – Some enabling elements
 4 – Significant enabling elements

Mechanism	Tools	Scalable	Inv. returns	Env. benefits	Important Considerations
Bonds	Green Bonds	↕↕↕	💰💰	🌿	Green bonds have been used to finance other types of projects in areas in and around the Greenbelt (e.g., Port Lands Restoration in Toronto), but their application for conservation and restoration specific projects is limited. Scaling this type of model can be a challenge but adopting a Greenbelt-wide model with a sufficient pipeline could help address these issues for potential investors.
	Resilience Bonds	↕↕	💰💰	🌿🌿	Coordination between multiple partners and establishing an outcome payer would be keys to success. Given the profile and location of the Greenbelt, there would be no shortage of potential partners leading to a high potential for this type of mechanism. Success of this approach will hinge on the establishment of impact metrics that are used to build a business and attract investors/outcome payers.
	Recreation Bonds	↕↕↕↕	💰💰💰	🌿🌿	The Greenbelt is one of Canada’s highest-value outdoor recreation areas generating \$2.1 billion in annual revenues. Returns on investments will depend on the behaviour users, tourism patterns, and the continued quality of nature-based experiences—this represents both a substantial opportunity based on recent visitation patterns, as well as moderate risk exposure from adverse effects (e.g., pandemics) influencing sector-wide trends. Most of this risk can be mitigated with project designs that apply flexible repayments schedules. The challenge for these types of instruments will be drawing direct correlations between conservation/restoration efforts and increased revenue streams from outdoor recreation.
	EIB / CIB	↕↕↕	💰💰	🌿🌿	Like a Resilience Bond, this model requires the coordination between multiple partners and establishing a potential outcome payer. Transaction costs for establishing this type of model will be high, but with a recent successful pilot project run by Carolinian Canada and supported by VERGE Capital, scaling and replicating EIB/CIB in the Greenbelt may be easier due to “brand recognition.”
Credits & Offsets	Carbon Offsets	↕↕↕	💰💰💰💰	🌿🌿	The Greenbelt contains a variety of carbon rich landscapes, including wetlands, forests, and agricultural soils. Many of these ecosystems also correspond to high-value co-benefits, such outdoor recreation, food security, water quality, and flood mitigation. This would increase the value of any offsets offered in voluntary markets. In the absence of compliance markets, limited demand continues to be a major issue for scaling existing voluntary carbon offset projects. Once federal protocols are in place, there would likely be less limitations in terms of scaling regional offset programs. Leakage, additionality, permanence, and tensions between biodiverse and carbon rich landscapes continue to be major questions that are currently unaddressed. These questions increase the vulnerability of improperly structured programs in the Greenbelt to result in high investment values with limited ecological returns.
	Biodiversity credits	↕↕	💰💰	🌿🌿	The Greenbelt is one of Canada’s most biodiverse regions but is also subject to high levels of urban encroachment and habitat fragmentation. The conservation of natural heritage is obligated under the provincial legislative framework, but with recent regulatory changes, who will pay and monitor for these efforts is a major question. The ecological and economic returns, and potential to scale these programs will hinge on the development of standard guidelines for a regionally specific program.
	Species and habitat banking	↕	💰💰	🌿🌿🌿	The provincial regulatory framework in the Greenbelt limits this type of model being applied to a limited number of waterways under federal jurisdiction. Habitat banking has proven ecologically successful in other parts of the country, but without changes in the current framework the application of these types of frameworks in the Greenbelt will remain limited.
	Stormwater credits	↕	💰💰	🌿🌿	Stormwater management credits have been adopted or are currently being explored by several municipalities in and around the Greenbelt. Current provincial legislation does not provide the strict compliance measures that are needed to create a robust framework for participation.
	Soil carbon credits	↕↕↕	💰💰💰	🌿🌿	High potential in the Greenbelt due to agro-ecological context and stakeholder buy-in, but program design is critical to ensure benefits are measured and delivered. Regulatory innovation will be key for advancing these types of projects.

Mechanism	Tools	Scalable	Inv. returns	Env. benefits	Important Considerations
Insurance Products	Parametric insurance	↕↕↕	💰💰💰	🌿🌿	High potential for the Greenbelt, but currently a lot of uncertainty around the appropriate design and metrics. Once the right metrics are in place, recent calls to action by insurance actors to improve mitigation and adaptation capacities indicate a significant window of opportunity. The ability to scale BMPs would be limited compared to parametric insurance due to the site-specific conditions required in designing the former.
	BMP insurance	↕↕	💰💰💰	🌿🌿	
Investment Funds	Impact investments	↕↕↕	💰💰	🌿🌿	Follows a trusted financial model and has been applied to projects in and around the Greenbelt. Appropriate projects and evaluation frameworks are needed for different types of conservation and restoration actions. With limited pilot projects to support project development, transaction costs are high and challenging to scale to other jurisdictions.
	Revolving funds	↕↕↕↕	💰💰	🌿🌿🌿	The benefits and borders of the Greenbelt are well established, and the importance of the region is recognized across all levels of government in Canada. With a solid foundation of existing funding—including government grants, philanthropy, and private investments—the diverse ecosystems and co-benefits offered by the region there is substantial opportunity to scale local projects into a region-wide approach using a Revolving Fund model. Investment returns may initially be limited based on the challenges of connecting a diversity of value streams from various local projects, but as the fund gains momentum there is a potential for greater returns. This would have the inverse effect for ecological benefits—a regional approach would increase the scope and scale of potential ecological benefits by coordinating efforts.

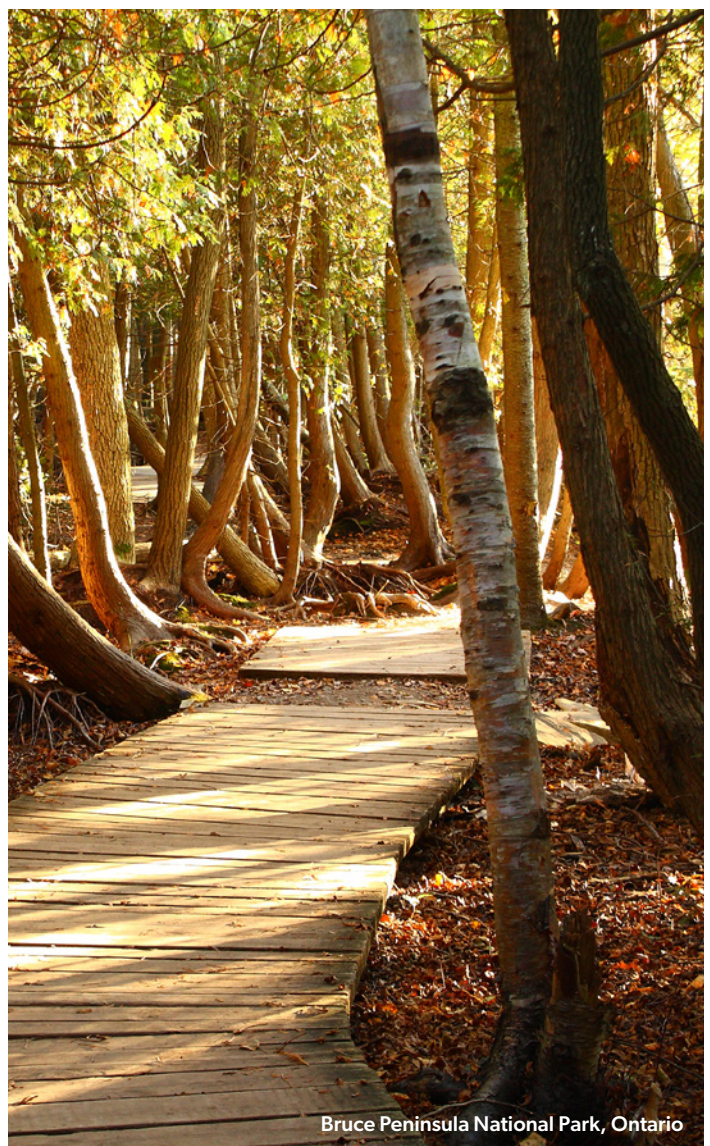
1.3 Who are the key stakeholders?

Given the complexity of natural systems, investments in conservation and restoration projects that produce clear ecological and economic benefits, while also having a suitable risk profile for investors, often require the development of multi-faceted partnerships. Consequently, project design involves coordinating a diverse range of stakeholders willing and able to take on roles and responsibilities to implement, operate, and measure various project components.

Figure 3 illustrates a simplified approach for organizing stakeholder roles and responsibilities that are necessary to consider when seeking to advance projects using a conservation finance approach.

Despite a growing interest among diverse Canadian stakeholders to increase investments in conservation and restoration, identifying opportunities across sectors remains a challenge.¹⁷ Establishing common language, terms, and procedures is an important step, but first, understanding which type of actors are filling what roles—as well as what elements of conservation finance projects can incentivize their participation—is needed to understand what will influence future standards and guidelines.

In the section below, we highlight the crucial project roles to address and broadly identify potential stakeholders and supporting organizations to illustrate the opportunity to solicit cross-sectoral support for advancing conservation finance projects. Each project role could be undertaken by a number of different stakeholders, which provides insight into how project outcomes need to be understood and communicated depending on the type of stakeholder involved.



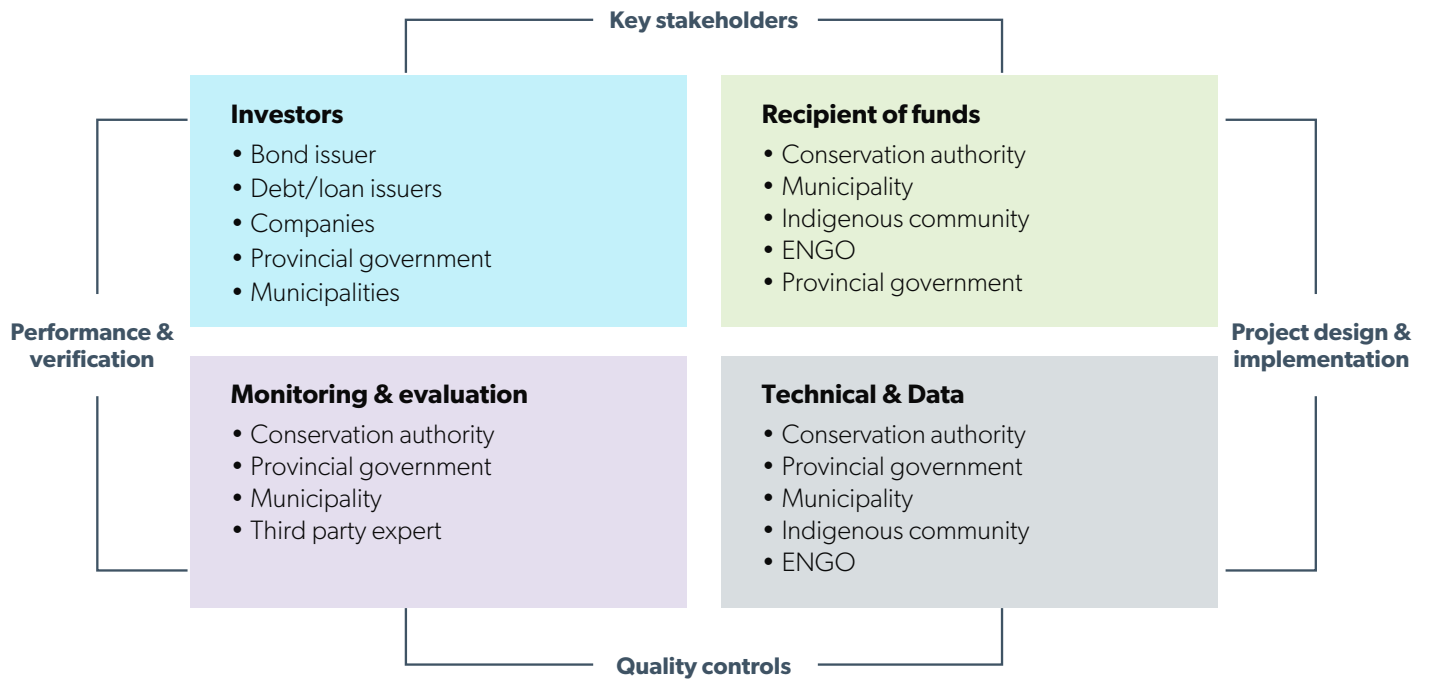


Figure 3. Conceptual diagram of roles and responsibilities needed to advance conservation finance projects

Investors	
Those who can provide up-front funding for a project. Depending on their exact role they may be seeking a return that ranges from 0% to market rate.	
Who	Will be concerned with:
Government (at any scale) Corporate Actors (demand at the moment particularly from Industry, those with net zero or CSR commitments) Financial Institutions (e.g., banks, credit unions) Insurance actors Institutional Investor (e.g., pension fund) Impact Investor (e.g., individual, foundation) Philanthropy (e.g., individual, foundation)	Types of return – ecological, financial Rate of return Term of return Baseline data and ecological target(s) Credibility of outcome payer Guarantee in case of default Credit rating, if available

Issuers/ Holders	
Those who have the financial and legal capacity to administer a financial instrument. Each type of financial instrument can have restrictions, particularly those that involve money being held over time and delivering a financial return (e.g., bonds) as opposed to a more straightforward transaction (e.g., purchase of offsets).	
Who	Will be concerned with:
Financial institutions (e.g., banks, credit unions) Insurance actors Institutional investor (e.g., pension fund) Impact investor (e.g., individual, foundation) Philanthropy (e.g., individual, foundation)	Legal framework Risk assessment Potential for a credit rating (if applicable) Project feasibility Terms and conditions Regulatory approval Financial oversight

Recipient of funds/Project Implementer

Those who are conducting the activity on the ground to meet their own conservation objectives (e.g., ENGO, conservation authority, farmer) or on behalf of an investor.

Who	Will be concerned with:
Private landowner Municipality ENGO Conservation authorities Indigenous communities Other land holder Combination of the above	Developing project proposal Collect/prepare baseline data Making business case and financial plan – how to use funds Connecting to key stakeholders Implementing Project Monitoring and Evaluation (perhaps) Clear financial model that allows for pay back to investors (depending on type of project)

Outcome payers (optional)

Outcome payers are a specific group of project beneficiaries that are responsible for paying back investors resulting from predetermined project objectives being met. Outcome payers typically have a vested interest in realizing the proposed conservation or restoration outcome, which can decrease some of the investment risk. Outcome payers are not always how revenues are generated, they are usually associated with payment for ecosystem services, conservation bonds, resilience bonds, environmental impact bonds, and other pay-for-performance models.

Who	Will be concerned with:
Municipality ENGO Industry Government	Availability and ease of collecting ecological data Monitoring and evaluation Clear financial model that allows for pay back to investors

Technical advisors (optional)

May not be necessary depending on the project and the capacity and capabilities of the project implementers, but are generally those that are available to provide additional project support where needed.

Who	Will be concerned with:
Environmental consultants and/or NGOs – can provide services associated with data collection and analysis, ecosystem service valuation, designing monitoring and evaluation frameworks, Conservation authorities – many collect a range of data especially associated with watershed management Government – can be resources for regulatory considerations.	Feasibility studies Monitoring and evaluation

1.4 What tools are available to support conservation finance projects?

For those seeking to advance a conservation finance project, selecting the ideal combination of instruments and tools to plan, design, implement and measure project outcomes means balancing several considerations:

- Cost and effectiveness,
- Feasibility within the local context,
- Availability of local data or investment required to collect new data,
- Technical complexity,
- Ease of involving community stakeholders,
- Ease of use across multiple projects, to reduce the overall cost barriers for implementation,
- Availability of standardized measures and metrics that connect ecological outcomes to economic benefits at the project level.¹⁸

The following sections review potential project design instruments and measurement tools. While not exhaustive, we highlight what they can measure and when they are useful for conservation finance mechanisms. **Appendix 2** provides a further detailed overview of the benefits and limitations of different design instruments and tools.

Project design instruments

Project design instruments are a series of systematized methods that project proponents can use to develop an ecological and economic case for advancing a specific type of conservation finance project. **Selecting the right instrument is necessary for determine quantifiable outcomes (economic and ecosystem), cultivating interest among necessary stakeholders, and ensuring confidence among potential investors.**

Design instruments will indicate how project success will be measured and can determine when, and how much, investors will be repaid. Knowing how to select the right instrument can also reduce the upfront transaction costs for project proponents by identifying different benefit pathways—i.e., linking ecological outcomes to associated economic impacts. Selecting the right instrument can also help highlight specific value streams that will form the foundation of the long-term transactional agreement between project proponents, target beneficiaries, and investors.

Below we highlight a few key project design instruments that can help make the business case to different stakeholder audiences when seeking to advance a conservation finance project.

Cost benefits analysis

Cost-benefit analyses (CBA) are standard evaluation methods for grey infrastructure projects and are also used to measure the monetary value of a variety of impacts from conservation and restoration projects. Recently, CBAs have been adapted to evaluate natural infrastructure and NBS projects supporting community and ecological well-being. For example, the Hamilton parks and recreation master plan uses a CBA approach for making the business case to invest in the development and management of urban greenspaces. The municipal balance sheet reports a 3:1 return on investments generated in city parks (i.e., each \$1 of investment provides \$3 in returns for community benefits).¹⁹

Social Return on Investment

Social Return on Investment (SROI) is often used by non-profit organizations to estimate the social, environmental, and economic return of an investment in a particular project—also known as the **triple bottom line**.²⁰ Like CBAs, SROI compares the net present value of project benefits with the net present value of costs. Also, like CBA, it calculates the value of benefits by assigning economic value to intangible environmental and social benefits using financial proxies and combining these values with those of economic benefits. But unlike CBA, it actively involves stakeholders in identifying important benefits and estimating their value. These stakeholders may include beneficiaries, implementing organizations, project funders, and outcome payers.

Life Cycle Costing

Life cycle costing (LCC) evaluates projects based on upfront costs, as well as costs associated with ongoing asset management and maintenance. LCCs are better calibrated for evaluating the nature-based solutions by considering the low, long-term maintenance costs of natural assets. A suggested discount rate of between 3-5% is suitable when using LCCs for natural asset accounting as it better reflects the anticipated increase in returns during the mid- to late-stages of the project life cycle.²¹

Project supporting tools

Project supporting tools support local data collection and monitor changes in ecosystems and ecosystem services resulting from different conservation and restoration actions. Project proponents should select tools based on the intended scale of application and how the tool measures long-term impacts.

Selecting the right tool is a key step for ensuring monitoring and evaluation of both economic and ecological project outcomes are calibrated to meet the needs of the selected conservation finance mechanisms, as well as meet the threshold for incentivizing the participation of different stakeholders. For example, changes in annual park revenues are one indicator of a

restoration project's performance. By also measuring changes in vegetation cover—e.g., using a vegetation index tool—a clearer connection can be made between ecological and economic outcomes.

Several existing tools are available to assess ecological and economic considerations for a conservation finance project, we highlight three below.

Municipal Natural Assets Initiative

The Municipal Natural Assets Initiative (MNAI) has developed a levels of service (LOS) [guidebook](#) to support local governments in assessing how different natural assets contribute to core municipal service delivery.²² The LOS guidebook follows a similar process that is used for analyzing engineered assets and applies this to natural asset management by examining three core components: the services they provide, and the associated costs and risks. The approaches outlined in the LOS guidebook provide local governments and communities with pathways for understanding the contributions and economic values provided by a range of ecosystem services, such as water retention and stormwater management, carbon sequestration, and other dimensions of climate resilience. The MNAI model uses three forms of LOS assessments—corporate, customer, and technical—to ensure the appropriate metrics reflect the objective of different local stakeholders and that the resulting assessment data outputs capture the social, environmental, and economic impact of decisions affected local natural assets.

Sustainable Asset Valuation

The Sustainable Asset Valuation (SAVi) instrument is an assessment methodology developed by the International Institute

for Sustainable Development (IISD) that provides policymakers with the appropriate steps to develop a comprehensive valuation of NBS projects that includes environmental, social and economic costs, as well as any associated governance risks.²³ Using a combination of system dynamics—tracking changes in complex systems over time—and project finance modeling, the SAVi instrument simulates changes in project costs based on perceived risks and externalities that may emerge over the project lifecycle, ultimately providing a dollar value based on the sustainability of the project being evaluated. SAVi uses an eight-step process to evaluate the potential benefits of nature-based projects and is supported by IISD's technical guidelines to select appropriate data sources to populate the tool.

Risk and Return on Investment Tool

The Risk and Return on Investment Tool (RROIT) is a [flood hazard identification tool](#) developed by CVC enables municipalities, property owners and conservation authorities to analyze risks and financial costs associated from flooding events and erosion exacerbated by climate change.²⁴ Requests for the tool are submitted through CVC and are adaptable to a variety of climate scenarios and is calibrated to distinguish between at-risk public and private property. The tool also provides decision-makers with the opportunity to explore the social dimension of vulnerabilities to the impacts of climate change, including impacts to health and well-being, and increased exposure risks in low-income neighborhoods. RROIT contains an integrated platform to compare the efficacy of different risk-reduction strategies, as well as the financial implications of these strategies over the long-term by comparing the life cycle costs and benefits of different project options.





2 ADVANCING CONSERVATION FINANCE IN THE GREENBELT

Ontario's Greenbelt covers nearly 850,000 ha of protected land and 21 urban river valleys in the most densely populated and industrialized area of Canada.²⁵ The Greenbelt provides substantial economic value for communities in Southern Ontario—the cumulative value of food and resource production, flood protection, water supply, clean air, and recreation and tourism opportunities is \$3.2 billion annually.^{26,27} These “ecosystem services” delivered by the Greenbelt also include climate benefits such as long-term carbon storage valued at \$11 billion, with about \$52 million in additional carbon sequestration value added every year.²⁸

Located on the periphery of Canada's fastest growing and most densely populated region, trends in land use and land use change are often a necessary balancing act between the need to conserve vital ecosystems and accommodate growing communities. Currently, 56% of the Greenbelt is designated as agricultural land, followed by forest cover (20%), wetlands (12%), and urban areas (8%) (**Figure 4**).²⁹ While the rate of urban expansion has slowed in recent years, it continues to place pressures on the region's natural systems. Under current trends, and without greater investments in conservation and restoration efforts, key ecosystems in the Greenbelt will continue to degrade under pressures from competing land uses and rising regional demand.³⁰

The **value** of ecosystem services in the Greenbelt is enhanced by their **proximity** to a majority of Ontario's population

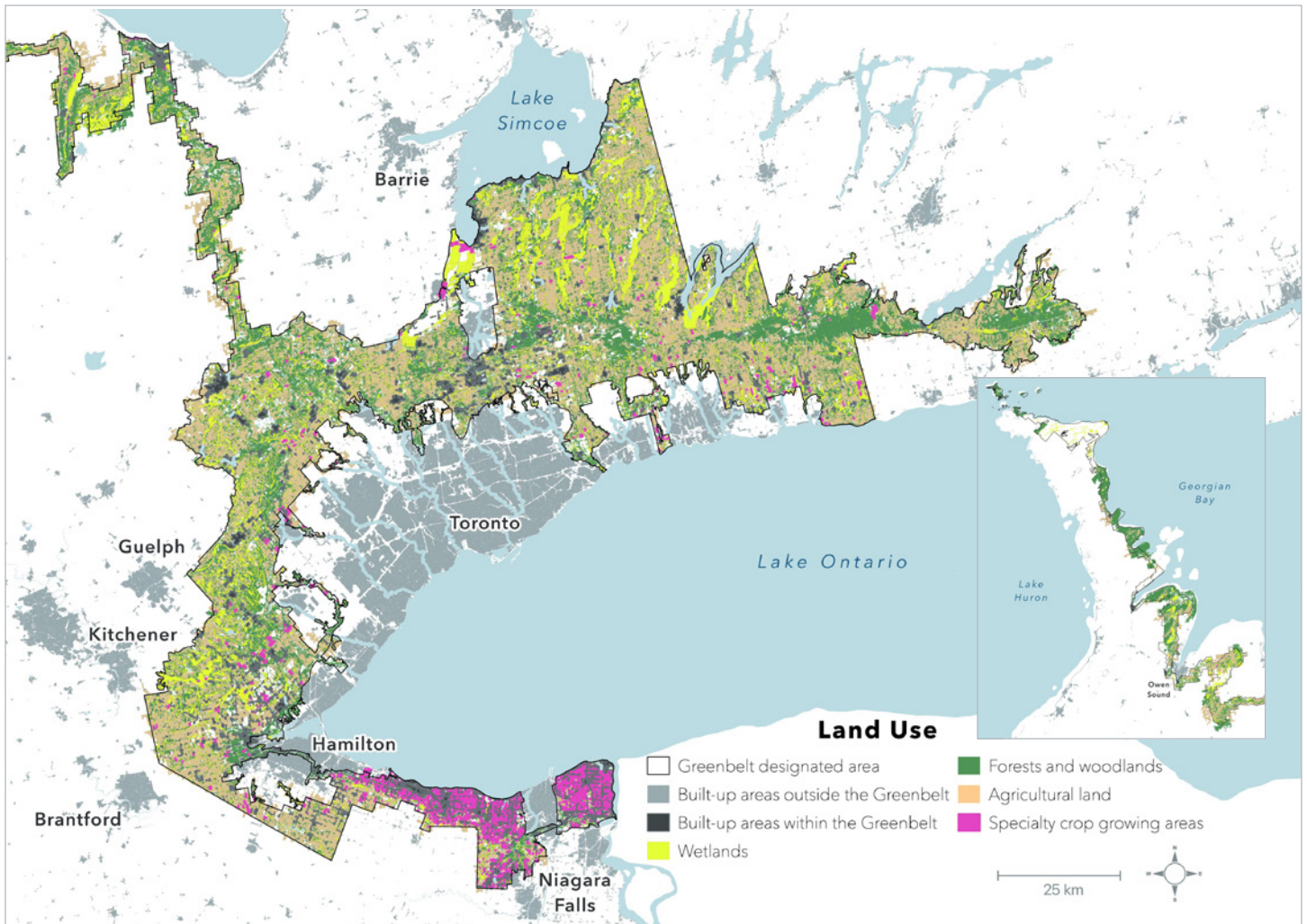


Figure 4. Current land use in Ontario's Greenbelt

This section highlights the ecological and economic value of ecosystems services in the Greenbelt and charts the path for making a business case to advance conservation finance projects by discussing practical considerations for connecting these values at the project level:

- 2.1 Economic value of ecosystem services in the Greenbelt
- 2.2 Regions with multiple high-value revenue streams
- 2.3 Environmental risks and the impacts of climate change
- 2.4 Key investment opportunities
- 2.4 Stakeholder engagement and strategic partnerships
- 2.5 Governance framework for Ontario's Greenbelt

2.1 Economic value of ecosystem services in the Greenbelt

The value of ecosystem services in the Greenbelt is enhanced by their proximity to a majority (62%) of Ontario's population—cleaner air and water, stormwater management, and climate risk reduction is both more costly to achieve and more highly valued when there are nearby people and communities at risk. Yet the way we measure the value of ecosystem services, and how we connect these values to potential investment opportunities, can be a challenge when seeking to advance conservation finance projects.

There is no "right" way to establish the value of ecosystems and the services they provide; but rather different approaches that can be effective depending on the type of project, how success will be measured and evaluated, and what combination of ecological and economic values are relevant for developing an investment project.

Two main approaches can be used in connecting ecological and economic value of ecosystems in the region to advance conservation finance projects:

Final ecosystem service approach—A 2016 study estimates the value of ecosystem services in the Greenbelt at \$15 billion—these estimates include benefits from **final ecosystem services** (\$3.2 billion), as well as a limited number of **intermediary services** such as carbon storage and sequestration (\$11.17 billion).³¹ Among the final ecosystem services that were evaluated, the highest value contributions were shown to be generated from outdoor recreation, followed by existence, bequest, aesthetics, extractive use, and protection of human property.³² Provincial parks, conservation areas, and other natural areas that permit recreation activities generate significant revenues from fees, levies, and permits for accessing recreation opportunities. Each of these revenue streams is an example of a fee-based service that depends on the ecological integrity of regional ecosystems, with value being derived directly from how and how often people pay to access and consume these services.

Intermediary ecosystem service approach—A 2008 study takes an alternative approach to establish the value of ecosystems in the Greenbelt.³³ Focusing on the distribution of land cover types and the value generated by their corresponding intermediary services (e.g., value of water filtration benefits), the 2008 study estimates the total value of intermediary services in the Greenbelt to be \$2.6 billion. These estimates identified wetlands and forest areas as providing the greatest economic value, followed by agricultural land. Appendix 3 provides an overview of estimated ecosystem service values in the Greenbelt using an intermediary services approach.

An intermediary approach offers an opportunity to value ecosystem services based on differences in land cover:

1. **Wetlands were valued at \$1.3 billion per year** primarily due to their regulating functions—i.e., water filtration, flood control, waste treatment, and wildlife habitats.
2. **Forests were valued at \$989 million per year** in regulating services—i.e., water filtration, carbon storage, and habitats for pollinators and other wildlife.³⁴

The 2008 study also explores a limited number of final ecosystem services based on land type—forests (\$61 million per year), wetlands (\$31 million per year), and grassland (\$1.4 million per year)—but with a limited number of recreation activities included in the analysis, these figures are more representative of a comparative importance of land use types of recreation activities in the region.³⁵

Table 2 outlines the total annual value broken down by ecosystem service type, illustrating several potential value streams for both intermediary and final service approaches. **It should be noted that, given the differences in the scope, scale and approaches used in each study, the findings are not directly comparable.** Both approaches have merit depending on the intended outcome of generating these values. Highlighting the two strategies also illustrates how ecosystem service values can change over time based on different methodological approaches, dataset availability, and the quality of available analysis tools.

The direct and indirect economic value of the Greenbelt has been evaluated in multiple assessments, so while there appears to be a clear business case to be made, having the numbers alone does not necessarily translate into greater investments.

The following sections examine key revenue streams in the Greenbelt that may support the development of conservation finance by connecting the value of ecosystem services to discrete economic opportunities to generate significant cost savings or increases in existing revenue streams.

Recreation and Tourism

The Greenbelt generates significant recreation and tourism revenues due to the region's rich natural heritage, but there are certain areas of concentrated high-value activities. Conservation Authorities across the region welcome more than 9 million visitors annually—TRCA and Halton Conservation each welcome more than 1 million visitors annually.^{36 37}

The Bruce Peninsula and Southern Georgian Bay area are also high-value recreation and tourism areas.³⁸ In 2019, Bruce County welcomed more than 2.5 million visitors generating \$326 million in revenues; Bruce Peninsula National Park welcomed 490,000 visitors. In Southern Georgian Bay, Fathom Five Marine Park welcomes 900,000 annually. Recreation activities in these two areas attract close to 1.4 million visitors and generate \$129 million in annual revenues.³⁹

Together, we estimate the value of tourism and recreation activities linked to natural heritage feature in the Greenbelt is capable of generating more than \$10 billion annually for the regional economy. The value of these activities is related to the quality of key regional ecosystems, yet funding and financing models that take advantage of these connections have been slow to develop. Given the existing high-value recreation and tourism opportunities in the Greenbelt, adopting innovating funding models using a conservation finance approach could help unlock the value of regional recreation services to incentivize greater public and private investments:

Outside of the Greenbelt, innovative finance models have been applied to support greater opportunities for outdoor recreation by using the increased revenues generated by these fee-based services to repay investors. A pay-for-performance model implemented by the US National Forest Service in Wayne National Forest, Ohio successfully leveraged \$3 million USD of public investment to raise an additional \$2.4 million USD in private investments to fund an 88-mile mountain biking trail. Repayment to private investors was contingent on the project's increasing number of trail users.⁴⁰ A blended finance approach was adopted with the understanding that more visitors to the region would in turn benefit local businesses and generate additional public and private revenues from annual tourism. The project generated an estimated \$53 million USD in economic, health, and environmental benefits for local communities.

Table 2. Estimated value of ecosystem services in the Greenbelt

2008 Study – Intermediary Ecosystem Services

Ecosystem Service Type	Ecosystem service	\$CAD ha ⁻¹	\$CAD (M)
Regulating Services	Air quality	91	69
	Climate regulation (carbon storage)	481	366
	Climate regulation (annual sequestration)	14	11
	Flood protection	500	380
	Water runoff control	366	278
	Water filtration	172	131
	Erosion control and sediment retention	1	1
	Pollination (agr.)	392	298
	Pollination (trees)	129	98
	Waste treatment	387	294
	Biological control	11	8
Provisioning Services	Soil formation	8	6
Supporting Services	Nutrient cycling	3	2
	Habitat/ Refugia	721	548
	Genetic resources	n/a	n/a
Cultural Services	Recreation	125	95
	Cultural/ Spiritual	87	66
Total		3,486	2,651

2016 Study – Final Ecosystem Services

Use Type	Ecosystem service	\$CAD (M)
Aquatic Use	Non-motorized water & beach	162
	Angling	179
	Waterfowl hunting	41
	Protection of human property	224
	Existence, bequest, aesthetics	124
	Crop irrigation	8
	Livestock	1
	Household water supply	359
Terrestrial Use	Hiking, climbing, equestrian	873
	Hunting & trapping	36
	Bird watching	236
	Cycling	205
	ATV & snowmobiling	47
	Cross-country skiing & snowshoeing	326
	Plant cultivation & pollination	48
	Existence, bequest, aesthetics	301
	Non-timber forest products	1
	Maple products	7
	Livestock grazing	1
Atmospheric Use	Clean air	18
Total		3,197

Health and well-being

Improved air quality is one of the most important ecosystem services provided by forests of the Greenbelt to local communities—trees remove air pollution, improving the health and quality of residents and visitors alike. **The annual health benefits associated with the clean air provided by the Greenbelt is valued at over \$18 million.**⁴¹ These health benefits are concentrated around the city of Hamilton, with high population density and tree cover.⁴² It is worth noting the importance of the location of tree cover, with dense forests in near-urban areas being of highest value. As the population in the Greater Toronto Hamilton Area (GTHA) continues to grow, the value of these health benefits will increase, as will the value of investments in additional tree cover.

Extreme heat is another by-product of climate change and has become a health concern in southern Ontario. Forested areas and tree canopies, such as those provided by the Greenbelt, can provide cooling effects to counteract some of the impacts of the urban heat island effect.⁴³ Studies undertaken by Ryerson University and the Greenbelt Foundation identified forests in the Greenbelt as having a significant impact in mitigating the effects of extreme heat. The study showed forest restoration in the Greenbelt having the potential to reduce ambient air temperatures by as much as 11° C during extreme heat events.⁴⁴

Ecosystems, like those in the Greenbelt, are also increasingly understood to support positive physical and mental health outcomes by providing greater opportunities for outdoor recreation in restorative and relaxing natural settings. Links exploring the potential to generate health cost savings by investing in Greenbelt ecosystems are underexplored. Similar studies in urban areas around the Greenbelt have shown access to healthy ecosystems as being able to reduce the risk of cardiovascular diseases and respiratory illnesses and reduce the incidence of stress and anxiety. In 2020, [a project](#) investigating the **conservation and restoration of the urban tree canopy in a Brampton, Ontario neighbourhood was estimated to generate up to \$3.2 million in annual health cost savings.**

Further investigation is needed to establish similar links between ecosystems and potential health cost savings in Ontario's Greenbelt. Existing outdoor recreation revenues would suggest a considerable opportunity to build a business case to advance conservation finance projects using health-based value streams.

For further information on establishing a health-based value stream to advance a conservation finance project, see SPI's report [The Nature of Health](#).

Flood protection and enhanced stormwater management

Regional stormwater and flood protection infrastructure is aging and under pressure from increased development and climate change. As minor drainage systems become overwhelmed more often, remediation costs to address water pollution, more

frequent flooding, and damage from erosion have steadily increased, with municipalities bearing most of the financial burden. For example, since 2005, flooding in the City of Toronto has caused \$2.5 billion in insured damages to public and private property—the city has committed to spending a further \$4.1 billion between 2022 and 2031 to improve flood mitigation and upgrade stormwater management infrastructure.^{45,46}

Nevertheless, the continued development in upstream ecosystems increases the volume and velocity of stormwater runoff, leading to more erosion and flood risk.⁴⁷ Investing in the conservation and restoration of upstream natural lands and watercourses within the Greenbelt is needed to reduce the need for costly downstream “grey” infrastructure upgrades.

Specifically, the restoration and conservation of wetlands in the Greenbelt can play an additional key role in regulating flooding and reducing the risk of damage to property for local municipalities. **Every year, wetlands in the Greenbelt provide an estimated \$224 million in flood regulation services** yet remain under threat from development.⁴⁸ Investments in regional wetlands should be considered a key component of any regional flood resilience plan able to generate considerable cost savings. On average, each wetland in the Greenbelt provides \$1 million of annual flood protection for regional infrastructure.⁴⁹

A report by Ontario Nature (2017) addressed the protection and conservation of wetlands in the Greenbelt under provincial land use policies. It points to current funding structures and competing land use regulations as a challenge for supporting greater conservation and restoration of wetland ecosystems.⁵⁰ See **Section 2.6** for more details.

Across the Greenbelt, many examples of local communities investing in natural assets to improve flood protection and enhance stormwater management have a clear business case. Yet most of these efforts continue to struggle to attract sustained investments despite their clear economic benefits:

1. **Saltfleet Conservation Area** implemented by the Hamilton Conservation Authority secured \$15.3 million in funding, while delivering flood mitigation, recreation, biodiversity, carbon sequestration, and water quality **benefits estimated \$24–44 million at a 50-year net present value.**⁵¹
2. **Brock Lands Restoration Project** undertaken by TRCA in 2011 at a cost of \$8 million yielded ecosystem services with a combined value of \$60-92 million.⁵² Taking into consideration the initial capital costs and ongoing operating and maintenance costs of the project, the net value of recreational benefits alone was valued at \$18–28 million—**a return of 3.6 to 4.5 times the initial investment.**

Outside the Greenbelt, Quantified Ventures in Louisiana has developed an environmental impact bond for wetland restoration over 835 acres. Generating approximately \$15-58 billion worth of ecosystem services from the wetlands per year, every dollar invested in the project was estimated to generate \$17 in returns that could be used to pay back investors.⁵³ Given the

high value of wetlands and other natural flood mitigation infrastructure in the Greenbelt, a similar pay-for-performance model could represent an opportunity to leverage private investments to improve the flood mitigation of regional natural infrastructure.

Source water protection

Ecosystems in the Greenbelt act as a regional water filtration system. Regional watersheds provide clean drinking water, feed irrigation systems, and support industrial processes, and are also appreciated for recreation and aesthetics. Oak Ridges Moraine is a dividing point between regional watersheds that drain south towards Lake Ontario and those that drain north into Lake Simcoe, Scugog, and Huron (Figure 5).⁵⁴ **The annual value of the water resources in the Greenbelt is estimated at over \$1 billion per year**, which is dependent on continued water quality and availability across the region.⁵⁵ Investments in natural water processes have the potential to improve the quality of the Greenbelt’s water, further increasing the value of regional water resources while also reducing costs to maintain freshwater ecosystems.

Municipalities and private businesses in the Greenbelt rely on both surface water and groundwater sources for drinking water, irrigation, and other industrial uses. The cost of drinking water treatment is directly related to the quality and availability of water. Watersheds in the Greenbelt hold abundant freshwater resources, but degraded water is more costly to treat up to drinking water standards with most of this burden being shouldered by local municipalities. Toronto Water, for example, sources water from Lake Ontario and plans to spend \$4.4 billion over the next 10 years on water treatment and supply infrastructure.⁵⁶

Surface water and groundwater aquifers are also susceptible to pollution from human land uses. The rainfall and snowmelt which recharge these water sources often encounter surface pollutants from agricultural and urban lands, including construction sites and highways. Common water contaminants include metals, organic matter, oils, pesticides, pathogenic organisms, road salt, and fine solids which cause increased turbidity.⁵⁷ Wastewater effluent is also a major source of surface water contamination, which can be exacerbated by lower levels of natural land cover.

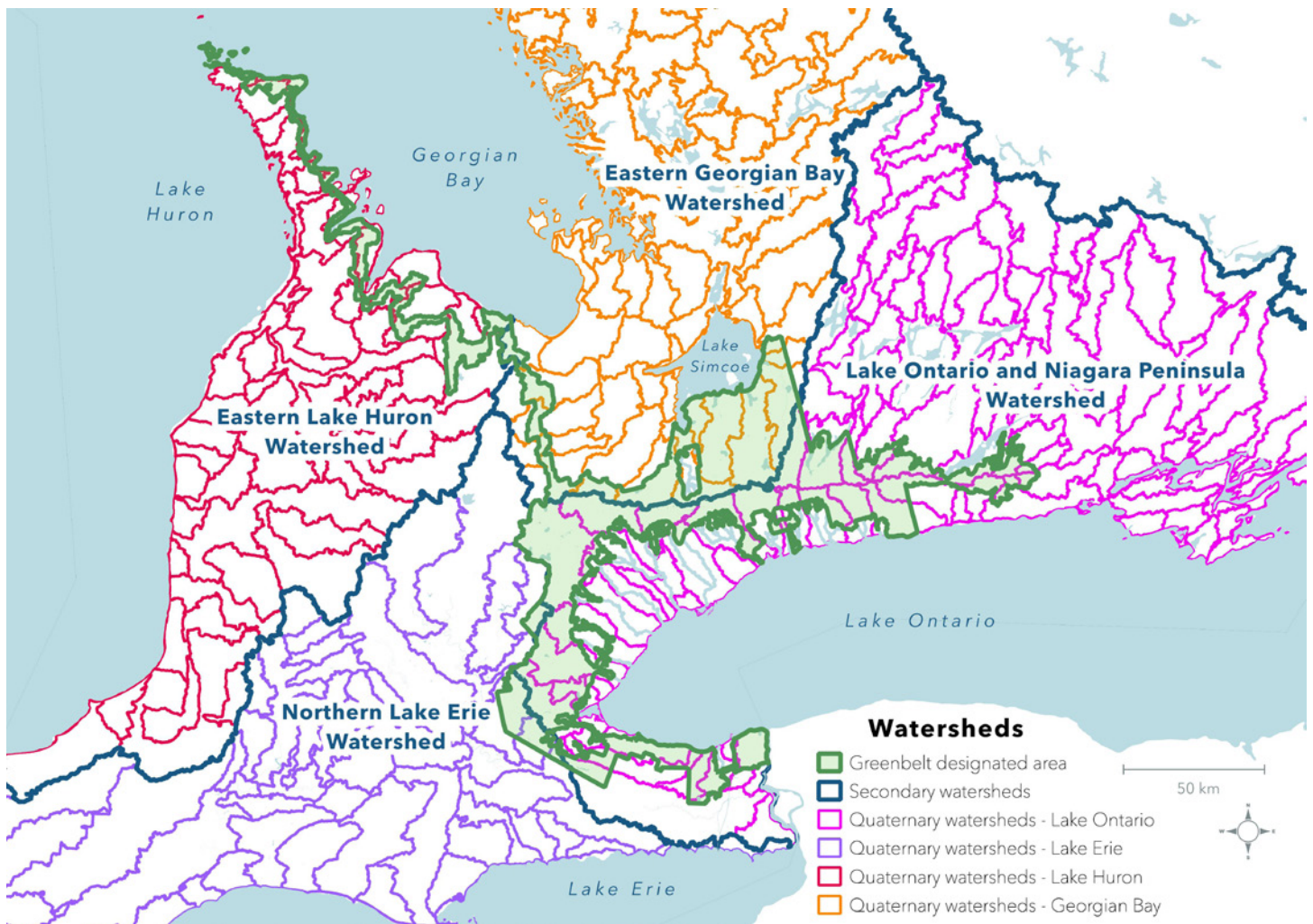


Figure 5. Secondary and quaternary watersheds in around Ontario’s Greenbelt

(Source: Ontario Ministry of Natural Resources)

Conservation investments in the Greenbelt could be a valuable method of source water protection for municipalities to ensure continued access to high quality drinking water, reducing the cost of future infrastructure upgrades. This could also increase water quality for recreation and aesthetics within the Greenbelt—building further resilience in the \$500 million per year generated from water-based outdoor recreation activities (as identified in **Table 2**). There are many types of restoration and conservation projects within the Greenbelt that could have a direct benefit for source water. Such projects include protecting key hydraulic areas, conservation of natural landscapes, wetland restoration, increasing tree canopy, channel naturalization, agricultural BMPs, buffer strips near highways, and other green infrastructure projects.

Agricultural production

Southern Ontario contains 50% of Canada's Class 1 agricultural land—meaning regional soils are well adapted to various agricultural uses with few limitations. The Greenbelt's agricultural lands—37% of the total area—influence hydrological flows, regional biodiversity, and soil-based ecosystems.⁵⁸ Farm ecosystems in the Greenbelt are highly productive, contributing more than 50% of fruit and 10% of vegetable production province wide and includes high-value speciality crop growing areas such as [Holland's Marsh](#) (\$1 billion) and areas of the [Niagara region](#) (\$838 million).

There are more than 4,700 farms in the Greenbelt that can have a positive impact on local biodiversity and reinforce pro-environmental behaviours by better connecting people to the local produce. These farms produce on average 70% more annual revenue per acre than farms outside and adjacent to the Greenbelt's protected countryside.⁵⁹ In 2020, [primary agriculture in the Greenbelt](#) generated more than \$727 million—the total value of the agricultural sector activity was \$4.1 billion.

Although farmers and farmland in the region continue to disappear due to pressures of urban expansion and population growth—700,000 ha of farmland has been lost across Southern Ontario since 2001⁶⁰—these pressures have also catalyzed cross-sector working groups that encourage the adoption of sustainable land management practices. Efforts to curb the negative environmental impact of agricultural land use in the Greenbelt have been relatively more successful when compared to other regions of Southern Ontario. Since 2001, these efforts have led to⁶¹:

- Herbicide use has decreased by 25%,
- Commercial fertilizer use has decreased by 33%,
- Insecticide use has decreased by 22%,
- No-to-low till has increased by 25% and winter cover crops have increased by 50%,
- Windbreaks and incorporation of crop residues have increased, reducing the risk of soil erosion, and promoting greater soil nutrients and carbon sequestration capacity.

The result of these changes has been an improvement in the quality of regional water resources, a reduction in the damage to pollinators and soil microbiota, reduced erosion and enhanced carbon storage in agricultural soils. To accelerate the adoption of similar practices, conservation finance models represent an opportunity to connect resilience building activities with downstream beneficiaries able to provide further investments to scale these types of initiatives.

Between 2015-2017, grants to expand agricultural production in key areas of the Greenbelt—i.e., tender fruit-growing areas of the Niagara region—increased productivity by 15%, adding \$23 million in annual revenues. Subsequent grants in 2021 are anticipated to have a similar impact—adding \$10 million in annual revenues and growing sector capacity by 7%.⁶²

Expanding the scope of these projects to include public and private investments may represent an opportunity to leverage an existing \$4.1 billion industry and further de-risk a regional shift toward the adoption of on-farm regenerative agricultural practices. These practices have a proven track record of strong buy-in from local producers and ability to increase revenues while building ecological resilience. **Using a conservation finance approach to finance on-farm activities that enhance high-revenue activities (i.e., tender fruit production) while conserving high-value ecosystems (biodiversity conservation), represents a significant and immediate opportunity to invest in the growth and resilience of agricultural ecosystems in the Greenbelt.**

Carbon sequestration and climate regulation

Ontario's Greenbelt is a carbon rich landscape—wetlands, forests, and agricultural lands sequester and store a significant amount of carbon every year. The value of carbon storage for Greenbelt ecosystems was estimated over \$11 billion in 2016, with annual sequestration valued at about \$52 million.⁶³ **This value would increase with a higher social cost of carbon.** Many investments can be made to maintain and increase the carbon stored in the Greenbelt. Initiatives to do this include protecting and restoring forests and wetlands, as well as promoting agricultural practices for improved carbon sequestration in soils.

Given the absence of a provincial protocol establishing a regulatory compliance framework for carbon offsets, and with the federal protocols currently under development, offset projects in the Greenbelt would need to adopt a voluntary approach. Voluntary approaches tend to use different methods and accounting frameworks, which can make scaling these types of projects a challenge, as well as limit opportunities for buyers and sellers to exchange credits between different types of voluntary systems.

Nevertheless, carbon offset projects in Canada using the Verra voluntary protocol—Darkwoods Forest Conservation in British Columbia and the Boreal Wildlands Carbon Project in Northern Ontario—have been implemented to conserve more than 400,000 ha of forests. In the case of the Darkwoods project,

the value of protecting 54,000 ha is estimated to be generating \$7.8 million per year in benefits.⁶⁴ The Boreal Wildlands Carbon Project recently launched and received a \$10 million initial investment from TD securities. Assuming a similar rate of return of around \$144 per ha, the Ontario project may be able to generate more than \$50 million per year in offset revenues.⁶⁵

With 120,000 hectares of forest cover in the Greenbelt, **using a voluntary offset protocol, revenues from a carbon offset project could amount to an additional \$17 million in annual revenues.** The implementation of federal offset protocols for forest and soil carbon will only serve to increase the confidence of potential investors and expand the potential markets for developing these types of conservation finance projects.

2.2 Regions with multiple high-value streams

Notable ecological features and land use patterns in certain key ecosystems across the Greenbelt represent unique high-value opportunities to advance specific types of conservation finance projects. From a legislative perspective, these areas have been broadly identified as *ecologically significant administrative regions* within the Greenbelt that—due to differences in geography and their relevance for local communities—generate a diversity of valuable ecosystem services that can help frame the viability of certain conservation finance projects.

Niagara Escarpment

Stretching more than 725 km from the Niagara River to Tobermory at the end of the Bruce Peninsula, the area was first designated as a World Biosphere Reserve by UNESCO in 1990—the same year that the Niagara Escarpment Planning and Development Act (NEDPA) was passed by the Ontario legislature (See **Section 2.5.1** for more information about the NEDPA). The Niagara Escarpment sustains a wide diversity of plant and animal life—including 300 bird species, 55 mammals, 36 reptiles and amphibians, 90 fish, and 100 varieties of special interest flora.⁶⁶ The Escarpment also supports fertile farmland across its length, high value-added agricultural operations, and attracts millions of tourists annually to internationally recognized natural landmarks. The following are highlights of ecosystem service values generated by the eco-geological features of the Niagara escarpment:

- Niagara Peninsula has 87,000 hectares of farmland—average regional farm revenues have increased by 47% between 2011 and 2016,⁶⁷
- Tender fruit growing areas generated \$120 million in 2020 from a combination of farming and agri-food processing,⁶⁸
- High value-added wine producing region in the Niagara region generated \$4.4 billion in economic benefits in 2015,⁶⁹

- Niagara Peninsula attracted 13 million visitors in 2017,⁷⁰
- Bruce County (including the Bruce Trail and Fathom Five marine protected area) attracted 2.5 million visitors in 2019.⁷¹

Oak Ridges Moraine

The Oak Ridges Moraine is another area of ecological importance in the Greenbelt due to its hydrological significance that consists of vital wetlands, aquifers, groundwater recharge zone, and watershed footprint. Stretching 160km from the edge of the Niagara Escarpment to the east shore of Rice Lake near Peterborough, the Oak Ridges Moraine contains a series of ecologically significant features that support regional hydrological functions, natural habitats, and climate resilience. The Moraine also serves as a physical demarcation between the flows of key watersheds in Southern Ontario that flow either south into Lake Ontario, or north into Georgian Bay. The following are highlights of ecosystem service values generated by the geophysical characteristics of the Oak Ridges Moraine:

- Provides habitats for several species-at-risk, including the endangered Butternut, the threatened Meadowlark, and the species of special concern Monarch Butterfly,
- 466 of the species that live in the Moraine are endemic, and 88 are at risk of extinction,
- Forms the most continuous region of forest cover surrounding the GTA,⁷²
- Has 64 rivers or streams that begin on the Moraine and run either south directly into Lake Ontario, or north to Lakes Scugog, Simcoe or Georgian Bay (Lake Huron),
- Has 32% of its area covered in upland forests and is one of the six recognized areas for forest bird diversity in southern Ontario,
- Carbon stored in the Moraine is estimated at \$7.1 million per year due to its mitigating effects on climate change.⁷³

Lake Simcoe Watershed

Lake Simcoe watershed—spanning over 3,400 sq km—is home to 75 species of fish in the watershed with over 50 different species found in the lake.⁷⁴ Over 32 are species at risk due to habitat pressures. Examples of these species are the Red shouldered hawk, Eastern hog-nosed snake, Jefferson salamander, and Southern flying squirrel. More than 450,000 people live in the watershed and recreation opportunities from the lake generate over \$200 million per year for the local economy, 80% of which is connected to ice fishing. The Watershed also includes the Holland Marsh Specialty Crop Growing Area, which is estimated to generate \$1 billion in annual revenues from agricultural production.⁷⁵

2.3 Environmental risks and the impacts of climate change

Despite the considerable ecological and economic value of the Greenbelt, ecosystems in the region continue to face pressures of urbanization, which are increasingly being exacerbated by the impacts of climate change. Even in areas not facing the strongest and most direct pressures of urbanization and overuse, natural systems are becoming more fragmented and vulnerable to these impacts. Habitat loss and fragmentation, pollution levels (air and water), freshwater eutrophication, biodiversity loss, and a lower proportion of natural landscapes are placing the resilience of regional ecosystems at a greater risk of being unable to accommodate regional growth patterns. During the COVID-19 pandemic a (re)discovery of outdoor recreation opportunities in the Greenbelt created additional pressures of habitat degradation due to unsustainable user demand. As the regional population continues to grow, these trends risk becoming entrenched under existing land-use plans.

A recent report identified habitat fragmentation as having a disproportionate impact on prime agricultural land and natural areas in the Greenbelt due to dual pressures of recreational overuse and lenient land use policies—e.g., allowing aggregate extraction and roadway construction.⁷⁶ The increasing vulnerability of several core natural habitats to the encroachment of human activities are decreasing the ability of these ecosystems to maintain and deliver key ecosystem services that are responsible for the continued ecological and economic prosperity of the Greenbelt region. **Figure 6** illustrates the importance of the Greenbelt as an ecological connector between key regional ecosystems.

Population pressures and urban sprawl

Ontario's population continues to increase beyond the national average of 1% annual growth.^{77,78} In the area surrounding the Greenbelt, urban centers are growing at an even faster pace. Between 1996 and 2021, population in the Greater Golden Horseshoe (GGH) grew at an annual rate of 4%, welcoming 6.5 million new residents.⁷⁹

Simultaneous increases in housing prices in major urban centers on the edges of the Greenbelt and COVID-19 have caused migration to smaller Southern Ontario cities and towns.⁸⁰ Urban to suburban-rural demographic shifts have created a spillover of property price hikes in smaller communities, displacing first-time homeowners.⁸¹ This is a recipe for low-density urban development, or “urban sprawl,” which tends to accelerate the loss of key ecosystems and the vital services that they provide.⁸² Urban sprawl, in turn, is linked to human health issues,⁸³ higher municipal service costs,⁸⁴ increased needs for transportation connections,⁸⁵ negative impacts on habitats and biodiversity,⁸⁶ loss of local farmland,⁸⁷ and increased pressures on flood and stormwater infrastructure.⁸⁸

With population growth and regional economic development driving demand for new housing on the edges of Ontario's

Greenbelt—580,000 new homes by 2031—and with 73% of this projected demand to consist of low and medium rise apartments (i.e., less than five storeys), options to meet these demands through infill are limited.⁸⁹ These trends will continue to place pressures on local ecosystems as a growing amount of land is facing the pressure of rapid urban development. The result will be the creation of more suburbs and highway connections,⁹⁰ accelerating the conversion of agricultural land on the edges of the Greenbelt, and where permissible within the protected area, to meet the needs of housing and transportation infrastructure.

Climate risks for future growth in the Greenbelt

Climate change also presents an existential threat to ecosystems in Ontario's Greenbelt. In this case, habitat loss and fragmentation, pollution levels (air and water), freshwater eutrophication, biodiversity loss, and the degradation of natural landscapes are increasing vulnerability of the region to extreme heat, flooding, and extreme weather events.⁹¹ Flooding in the City of Toronto alone has caused more than \$1.5 billion in insured damages over the last 10 years—a figure that is likely much higher when considering the damage to uninsured natural assets and grey infrastructure.⁹² By 2050, annual precipitation in the GGH is projected to increase by 5%, with temperatures similarly increasing by 2.7C above 1961-90 levels and the number of heatwaves doubling across the region.^{93,94} A growing number of climate models illustrate that the role of natural infrastructure in the region will be crucial for building resilience against climate change. A recent report estimates the costs of maintaining public infrastructure in the province to increase by \$6 billion per year through 2030.⁹⁵

Most of the risk associated with these challenges is easily mitigated by improving the integration of natural asset accounting during the project planning and design phases.

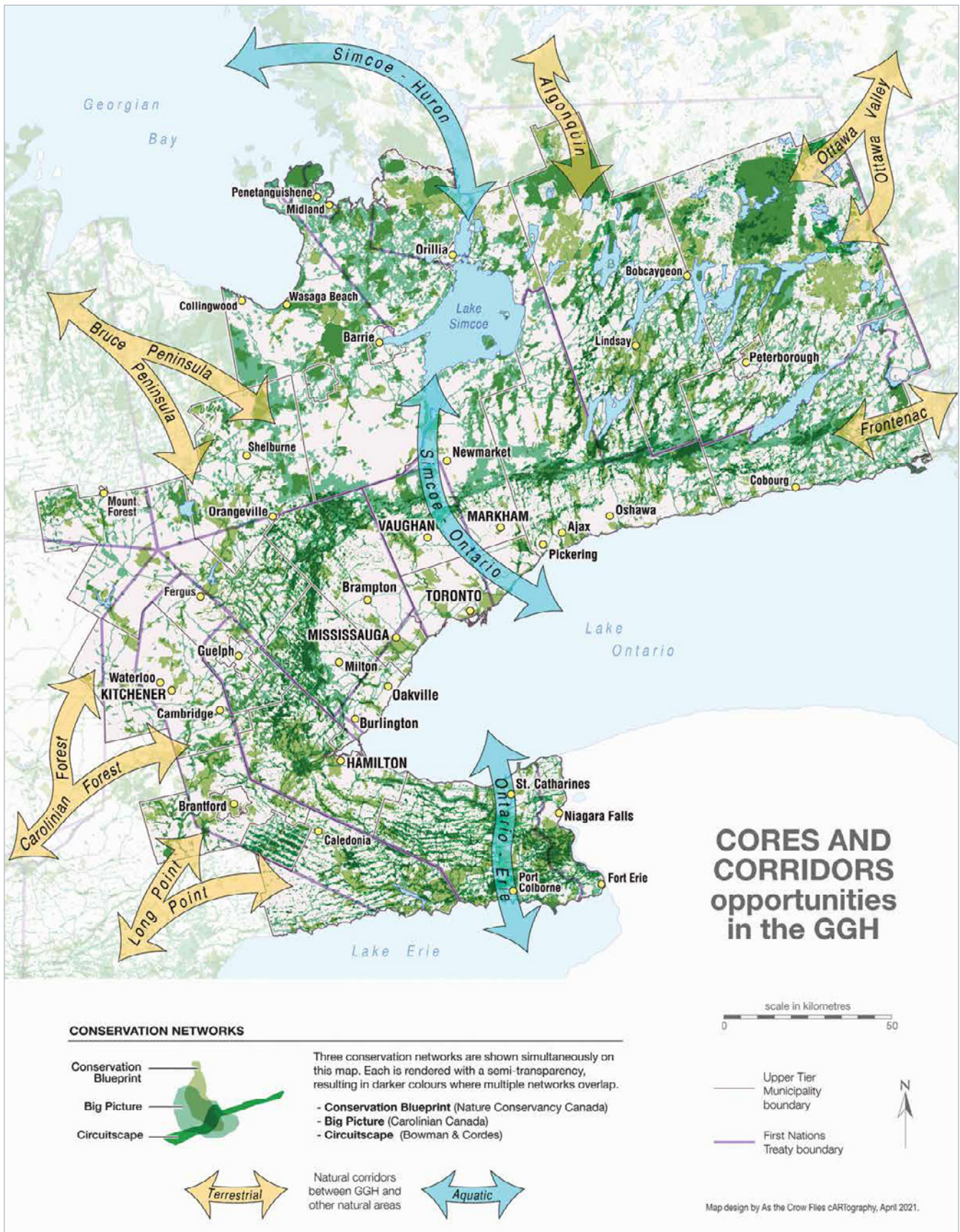


Figure 6. The ecological connection potential of Ontario’s Greenbelt within other ecosystems across Southern Ontario.

Map reproduced from: Southern Ontario Nature Coalition. (2021). *Near Urban Nature Network: A Solution to Climate Change and Biodiversity Loss*. p. 47. Map design by As The Crow Flies cARTography.

Conversion of agricultural land

Agricultural lands are specifically protected in the Greenbelt and the continued conversion of these ecosystems across the GGH represents a particular challenge for balancing regional development and ecological integrity. Between 2000 and 2017 a total of 24,404 ha of agricultural land was lost in the GGH with 76% redesignated for development. This compares to 2,687 ha lost in Western Ontario and 1,213 ha lost in Eastern Ontario (Figure 7).⁹⁶ The greatest loss of primary agricultural land occurred around urban settlements on the edges of the Greenbelt (i.e., York 7,989 ha, Peel 3,442 ha, Halton 2,938 ha and Simcoe 2,426 ha).

In the Greenbelt, total farm land was observed to decline by 13% between 2011-2016, indicating similar trends of declining farm land compared to areas outside of the protected area.⁹⁷ A similar analysis of land use data from 1993 to 2007 shows that 51% of new urban developments in the Greenbelt were located on high-value agricultural lands—with most of this development taking place in the ecologically crucial, and nominally protected, Oak Ridges Moraine.⁹⁸ Even though the observed changes in both cases likely consist primarily of land already designated for development, drivers of land use change in the Greenbelt are diverse and complex. A recent report shows that farm land loss and population growth are correlated in York, Peel, and Halton, but that loss in the Greenbelt is slower than the surrounding areas and caused by a diversity of drivers – e.g., – redesignation for development and rural lands, as well as intensification and changes in production patterns. More data are required to understand the relationship between regional development and farmland loss in the Greenbelt, but these figures

serve to emphasize the historical and continued pressures of urban growth patterns on high value agricultural ecosystems, including⁹⁹:

- Conversion of agricultural lands (re)designated for urban expansion under provincial and municipal growth plans—e.g., the ‘Whitebelt,’
- Intensification of existing agricultural lands and changes in farming practices,
- Land use change as permitted under the *Aggregate Resources Act*,
- Encroachment of transportation infrastructure into agricultural lands.

The intersection of agricultural lands with the integrity of regional ecosystems and patterns of growth in the Greenbelt is complex and multifaceted. When evaluating risks to agricultural lands in Ontario’s Greenbelt and what this means for the integrity of integrated working ecosystems, the following are key considerations:

The creation of the Greenbelt in 2005 has slowed the rate of urban expansion into agricultural lands, but regional development trends—more need for housing and transportation infrastructure—continue to place pressure on regional ecosystems, often using an economic imperative as justification. These arguments often miss, or severely discount, the future costs associated with land use change and ecosystem degradation, externalizing the financial risks from the assumed benefits of prioritizing development.

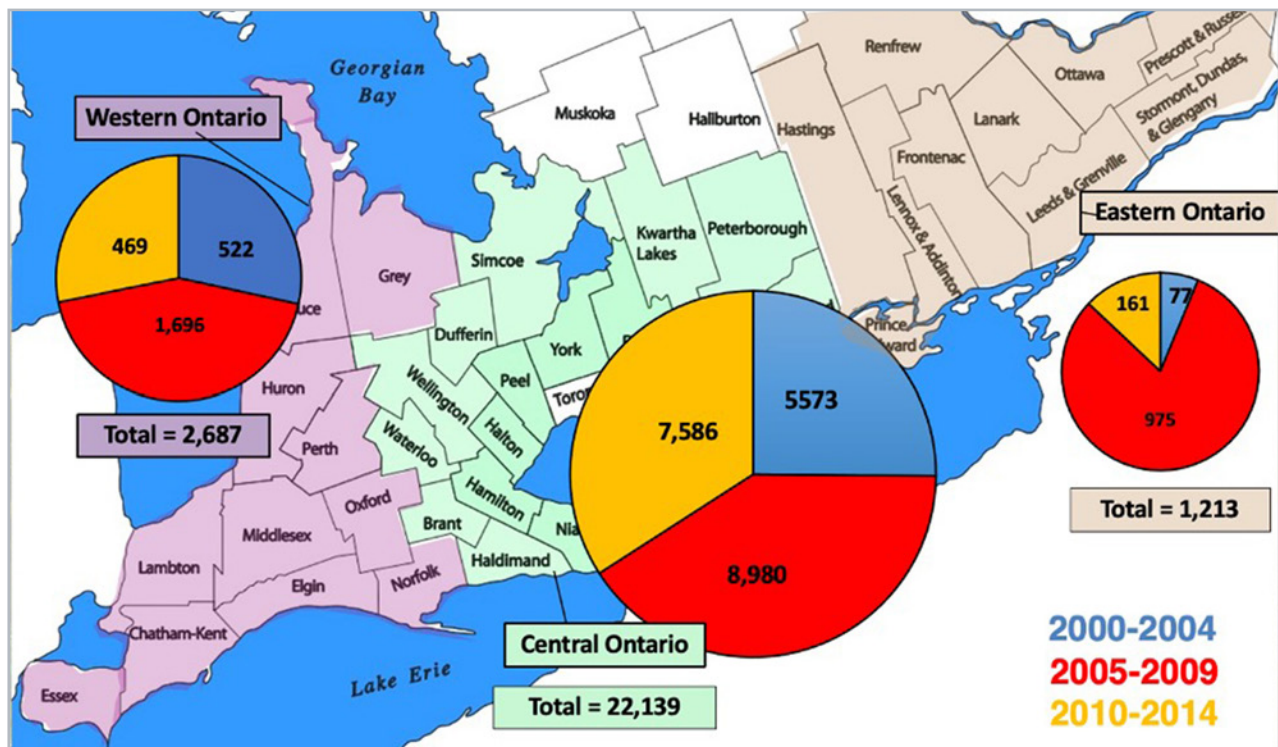


Figure 7. Loss of prime agricultural land in Southern Ontario by region, 2000-2014

Map reproduced from Caldwell et al. (2022). *Farmland Preservation and Urban Expansion: Case Study of Southern Ontario, Canada*. *Frontiers in Sustainable Food Systems*. Vol 6.

Continued loss of agricultural lands represents a significant challenge for farm ecosystems to continue supporting regional growth and prosperity. Sectors that are directly linked to the integrity of these ecosystems, such as agriculture, agri-food, tourism, and outdoor recreation, will suffer the greatest economic impact from continued environmental degradation. Together, these industries contribute more than \$2.9 billion in annual revenues.

Conversion of agricultural lands for housing development increases GHG emissions and exacerbates the impacts of climate change. Agricultural lands are becoming increasingly crucial for sustaining regional growth, food security, and building resilience against the impacts of climate change. In agricultural lands slated for future development—such as the 45,000 ha in the ‘Whitebelt’ on the inner edge of the Greenbelt—the value of this land is discounted from an ecosystem health and agricultural utility standpoint due to inequitable competition for farming and non-farming land use.¹⁰⁰ Insecure land tenure and time-bound revenue streams can result in greater rates of land use change, exacerbate soil erosion and, by consequence, increase GHG emissions when compared to the regional average.^{101,102}

2.4 Key investment opportunities

Despite these challenges, the ecological characteristics of the Greenbelt provide ample opportunity to leverage the wealth of existing natural assets to reinforce the resilience of communities across the region. Addressing the dual impact of rapid urbanization and climate change on the value of ecosystem services generated by the Greenbelt poses a significant challenge for developing successful conservation finance projects, however, **most of the risk associated with these challenges is easily mitigated by improving the integration of natural asset accounting during the project planning and design phases.**

Based on the ecological significance, diversity of ecosystem service values, and the risks associated with not investing in Ontario’s Greenbelt, the following represents areas of significant opportunity to implement conservation finance projects that are able to build ecological and economic resilience in communities across the region:

1. **Mitigate habitat loss and biodiversity.** The risk of habitat loss, habitat fragmentation, and invasive species has increased due to growing pressures on public lands to continue sustaining regional growth. Overall, this affects the ecological function and productivity of the region. This in turn increases the vulnerability of flora and fauna to climate change, extinction of species, and natural disasters.

Conservation finance mechanisms to reduce wildlife habitat loss, conserve biodiversity, and mitigate the impact of invasive species could have multiple benefits—both ecological and economic.

2. **Reduce the risk of forest fires, droughts, tornadoes.** Climate change is increasing the frequency of natural disasters. This makes the public utilities, private property owners, businesses, farms, parklands, and municipalities vulnerable to economic losses and liabilities. Insurance products such as parametric insurance could ensure critical natural assets are rehabilitated in the event of extreme events. This could be particularly beneficial for Conservation Authorities, municipalities, or any other organization that is liable for mitigating any natural hazards caused by these events. Additional investments in climate resilient infrastructure, water source protection, and disaster mitigation present a clear opportunity to minimize the impacts and liability risk of future natural disasters.
3. **Reduce risk of flooding and erosion.** Flooding is a serious risk in the Greenbelt. Municipal stormwater systems are under increasing pressure due to urbanization and more frequent extreme rainfall events due to climate change. Extreme events can also cause sudden erosion damage to private and public property. Wetland restoration projects within the Greenbelt could help protect urban centers from flood damage. Insurance products or bonds specific to flood mitigation could be used to incentivize investments to restoration and conserve climate resilient green infrastructure.
4. **Improve source water protection.** Maintaining and enhancing the natural water processes within the Greenbelt helps protect crucial regional water resources. Improved water quality and availability also supports local agriculture and recreation activities. Projects that help protect and improve regional water could boost the value of these sectors and help municipalities avoid costly infrastructure upgrades.
5. **Improve the health and well-being of local communities.** The ability of ecosystems in the Greenbelt to continue supporting regional prosperity will depend on whether investments are made to support the delivery of key ecosystem services for a growing population. With many ecosystems in the Greenbelt already considered to be vulnerable to pressures of overuse and increasing habitat fragmentation, the impact of these pressures on local communities places the health and well-being of residents directly at risk. More work is needed to connect conservation and restoration to specific health outcomes in the Greenbelt, but there is significant potential to design conservation finance projects using health-based value streams.

2.5 Stakeholder engagement and strategic partnerships

Engaging the right stakeholders remains a key challenge for advancing conservation finance projects in the Greenbelt, especially when seeking to advance projects using complex blended finance mechanisms (i.e., public and private). Roles and responsibilities can vary depending on the type of conservation finance mechanism, the transaction model, and the desired ecological outcome.

Focusing on the capacity of various municipal, provincial, and federal actors, as well as Ontario's network of Conservation Authorities, private landowners, Indigenous communities, and key financial institutions and insurance organizations, we aim to highlight where there is potential to leverage existing partnerships and develop new partnerships that are necessary to advance projects on the ground.

National and provincial governments

National and provincial government departments can be key stakeholders for conservation finance in the Greenbelt, as funders and as regulatory bodies (through policy or regulations that prevent certain activities). Public funds can be helpful to leverage private dollars and advance a variety of conservation finance projects using a blended finance model.

The following identifies federal and provincial programs able to co-funding for conservation finance projects in the Greenbelt:

Natural Resources Canada

The 2 Billion Trees (2BT) program (formerly Growing Canada's Forests) has allocated \$3.2 billion to plant 2 billion trees by 2030.¹⁰³ Tree planting is an effective and relatively low-cost solution to enhance conservation and restoration efforts—the 2BT program could be used as a funding opportunity to target the restoration of Canada's most heavily degraded forest ecosystems in Southern Ontario. Coupling the availability of this funding stream with private investment fulfilling the role of necessary matching funds could augment any existing conservation finance initiative creating greater confidence among project stakeholders through the diversification of available project funding sources.

Agriculture and Agri-Food Canada

The [On-Farm Climate Action Fund](#) is part of the [Agriculture Climate Solutions Initiative](#) that is funded under Canada's \$4 billion [Natural Climate Solutions Fund](#). In 2022, the Ontario Soil and Crop Improvement Association secured \$25 million in funding to on-farm support conservation programs.¹⁰⁴ These programs include the Species at Risk Farm Incentive Program (SARFIP), Species at Risk Partnerships on Agricultural Lands (SARPAL) and providing support to farmers in adopting beneficial management practices (BMPs) that store carbon and reduce GHGs (e.g., nitrogen management, cover cropping,

and rotational grazing practices). Supported activities include specific species at risk needs, such as implementing corridors connecting habitat and biodiversity enhancement plans, native tree, shrub, and grassland planting, wetland restoration, and implementing erosion control structures.

Environment and Climate Change Canada

The [Nature Smart Climate Solutions Fund](#) (2021-2031) has allocated \$9 million to Conservation Ontario over three years (2021-2024) to reduce Canada's net GHG emissions using natural climate solutions, while providing benefits for biodiversity and human well-being.¹⁰⁵ The funds will support over 50 projects across 17 watersheds in Ontario to conserve, restore, and enhance management of wetlands, peatlands, grasslands, riparian areas, and enhanced land management (e.g., cover crops) to store and capture carbon. The funding will also support support flood and erosion risk reduction, enhance water quality, conservation, restoration, and enhancement of habitats for migratory birds, species at risk, and other species of cultural and socio-economic importance.

Ministry of the Environment Conservation and Parks

Provincial funding to the Greenbelt Foundation has been renewed in the form of \$12 million over three years (2021-2023) to continue work on promoting natural solutions to climate change, strengthening the local food and agriculture sectors, and supporting rural economies in recovering from the COVID-19 pandemic.¹⁰⁶ The funding will support a) conservation and restoration projects (i.e., native vegetation plantings to increase natural cover and protection of watersheds) while enhancing recreational opportunities for people to experience nature, b) improved knowledge and understanding of the Greenbelt and its benefits, c) partnership development, and d) public outreach efforts to increase knowledge, awareness, and understanding of the Greenbelt's benefits.

Conservation Authorities

There are 14 Conservation Authorities (CA) that are responsible for managing the watersheds in Ontario's Greenbelt and ensure access to clean drinking water for the region's 10 million residents. **Appendix 4** provides an overview of the connection between environmental stewardship and economic opportunity for Conservation Authorities in the Greenbelt region, as well as additional details, including differences in their priorities, programming, and ecosystem service value streams that can support the advancement of a conservation finance project.

The core mandate of CAs is to **advance integrated watershed management systems to protect both people and prosperity, while also helping to mitigate natural disasters, and conserve local natural heritage**. The environmental stewardship role and watershed approach of CAs position them as key partners for advancing any type of conservation finance activity in the region¹⁰⁷:

- Second largest landowner in Ontario—36 CAs manage 150,000ha,
- CAs have technical capacity to collect, manage, and share ecosystem data,
- CAs are organized as non-profits or charitable organizations, which provides additional financing and funding opportunities,
- Engage in strategic land use planning at a watershed-level through partnerships with multiple municipalities, towns, and individual landowners.

Starting in 2019, the Ontario Government started to redefine the nature of these partnerships under the Conservation Authorities Act (CAA), with the last of these changes due to take effect in January 2024. Substantive changes that may affect the capacity and role of CAs to support conservation finance projects in their watersheds are outlined in **Section 2.6**.

Currently, core activities for all 36 CAs in Ontario are mainly funded through municipal levies (56%) and self-generated revenues (34%), generating an average of \$67 worth of ecosystem services for more than 13 million households in the Greenbelt.^{108,109} These activities include:

- Welcoming **9 million visitors annually** to 7,700 campsites and 3,500km of trails,
- **Managing \$3.8 billion in flood mitigation infrastructure** that generates \$150 million in annual benefits,
- Delivering programs and services that generate **\$390 million in annual benefits**,
- **Providing \$4.9 million in grants to support water quality improvements projects**,
- Working with private land owners and other partners to plant close to **2 million trees a year**,
- **Monitoring and reporting on watershed quality.**

Activities not mandated under the CAA are not covered by statutory funding agreements, meaning these types of initiatives are primarily funded through self-generated revenues, philanthropic donations, and a small number of government grants. These activities include investments in data collection and monitoring capacity, enhancing carbon sequestration, and limiting disturbances of soil carbon, and passive recreation.¹¹⁰

Without appropriate funding support, key activities supporting conservation and restoration efforts can be limited—e.g., investing to improve data collection or passive recreation opportunities.

Conservation Ontario

Conservation Ontario (CO) represents the overarching interests of Conservation Authorities with a mandate to further policies, government relations, corporate services and strategic partnerships, and conservation-based research that “promote[s]

and strengthen[s] a watershed-based conservation coalition in Ontario.”¹¹¹ See **Appendix 5** for an overview of funding opportunities secured by CO to advance various conservation and restoration projects across the Greenbelt.

Moving forward, CO can be a key organization for supporting the development of strategic partnerships to expand innovative conservation programs in Ontario’s Greenbelt region by:

- Working on building the business case for greater investments in conservation,
- Representing the interests of CAs to advance policy changes at different scales that unlock the potential conservation finance projects for achieving regional targets,
- Advocating for greater integration of NBS and ecosystems services values in regional land use planning and municipal accounting frameworks,
- Representing and facilitating conservation finance opportunities on behalf of CAs across Ontario.

Engagement with the provincial government on recent proposals affecting the regulatory conditions under the CAA are ongoing—the following strategic priorities have been identified that align with the development of conservation finance mechanisms in Ontario’s Greenbelt region^{112,113,114}:

1. Support the advancement of integrated watershed management in Ontario by tracking and influencing provincial policies and programs to enhance the ability of conservation authorities to adopt innovative financing mechanisms to achieve their strategic goals,
2. Develop information management, communication, and technical tools to support the ongoing work of CAs—many of these tools are necessary to monitor and evaluate the success of conservation and restoration projects but are currently outside of the core funding mandate of CAs,
3. Improve the capacity of CAs to address watershed health and climate change impacts by developing strategic partnerships to enhance funding opportunities, as well as the implementation of policies and programs,
4. Include passive recreation as a core activity that would be funded under the CAA.

Municipalities

The municipalities that rely on the Greenbelt are working to protect and restore its natural areas and water resources (including farmland, forests, wetlands, watersheds, and wildlife habitat). This is being done in partnership with neighboring municipalities, conservation authorities, provincial agencies, and conservation organizations. Funding agreements between municipalities and conservation authorities have long been established under the Conservation Authorities Act, but recent changes to the Act and additional powers given to second-tier municipalities

to engage in land use planning provides a considerable opportunity to for municipalities to revise strategic agreements that prioritize investments in low-cost, high-impact natural infrastructure projects.^{115,116}

Below are the key priorities across municipalities in the Greenbelt:

- **Conserve and restore prime agricultural areas** while emphasizing economic prosperity and carbon sequestration
- **Improve stormwater management and municipal water quality using nature-based solutions.** Extreme weather events and development activities are adversely affecting natural ecosystems, leading to erosion, increased demand on wastewater and water treatment plants, and higher volume of pollutants entering watersheds. In response, municipalities are restoring and enhancing natural areas to help manage stormwater and improve water quality
- **Expand the tree canopy** by protecting, enhancing, and acquiring forested areas within their boundaries to improve climate resilience and biodiversity
- **Promote recreation and ecotourism** by establishing trail systems and creating destinations to improve public access to natural areas

Appendix 6 provides an overview of each upper-tier municipality in the Greenbelt, their current spending on various services that impact natural areas and water resources, their priorities related to nature conservation, and areas of opportunity that could support the advancement of a conservation finance project.

Indigenous communities

The Greenbelt lies at the intersection of the traditional territory of the Anishinaabek Nation, Haudenosaunee Confederacy, Huron-Wendat Nation, Mississauga Nation, and is now home to many other diverse First Nations, Métis, and Inuit Peoples. These First Nations are represented by several Indigenous communities that are located within, or immediately outside, the boundary of the Greenbelt. The **Anishinaabek Nation** has the greatest representation in the Greenbelt area and is represented by several Indigenous communities:

- Alderville First Nation (located south of Rice Lake),
- Chippewas of Georgina Island First Nation (located in Lake Simcoe),
- Mississaugas of Scugog Island First Nation (located by Lake Scugog),
- Mississaugas of the Credit First Nation (located southeast of Hamilton),
- Chippewas of Nawash First Nation and
- Chippewas of Saugeen (both located on the northern portion of the Niagara Escarpment).

The **Mississauga Nation** is also represented by the community of Hiawatha First Nation (located north of Rice Lake) and the **Haudenosaunee Confederacy** is represented by the community of Six Nations of the Grand River (located southeast of Hamilton).

Each of these communities has a long connection to lands in the Greenbelt and, more recently, some have developed partnerships that have been able to advance Indigenous Knowledge Systems and ways of knowing and connecting to regional lands. The exchange of ideas has served to reinforce a growing awareness of what conservation and restoration efforts can mean for Indigenous peoples and, if done right, what this type of engagement can contribute to further efforts for Reconciliation.

For example, in 2007, the Six Nations of Grand River negotiated an agreement with the City of Hamilton to undertake a restoration project to plant over a million trees in one of the largest renaturing projects in Canada.¹¹⁷ Establishing the Kayanase ecological restoration and ecotourism company, the initial success of the restoration efforts at the Red Hill Valley site, as well as working with the City of Hamilton, have translated into further efforts to improve marginal lands and habitat quality that serve both the ecological and economic of the prosperity of the First Nation.¹¹⁸ Today, the initial agreement between the City and Kayanase has transformed into a successful business model that improves local ecosystems that supports continued community development.

Although priorities, objectives, and approaches will certainly differ between Indigenous communities in the Greenbelt, the model developed by the Six Nations of the Grand River may be able to serve as a guide to incentivize the participation of Indigenous communities and stakeholders in the development of future conservation finance projects.

Agricultural producers and rural landowners

The agriculture sector in the Greenbelt is vital for the rural economy and the residents of the Greater Golden Horseshoe. The Greenbelt is home to Ontario's two high-value specialty crop growing areas—the Holland Marsh and the Niagara Tender Fruit and Grape Area. In these areas, fertile soils and unique climate conditions allow for the growth of unique high value crops. Outside of these two areas, prime agricultural land can be found throughout the Greenbelt that contributes to one of Canada's most productive agricultural areas.

Protection of farmland within the Greenbelt is essential for the security and long-term success of the food and farm related businesses across the region. The Greenbelt Foundation is supporting this work by promoting soil health in agriculture, enhancing direct-to-market agri-food and culinary tourism opportunities, and accelerating innovation and commercialization of new crops that help farmers respond to market demand.

Farmers have expressed concerns regarding the future of farming in Ontario's Greenbelt as reported in [Farming in Ontario's Greenbelt: Possibility Grows Here](#). These include:

- A general lack of acknowledgement of the importance of agriculture among the public and elected officials,
- Inconsistencies in interpretation of provincial policy across municipalities and conservation authorities, and,
- High costs for farmers to meet regulatory requirements.

Farmers also emphasize the importance of keeping prime agricultural land protected from development as a way to incentivize further climate-smart business investments.

Rural communities have also been engaged by partner organizations (e.g., conservation authorities) that are able to offer expertise and programs that incentivize greater environmental stewardship on private lands. In the case of CAs, programs helping landowners implement environmental stewardship projects are considered a cost-effective approach for initiating greater community-led improvements to support watershed health. The land conservation programs enacted by the conservation authorities offer landowners the opportunity to protect environmentally important land through easements, donations, bequests, and tax incentives.

Appendix 7 provides examples of programs being enacted by federal and provincial agencies and financial institutions to support the protection and restoration of farmland by the agriculture sector in the Greenbelt, as well as local incentive programs that are being developed through partnerships between CAs and rural communities.

Insurance actors

Insurance companies play an important role as proactive educators, raising the credibility of natural asset valuation and resiliency measures. In addition to providing novel insurance products to protect natural assets and incentivize conservation and restoration projects, insurance actors play an important role as proactive educators, raising the credibility of natural asset valuation and resiliency measures.¹¹⁹ Insurance companies themselves can also invest directly in conservation and restoration projects as they can internalize the cost through reduced payouts. Insurance companies may also be able to work with municipalities to address the growing problem of uninsured private property.

The Insurance Bureau of Canada—in partnership with Swiss Re and the Municipal Natural Assets Initiative—is seeking to develop new nature-based insurance products linked to watershed conservation and restoration as a measure to enhance climate resilience and flood mitigation.¹²⁰ This is an important leadership step for the industry.

Insurance companies may also provide a key role in data collection and analysis for conservation finance projects. These institutions already have data on property values and risks associated

with natural disasters. This knowledge may be leveraged through key stakeholder partnerships to develop a more complete understanding of the values of specific ecosystem services, such as wetlands for flood mitigation, allowing projects to effectively target optimal sites for restoration efforts.¹²¹

Financial institutions

A growing number of financial institutions are also investing in nature-based solutions and conservation initiatives across Canada. In Northern Ontario, TD securities recently invested \$10 million in the launch of the Boreal Wildlands Carbon [Offset] Project to support conservation of 145,000 ha of forests.¹²² In Southern Ontario, on the edges of the Greenbelt, VERGE Capital has invested \$130,000 in a conservation impact bond through a partnership with Deshkan Ziiibi First Nation and Carolinian Canada—the bond is designed to finance the restoration of 60 ha.¹²³ A second phase of the bond targeting in the Long Point Walsingham Forest anticipates greater interest for participation among several regional private investors—by 2023 a total of 400 ha is anticipated to be conserved and restored by this bond model.¹²⁴

The participation of private sector actors will continue to grow as the result of a greater understanding of the economic value that investments in ecosystem services can provide, as well as the value of these investments for reducing traditional investment risks by mitigating the causes and impacts of climate change. Selecting the appropriate partner can provide project proponents with support for the development of appropriate data collection and analysis capabilities, as well as a better understanding of appropriate transactional models and pathways for reducing financial risks of specific projects. In certain cases, additional grant funding may be available from private capital firms to support the development of data collection and monitoring capacity to meet the threshold of investible projects.¹²⁵

Appendix 8 provides examples of initiatives being enacted by insurance actors and financial institutions that could be leveraged to support greater investments in conservation and restoration activities in the Greenbelt.

2.6 Governance framework for Ontario's Greenbelt

Several legislative vehicles govern land use and land use change in Southern Ontario that can have an impact on different conservation and restoration initiatives. While most legislation focuses on land use planning in the context of urban growth and regional development, the following six Acts govern land use and land use change in the Greenbelt that carry specific implications for advancing conservation and restoration initiatives.

This section provides a brief overview of the six main pieces of legislation governing conservation and restoration activities in Ontario's Greenbelt, as well as a summary of relevant corresponding regulatory vehicles governing industrial and agricultural activities, conservation initiatives, and discretionary ministerial powers.

Legislative framework governing land use in the Greenbelt

Niagara Escarpment Planning and Development Act (NEPDA)

The purpose of the [Niagara Escarpment Planning and Development Act](#) (NEPDA) is embodied in the Niagara Escarpment Plan (2017) that sets out a comprehensive regulatory framework to protect and conserve a network of key ecosystems located in Ontario's section of the Niagara Escarpment.¹²⁶ These objectives are aimed at ensuring the long-term sustainability of regional ecosystems services, while also ensuring residents can enjoy outdoor recreation opportunities.

The NEP is the minimum regulatory requirements guiding all land use planning and zoning by-laws, unless otherwise specified in corresponding Acts. For example, the Clean Water Act (2006) provides a provision that the regulation with the greatest protection to drinking water resources should prevail across the entirety of the Greenbelt.¹²⁷

Oak Ridges Moraine Conservation Act

The [Oak Ridges Moraine Conservation Act](#) (ORMCA) provides direction for land use planning and natural resource management that covers 190,000 hectares of ecologically significant area in the Greenbelt north of the Greater Toronto Area. Similar to the NEP, the ORMCA established the Oak Ridges Moraine Conservation Plan (the Plan) under the principles of advancing conservation initiatives to support vital regional ecosystem services, while also establishing a framework to encourage recreation opportunities and regional development with minimal environmental impacts.¹²⁸

The Plan is considered the standard regulatory guideline for all land use planning and zoning by-law decisions, unless otherwise specified in corresponding Acts. Under the Plan, official plans and zoning by-laws deemed to be more restrictive may be prohibited.

Places to Grow Act

The [Places to Grow Act](#) outlines the development plan for the greater golden horseshoe region between 2001 and 2031. The Act explicitly protects natural environment and human health over anthropogenic growth.¹²⁹ Thus, in case of a conflict, the plans prepared under the Niagara Escarpment Planning and Development Act, the Oak Ridges Moraine Conservation Act,

2001 and the Greenbelt Act, 2005 will prevail over an infrastructure development project or land use change application.

Greenbelt Act

The [Greenbelt Act](#) (GA) provides the regulatory framework for the conservation of key ecological areas and productive farmlands located in the Greater Golden Horseshoe region of Southern Ontario. The GA extended existing conservation measures in place for the Niagara Escarpment (1978) and Oak Ridges Moraine (2001) to provide protection for key ecosystems and watersheds across the region, as well as encourage strategic land use planning in the region that prioritized both ecological integrity and sustainable development.

For the purposes of land use planning and conservation in the Greenbelt, the regulatory framework established under the Greenbelt Plan has precedence over local land use planning and municipal by-laws, but the framework also contains provisions where regulations established in the three preceding Acts take precedence.¹³⁰

Protected areas of the Greenbelt are designated as either *Protected Countryside* or as an *Urban River Valley*, with protection centered on six geographic specific-policy frameworks that outline permitted land uses and limits on land use change. See [Appendix 9](#) for further details.

Lake Simcoe Protection Act (LSPA)

Similar to the NEPDA and the ORMCA, the [Lake Simcoe Protection Act](#) (LSCPA) regulates conservation and regional development using an ecosystem-based approach across the 340,000 ha of the Lake Simcoe Watershed. The LSCPA was created in 2008. The Act laid out the goals for protecting Lake Simcoe and paved the way for the creation of the Lake Simcoe Protection Plan. The Plan is the template used for implementing projects, highlighting targets of phosphorus reduction, putting forward limitations on new developments and growth, and lays out voluntary and mandatory measures for the province and municipalities to protect Lake Simcoe.

The Act regulates activities in land and water adjacent to the shoreline of Lake Simcoe, any other lake in the Lake Simcoe watershed, tributaries of Lake Simcoe, and wetlands. The LSCPA includes the Holland Marsh specialty crop areas as well as other provincially significant wetlands, with the portion between the southern shore of Lake Simcoe and the northern border of the Oak Ridges Moraine falling within the boundaries of Ontario's Greenbelt.

Navigating the framework

Acts governing land use in Ontario's Greenbelt region are administered by the Ontario Ministry of Municipal Affairs and Housing, except for the NEPDA, which is implemented by the Niagara Escarpment Commissions. Together these Acts were

updated in 2017 and form the regulatory framework for ongoing conservation and restoration efforts. The overarching goal of the legislative framework is to ensure continued access and accessibility to key ecosystem services for communities across the Greenbelt.

Consequently, all land use decisions in the Greenbelt must comply with each of these legislative vehicles, as well as any relevant local, provincial, and federal legislation that applies to change in land use for specific areas of the Greenbelt (e.g., coastal areas of the Great Lakes). When seeking to advance a conservation finance project in this region, regulations for different types of land use and land use change may provide an additional layer of protection toward ensuring successful project outcomes and reduce investor risk by limiting the number of possible competing land use decisions.

Appendix 9 provides additional details regarding differences in land use designations, permitted land uses, and land use change under each of the regulatory frameworks.

Additional Legislative Considerations

Conservation authorities

The [Conservation Authorities Act](#) created Ontario's network of Conservation Authorities for the purpose of enhancing regional watershed management. From a regulatory perspective, the CAA provides Conservation Authorities with oversight for local land use planning and zoning by-laws that interfere with wetlands, riparian areas, and waterways. However, the CAA also stipulates that any regulatory decisions taken by a CA that conflict with Section 47 of the Planning Act, the latter would prevail—these are commonly known as Ministerial Zoning Orders (MZO), which will be discussed as part of the next section on discretionary powers. The regulatory powers of the CA under the CAA are also subject to conflicting provisions established under the *Municipal Conflict of Interest Act*, the *Municipal Freedom of Information and Protection of Privacy Act*, and, most notably, the *Aggregate Resources Act* (see below).

Under the CAA, all CAs are established as corporate bodies with the explicit powers to raise debt to finance projects using a promissory note. Since CAs are also de facto governed as incorporated not-for-profit or charitable organizations, amendments to the [Not-for-Profit Corporations Act](#) (ONCA) that came into force in 2021 nominally provides CAs with powers to issue debt and secure credit-based financing, creating additional funding opportunities to advance conservation and restoration projects under CA jurisdiction.¹³¹ In the absence of legislative or by-law conflicts, Part IX, Sec. 85 of the ONCA provides CAs with the powers to:

1. Establish corporate credit against which money can be borrowed
2. Issue, reissue, sell, or pledge debt obligations

3. Mortgage, pledge, or otherwise create a security interest for any owned property

Further to these resolutions and barring any regulatory conflicts with other Acts in force in Ontario, CAs hold the power to acquire property, construct (natural) infrastructure, work with private landowners, control the flow of surface waters to mitigate the impacts of flooding and contamination, and alter the courses of waterways to enhance conservation and reduce damage to built infrastructure.

Recent notable amendments to the CAA have altered the scope and reach of regulatory powers and responsibilities of CAs.¹³² These changes include:

[More Homes, More Choices Act, 2019](#) prescribed a list of programs and services that CAs are required to provide under the Act, as well as the power to pursue additional activities that support the interest of CA objectives if funding is available. Revisions to the Act also included discretionary powers of Ministerial oversight of CAs.

[Protect Support and Recover from COVID-19 Act, 2020](#) initiated significant changes in the roles and responsibilities of Conservation Authorities with relation to municipal land use planning. These changes included:

1. Conservation authorities are no longer allowed to appeal land use planning decisions of municipal councils through the Ontario Land Tribunal (OLT)
2. Allow for permit decisions made by Conservation Authorities to be challenged by Ministerial review or through the OLT. Permit cancellations and Permit Fee decisions can also be appealed through the OLT.
3. Provides the Minister with discretionary powers to override any permitting decisions and requires Conservation Authorities to issue development permits in areas subject to zoning orders.
4. The obligation to enter into an agreement with Conservation Authorities to offset the ecological impact of issuing development permits is no longer required.

Ontario Regulation 687/21 has given conservation authorities up until January 2024 to transition to a new budgetary framework, which will alter the way CAs receive funding from municipalities (levy), how fees are charged for services, and how project funding is apportioned for conservation and restoration projects.

[More Homes Built Faster Act, 2022](#) has been tabled for a public consultation period at the time of writing this report. As it stands, the Act proposes to transfer regulatory powers of CAs to local municipalities, as well as restrict the ability of CA to develop partnerships with local municipalities to address issues of environmental and natural heritage. Changes to wetland protections, and potential offsetting programs are also proposed under the Act, which could place current and future communities in flood prone areas at greater risk.

Industrial and agricultural activities

The [Aggregates Resources Act \(ARA\)](#) governs mineral extraction licenses in the province and outlines obligation and permitted land uses during the lifecycle of aggregate extraction operations, including obligations for post-extraction site restoration. Under the ARA, aggregate mining is permitted within the Niagara Escarpment, Oak Ridges Moraine, Lake Simcoe Watershed, and across the wider Greenbelt, but is subject to specific terms and conditions that regulate operations in each of the areas under the respective jurisdiction of the corresponding Acts.

In all cases, site restoration is required once extraction operations have ended. With more than 2,171 aggregate mining sites identified as being eligible for restoration with an estimated land use footprint of 4,342 ha, there is a considerable opportunity, as well as regulatory incentive, to attract investment for these types of restoration projects within the existing regulatory framework.¹³³ However, monitoring and enforcement of rehabilitation obligations continues to be a challenge across the province with extra protections in the Greenbelt providing little in the way of further incentives for participation, or enforcement.

Sustainable resource management

Under the [Clean Water Act 2006](#), conservation authorities have legislative roles as **source protection authorities**. Conservation authorities focus on the management and maintenance of safe drinking water sources. With 85% of Ontarians served by municipal drinking water, source protection authorities play a critical role. Thirty-eight local source protection plans have been prepared in Ontario, including for 'Credit Valley, Toronto Region, and Central Lake Ontario Region', 'Grand River Region', and 'Halton-Hamilton Region'.¹³⁴ Notably, in case of a conflict between policies of significant threat, source protection plans would supersede bylaws (under section 39 of the *Clean Water Act*). This provides additional regulatory protection for advancing conservation finance projects that target watershed management projects with the aim of enhancing the delivery of clean drinking water.

The [Green Energy Act \(2009\)](#) focuses on promotion of opportunities for renewable energy. However, the project proponent needs to submit a project plan to Niagara Escarpment Commission before applying for approval. In case of Oak Ridges Moraine and Protected Countryside, an approval for a renewable energy project is required if the project is within 120 meters of a wetland, or if an environmental impact assessment has not been carried out.

[Great Lakes Protection Act \(2015\)](#) is targeted to fight climate change, protect wetlands and coastal areas, monitor health of lakes, among others in the Great Lakes-St Lawrence River basin. As the conservation authorities are public bodies, the Minister of Environment and Climate change and Minister of Natural Resources and Forestry can issue directives to conservation authorities (section 34). Notably, the Great Lakes Guardians' Council, established under the Act, includes representatives of conservation authorities.

Discretionary ministerial powers

Several provincial ministries in Ontario hold discretionary powers pertaining to how land is used and how conservation efforts are undertaken in the Greenbelt. This subsection outlines some of the discretionary regulatory powers of different government ministries to help better understand the risks and opportunities for different types of conservation and restoration projects in the region.

Minister of Municipal Affairs and Housing

While municipalities nominally have powers for land use planning in settlement areas covered by their municipal plans, the Municipal Affairs and Housing Minister can issue a Ministerial Zoning Order under Section 34 of the Planning Act to 'fast track' land use change decisions. MZO's are not new but are being increasingly used as a catalyst to promote further development in and around the Greenbelt—44 MZO's were issued between March 2019 and March 2021.¹³⁵ These orders override local planning authority and approve development projects without performing the necessary expert and public consultations. As of January 2022, the discretionary power of the Minister to issue MZO's has been extended to the CAA, allowing the Minister to override current or future land use designations, as well as project permit decisions taken by CAs.

These orders may present a significant, although not absolute risk, when considering how to move forward with a conservation finance project in the Greenbelt.

Minister of Environment, Conservation and Parks

Environmental impact assessments under Ontario's [Environmental Assessment Act](#) are voluntary, but also provide the Minister with the discretionary powers to recommend, admit, or reject projects from passing to comprehensive environmental assessments. The Minister also has discretionary powers to issue stop orders for any activities that contravene provincial legislation for Species at Risk in the Greenbelt.

Strong Mayors, Building Homes Act

In August 2022, the Ontario provincial government introduced [Bill 3, Strong Mayors, Building Homes Act, 2022](#) to give veto powers to the mayors of Toronto and Ottawa over bylaws that conflict with provincial priorities, such as building housing. Although the impacts on conservation and restoration efforts are currently unknown, the legislation marks a shift in power balance toward local governments that is likely to carry significant implications for advancing conservation finance projects.

Navigating the governance framework

The laws and regulations presented above have implications on the depth of due diligence required before a project could be launched. For example, if a wind project were proposed in the region, the project proponent needs approval (under the [Green Energy Act 2009](#)) from the Niagara Escarpment Commission

or needs to carry out an environmental impact assessment. The type of financial instrument—either a green bond issued by the provincial government or business equity loan—will not affect the project’s approval process, but the regulatory requirements may provide an extra layer of protection for the permanence of adjacent conservation and restoration initiatives.

The land use framework in the Greenbelt provides additional protection for key natural assets, which can significantly reduce the overall risk of advancing conservation finance projects when compared to areas outside of the Greenbelt. Examples of these protections include:

- A proposal to open 60-hectares of natural core areas protected under the Oak Ridges Moraine Conservation Act in the City of Vaughan for development was rejected due to the developer being unable to meet the requirements of protecting key natural features if the project were to move ahead.¹³⁶
- A proposal by a developer in 2020 to build a hospital at the headwaters of Carruthers Creek in Northeast Pickering, just outside the official Greenbelt boundary—known as the Whitebelt. The 28-hectare project was identified as increasing the risk of flooding in Ajax.¹³⁷ The developer sought a MZO to fast-track this development, but later withdrew its request due to significant public opposition.¹³⁸ The Durham Regional Council was also opposed to any land use change using a MZO and had urged the developer to follow the ‘normal’ procedures for any type of land use change in the area.¹³⁹
- A proposal by the City of Richmond Hill in February 2021 to expand municipal lands into protected agricultural and rural lands of the Greenbelt, was rejected by the provincial government due to prohibitions under *Oak Ridges Moraine Conservation Act*, the proposed development was prohibited. In this case, the City approached the province to issue an MZO.¹⁴⁰

Even though there is a consensus that the land use framework in Ontario’s Greenbelt has slowed the conversion of key natural assets, there are limits to the current regulations. The following

considerations could have implications for evaluating the potential of different ecological characteristics when seeking to advance a conservation finance project:

1. **Land use and land use change regulations provide inconsistent protection** for protected and conserved areas in the Greenbelt. Special provisions—e.g., Aggregate Resources Act, MZOs—contravene the limits placed on urban growth and pose a challenge for the continued efficacy of these protections.
2. **Recent changes under the Build Homes Faster Act increase the risk of future development being carried out in flood prone, or special policy areas**, which were previously controlled by policies designed to enhance flood mitigation. The impacts on regional wetlands could also have a net-negative impact on regional flood mitigation capacity, depending on how many wetlands and water-courses are affected by future developments
3. **Agricultural land continues to face development pressures across the Greenbelt region.** Inequitable competition between farm and non-farm uses has contributed to faster-than-average losses of farmland on the outside of the Greenbelt, while lands inside the Greenbelt not designated as prime agricultural lands face constant pressures of resignation.
4. **Legal protections and regional policy frameworks do not support the expansion or improved functioning of key wetland ecosystems** despite their crucial importance for reducing the impacts of flooding and ensuring the continued delivery of clean drinking water. In the absence of resource limitations, local governments are typically active stakeholders in conserving wetlands and other water features. Recent changes in the administration of wetland protections, municipal powers on flood mitigation planning, and ecological offsetting protocols, risk changing the foundation of this relationship.
5. **Monitoring and evaluation of projects supporting the continued delivery of key ecosystem services are fragmented** and create challenges for determining the success of policies promoting their protection and conservation.

Table 3. Overview of land use governance and its impact on potential conservation finance projects in the Greenbelt



1 – Low
2 – Medium
3 – High

Act	Conflicting Acts	Notable Sections	Risk Level	Support Level
Aggregates Resources Act, 1990	If municipal by-law, official plan or development agreement deals with the same subject-matter as this Act, the Act prevails over such plans and agreements. Source protection plan under the Clean Water Act, 2006 prevails over the Act	To get a wayside permit, Niagara Escarpment Planning and Development Act prevails. No quarries within 200m from the edge of the Niagara escarpment.		
Conservation Authorities Act, 1990	Activity approved under Aggregate Resources Act does not require permission from CA	Powers to CAs to issue permits for development. Minister's Zoning Order under Planning Act prevails.		
Niagara Escarpment Planning and Development Act, 1990	The Act prevails, except Greenbelt Act	For the purposes of implementing the Plan, land may be purchased or leased. Public works need to conform with this Act/plan.		
Oak Ridges Moraine Conservation Act, 2001	This Act/plan prevails	Decisions made under Planning Act or the Condominium Act, 1998 to conform with ORMCP. Plan prevails over official plans, zoning by-laws.		
Greenbelt Act, 2005	This Act/plan prevails with the exception of the Clean Water Act and Aggregate Resources Act	No derogation to ORMCP and NEPDP. Ontario Planning and Development Act, 1994, the Planning Act or the Condominium Act, 1998 to conform with this Act/plan. Public works need to conform with this Act/plan.		
Place to Grow Act, 2005	Prevails over Greenbelt Plan, Niagara Escarpment Plan, and Oak Ridges Moraine Conservation Plan, in cases other than protection of the natural environment and human health.	Decisions made by a municipal council, municipal planning authority, planning board, conservation authority to conform with Growth Plan. Municipalities to amend their official plans to conform with the growth plan.		
Clean Water Act, 2006	CWA prevails over Nutrient Management Act, 2002	The area over which a CA has jurisdiction under the Conservation Authorities Act is established as a 'drinking water source protection area.' Decisions under the Planning Act or the Condominium Act, 1998 shall conform with source protection plans. Environmental Assessment Act continues to apply within the source protection area.		
Lake Simcoe Protection Act, 2008	This Act/plan prevails	Ecological health of Lake Simcoe watershed prevails while applying any by-law and regulation.		
Great Lakes Protection Act, 2015	Provisions that provide greatest protection to the ecological health of the Great Lakes-St. Lawrence River Basin prevails	Public works need to conform with this Act/plan. Environmental Assessment Act continues to apply within the geographical area of this Act.		
More Homes, More Choices Act, 2019	Amended 13 legislations related to SAR, CAs, Planning, cannabis, and so forth	Species at Risk Conservation Fund created. Minister can temporarily suspend protections for habitats and species for up to three years		
Protect Support and Recover from COVID-19 Act, 2020	Amended 44 legislations related to CAs, education, insurance, provincial parks, and so forth	Changed the appeal route for refused permits. The applicant may seek a review from the Minister of Environment, Conservation and Parks, rather than reconsideration by the CA.		
More Homes Built Faster Act, 2022	Amended 10 legislations related to CAs, development charges, municipalities, planning, and so forth	Changed land use planning regime. Minister can make regulations to limit the types of conditions that may be attached to a permission or permit issued by CA.		
Strong Mayors, Building Homes Act, 2022	(none)	The responsibility to prepare and table a city budget shifted from council's hands and into the mayor's		



3 CONSERVATION FINANCE BLUEPRINT FOR THE GREENBELT

Ontario's Greenbelt provides communities across the province with a range of direct and indirect ecosystem service benefits that can be measured in terms of both their monetary value and their positive impact on ecological and socio-cultural well-being. The blueprint for advancing conservation finance in the Greenbelt in this section is designed to provide consistent and clear information on how to enhance these benefits using a variety of innovative financial mechanisms; and to equip decision-makers with guidelines for selecting the appropriate approach and corresponding tools to integrate more public and private investments into ongoing conservation and restoration initiatives.

The blueprint highlights necessary considerations for site selections, regulatory contexts, the suitability of various financial instruments, and relevant strategies for shaping sustainable investments models.

Our Conservation Finance Blueprint consists of an incremental eight-step process to address the feasibility of various projects using a conservation finance lens (steps 1-5), as well as which instruments and financial models are the most suitable (steps 6-8) for advancing these projects (See **Box 2** for a summary of

the steps). Outcomes generated by this section are intended to be adaptable to a variety of organizations operating in and around the Greenbelt that are seeking to advance conservation finance projects in their areas.

It should also be noted that the stepwise process outlined in the section can be adapted to any phase of project readiness—ranging from initiation to completion. In all cases, we recommend beginning with Step 1 of the blueprint, although no actions may be necessary until later Steps depending on the readiness level of the given project.

Following the conclusion of Step 8 in this section, project proponents will be able to:

1. Compare the economic value of different ecosystem services and evaluate how they would relate to proposed conservation/restoration projects
2. Build a business case for a proposed project and identify the parameters for a suitable conservation finance mechanism
3. Implement a conservation finance pilot project

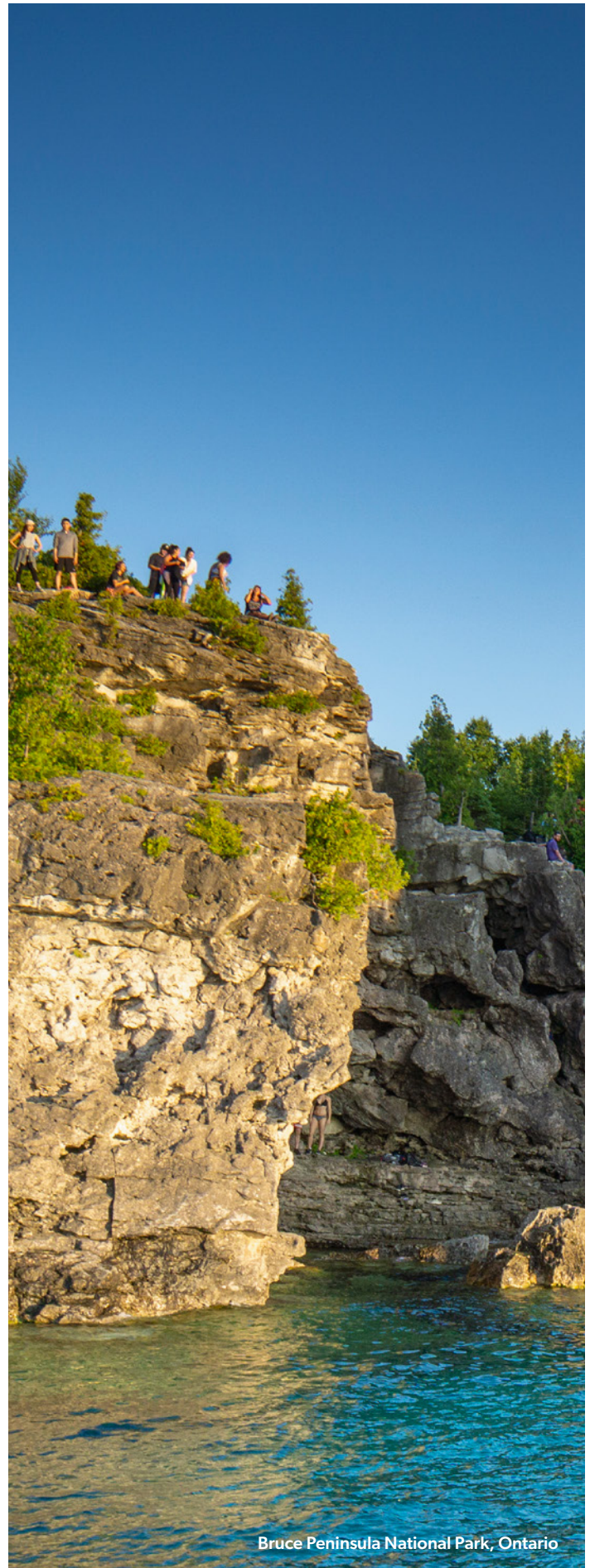
Box 2: Steps for developing a conservation finance project

Feasibility Assessment

- Step 1:** Identify key ecosystem services and relevant values
- Step 2:** Identify data needs and availability
- Inventory existing ecosystem service data
 - Establish existing/missing data for the identified benefits
- Step 3:** Establish anticipated project values
- Step 4:** Explore policy and regulatory implications and partnership context
- Regulatory Context
- Step 5:** Identify key partnerships and opportunities for Reconciliation
- Regional scan of actors and their level of involvement
 - Evaluate potential stakeholder involvement
 - Establish and action plan for engagement with Indigenous communities

Project Design Assessment

- Step 6:** Determine the appropriate financial instrument
- Match components collected in steps 1-4 to best fit instrument
 - Consult selection guidelines for instrument selection
 - Identify key performance and evaluation metrics
 - Identify supporting tools and instruments
- Step 7:** Development a basic investment model
- Outline cash flows and financial sustainability model
 - Develop an investor term sheet and exit strategy
- Step 8:** Perform a risk assessment and establish implementation objectives



Bruce Peninsula National Park, Ontario

3.1 Project feasibility assessment

Step 1: Identify key ecosystem services and relevant values

The first step in developing a conservation finance project is to identify the ecosystem services that are relevant for your project and to determine whether any additional data sources are needed to establish economic value for these services. In selecting ecosystem services, it is important to remember that these services need to be:

1. **Directly relevant to your project**
2. **Relatively easy to quantify**
3. **Able to generate economic returns that are distributable to investors**

Using a combination of the Economics of Ecosystems and Biodiversity (TEEB) and National Ecosystem Services Classification System Plus (NESCS) frameworks, we have identified five key classifications that contain a number of potential ecosystem services that represent the greatest opportunity to advance conservation finance projects in the Greenbelt.

When selecting the appropriate classification and subsequent ecosystem services for your project, it is important to consider the complexity of natural systems, as well as the challenge of measuring component parts of these systems as discrete entities. To mitigate the risk of inaccurate measurements, ecosystem services can be measured using one of the three following approaches:

Final ecosystem services (FES) use a beneficiary-centric approach to measure the economic value of ecosystem services as “ecosystem products and processes that are directly used, enjoyed, or appreciated by people.”¹⁴¹ With this approach, benefits are characterized as the active, passive, or appreciative consumption of ecological services, and are measured based on the consumption patterns of different types of beneficiaries. For example, clean water is a final service that can hold different economic value depending on the type of beneficiary (e.g., industrial processors vs. private households) and the type of consumption (e.g., active vs. passive vs. appreciative). An FES example is the value individuals place on clear water for outdoor recreation activities. It should be noted that different individuals can benefit from FES in multiple ways, meaning multiple groups of beneficiaries may experience different benefits from a given ecosystem service.

Measurable ecological processes (intermediary services approach) target the ecological outcomes of intermediary ecosystem services that are explicit and quantifiable. For example, evaluating the economic value of nutrient cycling in terrestrial or freshwater ecosystems can be measured through changes in the availability of nutrients in soil or water over time.

Benefit-specific and spatially defined uses a specifically identified relationship between a given ecological process, a desired economic outcome, and an intended change to an intermediary ecosystem service. An example of this type of approach would be quantifying the ability of a shoreline restoration project (ecological process) to generate cost savings in reducing the need for local water treatment (economic outcome). The project benefits would ultimately be measured via changes in the levels of soluble minerals (ecosystem service) in the target area over time.

Taking into consideration the best practices we have outlined for selecting and measuring relevant ecosystem services, the EVE tool below is meant to serve as a logical guide to identify the project type and current land use at the proposed site and connect these with relevant ecosystem services. The tool provides five project types as a starting point for applying conservation finance mechanisms in the Greenbelt. Given the complexity of natural systems, the diversity of ecosystems, and differing priorities for conservation and restoration activities, the EVE tool can be adapted to other types of projects that may be outside the scope of these blueprints (e.g., a coastal restoration project aligned with regional tourism objectives. When adding a project type, we recommended performing a similar preliminary feasibility using a conservation finance lens, as found in **Section 2** of this report.

The estimated regional economic values in the above table were calculated using avoided cost and replacement cost for valuations, and contingent valuation studies for culture-based ecosystem services. Determining the economic value of different ecosystem services requires the selection of a valuation method that is appropriate for evaluating changes in the desired outcomes. For example, the economic value of a forest restoration project can be calculated based on the amount of carbon stored using any of: avoided cost (i.e., damages avoided); replacement cost; or market price of carbon trading. Economic value for the same project can also be calculated based on changes in recreation patterns or contributions to human well-being using either of: a) contingent valuation; b) discrete choice experiments; c) travel-cost or hedonic price models; and d) life satisfaction surveys.

For the purposes of these blueprints, we focus on measuring avoided and replacement costs of changes in ecosystem services due to the simplicity of these methods in representing costs that are incurred in the absence of specific ecosystem services (e.g., reduced flood damage due to better stormwater management), and cost savings from services that replace human-made systems (e.g., replacing waste treatment plants by improving natural filtration systems). Revealed preferences (e.g., travel-cost), stated preferences (e.g., contingent valuation), and subjective well-being methods are also able to capture different types of economic value from changes in ecosystem services, but these values are based on individual value judgments of different users and further depend on their type of consumption of different services—i.e., active, passive, or appreciative. See **Appendix 10** for an overview of appropriate economic valuation methods for different types of ecosystem services.

EVE Tool

Estimated value of ecosystem services by ecosystem type in the Greenbelt¹⁴²

	Project type				
	Water quality	Carbon sequestration	Stormwater management	Community enjoyment	Provisioning support
Land use	<input type="checkbox"/> Agriculture <input type="checkbox"/> Built-up <input type="checkbox"/> Coastal/riparian <input type="checkbox"/> Grasslands <input type="checkbox"/> Forest <input type="checkbox"/> Waterway <input type="checkbox"/> Wetlands	<input type="checkbox"/> Agriculture <input type="checkbox"/> Built-up <input type="checkbox"/> Coastal/riparian <input type="checkbox"/> Grasslands <input type="checkbox"/> Forest <input type="checkbox"/> Waterway <input type="checkbox"/> Wetlands	<input type="checkbox"/> Agriculture <input type="checkbox"/> Built-up <input type="checkbox"/> Coastal/riparian <input type="checkbox"/> Grasslands <input type="checkbox"/> Forest <input type="checkbox"/> Waterway <input type="checkbox"/> Wetlands	<input type="checkbox"/> Agriculture <input type="checkbox"/> Built-up <input type="checkbox"/> Coastal/riparian <input type="checkbox"/> Grasslands <input type="checkbox"/> Forest <input type="checkbox"/> Waterway <input type="checkbox"/> Wetlands	<input type="checkbox"/> Agriculture <input type="checkbox"/> Built-up <input type="checkbox"/> Coastal/riparian <input type="checkbox"/> Grasslands <input type="checkbox"/> Forest <input type="checkbox"/> Waterway <input type="checkbox"/> Wetlands
Ecosystem services	<input type="checkbox"/> Carbon stored <input type="checkbox"/> Erosion control and sediment retention <input type="checkbox"/> Flood protection <input type="checkbox"/> Recreation <input type="checkbox"/> Water filtration <input type="checkbox"/> Water runoff control <input type="checkbox"/> Waste treatment	<input type="checkbox"/> Annual carbon uptake <input type="checkbox"/> Carbon storage <input type="checkbox"/> Erosion control and sediment retention <input type="checkbox"/> Soil formation <input type="checkbox"/> Nutrient cycling <input type="checkbox"/> Water runoff control	<input type="checkbox"/> Erosion control and sediment retention <input type="checkbox"/> Flood protection <input type="checkbox"/> Water runoff control <input type="checkbox"/> Waste treatment	<input type="checkbox"/> Recreation <input type="checkbox"/> Cultural/spiritual <input type="checkbox"/> Water filtration	<input type="checkbox"/> Biological control <input type="checkbox"/> Biodiversity <input type="checkbox"/> Nutrient cycling <input type="checkbox"/> Pollination (agr.) <input type="checkbox"/> Soil formation <input type="checkbox"/> Pollination (trees)
Data availability	Is there a recent local or regional study that estimates the value of ecosystem services? <input type="checkbox"/> Yes - use it! [Skip to Step 3] <input type="checkbox"/> No [If no above] Is there a model available to help establish values for ecosystem services relevant to your project? <input type="checkbox"/> Yes - use it! <input type="checkbox"/> No				
Ecosystem services (\$CAD ha ⁻¹)	<input type="checkbox"/> Annual carbon uptake (14) <input type="checkbox"/> Biological control (11) <input type="checkbox"/> Carbon stored (481) <input type="checkbox"/> Cultural/spiritual (87)	<input type="checkbox"/> Erosion control and sediment retention (1) <input type="checkbox"/> Flood protection (500) <input type="checkbox"/> Genetic resources (n/a) <input type="checkbox"/> Habitat/refugia (721)	<input type="checkbox"/> Nutrient cycling (3) <input type="checkbox"/> Pollination (agr.) (392) <input type="checkbox"/> Pollination (trees) (129) <input type="checkbox"/> Recreation (125)	<input type="checkbox"/> Soil formation (8) <input type="checkbox"/> Water runoff control (366) <input type="checkbox"/> Waste treatment (387) <input type="checkbox"/> Water filtration (172)	

Data availability and quality are essential to establish and evaluate the economic value of conservation and restoration of different ecosystems. The best-case scenario is that there are a range of established economic values that are available for the ecosystem service being affected by a proposed project, though this is not often the case due to the complexity of measuring natural systems. The outputs generated by the EVE Tool represent Greenbelt-wide estimates as a starting point for establishing specific economic values for ecosystem services found at

different project sites. Understanding what data are needed to move beyond regional assessments to establish ecosystem service valuations at the project level is explored in Step 2 and represents a key component in determining the viability of using conservation finance as a mechanism to advance conservation and restoration initiatives at different scales.

Step 2: Identify data needs and availability

Focusing your project on specific ecosystem services will also need to take into consideration that the way economic value is derived from ecosystem services is composed of two complementary components: 1) changes in ecosystem functions and; 2) the relationship of these changes to different investors. In this case, investors refers to groups of individuals, firms, governments, or other corporate actors and how they are incentivized

to (re)invest in different ecosystem services.¹⁴³ The DNA tool below is intended to provide project proponents with a better idea of what data are necessary to measure and evaluate projects to enhance existing ecosystem services, as well as how these data points differ depending on which beneficiaries are being targeted and what type of specialized skills might be necessary for different types of projects.

DNA tool – Data needs assessment for conservation finance projects in Ontario

	Project type				
	Water quality	Carbon sequestration	Stormwater management	Community enjoyment	Provisioning support
Ecological Metric	<input type="checkbox"/> Dissolved O ₂ <input type="checkbox"/> Turbidity <input type="checkbox"/> pH <input type="checkbox"/> Bioindicators <input type="checkbox"/> Nitrates <input type="checkbox"/> Temperature <input type="checkbox"/> Contaminants	<input type="checkbox"/> Soil organic carbon <input type="checkbox"/> Carbon storage in trees <input type="checkbox"/> Carbon storage in other vegetation	<input type="checkbox"/> Soil moisture <input type="checkbox"/> Water levels <input type="checkbox"/> Storm surge boundaries <input type="checkbox"/> Baseflows <input type="checkbox"/> Contaminants	<input type="checkbox"/> Biodiversity <input type="checkbox"/> Habitat quality <input type="checkbox"/> Species abundance	<input type="checkbox"/> Soil fertility <input type="checkbox"/> Species richness & abundance <input type="checkbox"/> Soil formation <input type="checkbox"/> Agricultural outputs <input type="checkbox"/> Natural resource availability
Data requirements	<input type="checkbox"/> Removal rates <input type="checkbox"/> Remediation costs	<input type="checkbox"/> SOC concentrations <input type="checkbox"/> Biomass carbon estimates	<input type="checkbox"/> Hydraulic and hydrological data <input type="checkbox"/> Weather data <input type="checkbox"/> Water table <input type="checkbox"/> Removal rates <input type="checkbox"/> Remediation costs	<input type="checkbox"/> Visitation <input type="checkbox"/> Health outcomes <input type="checkbox"/> Tourism statistics	<input type="checkbox"/> Natural accounting inventory <input type="checkbox"/> Ag. production <input type="checkbox"/> Water supply
Land use type	<input type="checkbox"/> Agriculture <input type="checkbox"/> Built-up <input type="checkbox"/> Coastal/riparian <input type="checkbox"/> Grasslands <input type="checkbox"/> Forest <input type="checkbox"/> Waterway <input type="checkbox"/> Wetlands				
Investors	<input type="checkbox"/> Municipalities <input type="checkbox"/> Ag. producers <input type="checkbox"/> Public institutions <input type="checkbox"/> Private landowners <input type="checkbox"/> Insurance carriers <input type="checkbox"/> Individuals <input type="checkbox"/> Tourism firms				
Ecosystem services	<input type="checkbox"/> Annual carbon uptake <input type="checkbox"/> Biological control <input type="checkbox"/> Carbon stored <input type="checkbox"/> Cultural/spiritual	<input type="checkbox"/> Erosion control and sediment retention <input type="checkbox"/> Flood protection <input type="checkbox"/> Genetic resources	<input type="checkbox"/> Nutrient cycling <input type="checkbox"/> Pollination (agr.) <input type="checkbox"/> Pollination (trees) <input type="checkbox"/> Recreation	<input type="checkbox"/> Soil formation <input type="checkbox"/> Water runoff control <input type="checkbox"/> Waste treatment <input type="checkbox"/> Water filtration	
Utility	<input type="checkbox"/> Climate regulation <input type="checkbox"/> Adaptive capacity <input type="checkbox"/> Flood prevention	<input type="checkbox"/> Erosion prevention <input type="checkbox"/> Habitat conservation <input type="checkbox"/> Integrity of water resources	<input type="checkbox"/> Integrity of land resources <input type="checkbox"/> Food production	<input type="checkbox"/> Biodiversity conservation <input type="checkbox"/> Pollution control	

Step 3: Establish anticipated project values

The next step is to match the identified ecosystem services to the economic benefit(s) anticipated from undertaking your project and weighing these benefits against project costs. Knowing your project costs does not require any additional steps when compared to typical project management techniques, but understanding the value of benefits provided by your project can be site specific and depend on a variety of factors, including:

1. Whether baseline value estimates are available, and what methods were used to create these estimates—in the absence of value estimates, **Appendix 10** provides an overview of how different methodologies can be used to develop value estimates,

2. How the value of changes in ecosystem services might be different for different target populations, and
3. The reliability of the first two considerations in representing the conditions on the ground for your selected site.

When considering these factors, it is important to remember that the value of ecosystem services for individual projects is largely dependent on 1) their proximity of services to nearby populations; 2) the total value of proximal economic activity; and 3) the scarcity of similar services in the target area. In all cases, establishing the economic value of different ecosystem services at the project level can be drawn from either their direct (e.g., cost savings from reducing flood damage) or indirect (e.g., the value of sequestered carbon) impact.

Estimated project costs, benefits and the ease of data collection and utilization

A. Project type	B. Types of data sources	C. Ecological metric	D. Estimated costs	E. Range of benefits	F. Data collection/ utilization \$	G. Cost minus benefits
Water quality	<ul style="list-style-type: none"> Removal rates Remediation costs 	Nitrogen removal			\$\$	
		pH			\$	
		Phosphorus removal			\$\$	
		Dissolved O ₂			\$\$	
		Temperature			\$	
		Turbidity			\$	
Carbon sequestration	<ul style="list-style-type: none"> SOC concentrations Biomass carbon estimates 	SOC concentration			\$\$\$\$	
		Carbon storage in trees			\$\$	
		Carbon storage in other vegetation			\$\$\$	
Stormwater management	<ul style="list-style-type: none"> Hydraulic and hydrological data Weather data Water table Removal rates Remediation costs 	Waterway base flows			\$\$	
		Water levels			\$	
		Soil moisture			\$\$	
		Coastal erosion rates			\$	
		Storm surge sizes			\$\$	
Community enjoyment	<ul style="list-style-type: none"> Visitation Health outcomes Tourism statistics 	Habitat quality			\$	
		Wilderness			\$\$	
		Biodiversity			\$\$\$	
Provisioning support	<ul style="list-style-type: none"> Natural accounting inventory Food production Water usage Changes in soil health 	Soil fertility			\$\$	
		Species richness & abundance			\$\$\$	
		Soil formation			\$	
		Agricultural outputs			\$	
		Natural resource availabilities			\$	

Step 4: What are the regulatory conditions and who are the key stakeholders?

ARC Tool – Applicable Regulatory Considerations for conservation finance projects in Ontario

	Project type				
	Water quality	Carbon sequestration	Stormwater management	Community enjoyment	Provisioning support
Land use	<input type="checkbox"/> Agriculture <input type="checkbox"/> Built-up <input type="checkbox"/> Coastal/riparian <input type="checkbox"/> Grasslands <input type="checkbox"/> Forest <input type="checkbox"/> Waterway <input type="checkbox"/> Wetlands	<input type="checkbox"/> Agriculture <input type="checkbox"/> Built-up <input type="checkbox"/> Coastal/riparian <input type="checkbox"/> Grasslands <input type="checkbox"/> Forest <input type="checkbox"/> Waterway <input type="checkbox"/> Wetlands	<input type="checkbox"/> Agriculture <input type="checkbox"/> Built-up <input type="checkbox"/> Coastal/riparian <input type="checkbox"/> Grasslands <input type="checkbox"/> Forest <input type="checkbox"/> Waterway <input type="checkbox"/> Wetlands	<input type="checkbox"/> Agriculture <input type="checkbox"/> Built-up <input type="checkbox"/> Coastal/ Riparian <input type="checkbox"/> Grasslands <input type="checkbox"/> Forest <input type="checkbox"/> Waterway <input type="checkbox"/> Wetlands	<input type="checkbox"/> Agriculture <input type="checkbox"/> Built-up <input type="checkbox"/> Coastal/ Riparian <input type="checkbox"/> Grasslands <input type="checkbox"/> Forest <input type="checkbox"/> Waterway <input type="checkbox"/> Wetlands
Ecosystem services	<input type="checkbox"/> Carbon stored <input type="checkbox"/> Erosion control and sediment retention <input type="checkbox"/> Flood protection <input type="checkbox"/> Recreation <input type="checkbox"/> Water filtration <input type="checkbox"/> Water runoff control <input type="checkbox"/> Waste treatment	<input type="checkbox"/> Annual carbon uptake <input type="checkbox"/> Carbon storage <input type="checkbox"/> Erosion control and sediment retention <input type="checkbox"/> Soil formation <input type="checkbox"/> Nutrient cycling <input type="checkbox"/> Water runoff control	<input type="checkbox"/> Erosion control and sediment retention <input type="checkbox"/> Flood protection <input type="checkbox"/> Water runoff control <input type="checkbox"/> Waste treatment	<input type="checkbox"/> Recreation <input type="checkbox"/> Cultural/ Spiritual <input type="checkbox"/> Water filtration	<input type="checkbox"/> Biological control <input type="checkbox"/> Biodiversity <input type="checkbox"/> Nutrient cycling <input type="checkbox"/> Pollination (agr.) <input type="checkbox"/> Soil formation <input type="checkbox"/> Pollination (trees)
Location	<input type="checkbox"/> Niagara Escarpment <input type="checkbox"/> Oak Ridges Moraine <input type="checkbox"/> Lake Simcoe Watershed <input type="checkbox"/> Greenbelt <input type="checkbox"/> Great Lakes Coastal Areas <input type="checkbox"/> Rest of Ontario				
Application Regulations	Fill in relevant regulatory considerations for your project based on specifications outlined in section 2:				

Step 5: Identify key partnerships and opportunities to further Reconciliation

ReSCAN tool — Stakeholder identification and organization for conservation finance projects in Ontario

Stakeholder	Organization	Role	Anticipated stakeholder participation
<input type="checkbox"/> National and provincial governments	<input type="checkbox"/> NRCAN <input type="checkbox"/> AAFC <input type="checkbox"/> ECCC <input type="checkbox"/> OFA <input type="checkbox"/> MMAH <input type="checkbox"/> MECP <input type="checkbox"/> Other (specify)	<input type="checkbox"/> Investors <input type="checkbox"/> Issuers <input type="checkbox"/> Holders <input type="checkbox"/> Project proponents <input type="checkbox"/> Technical advisors	<input type="checkbox"/> Investor <input type="checkbox"/> Recipient of funds <input type="checkbox"/> Data aggregation <input type="checkbox"/> Project monitoring & evaluation
<input type="checkbox"/> Conservation Authorities	<input type="checkbox"/> Specify	<input type="checkbox"/> Investors <input type="checkbox"/> Issuers <input type="checkbox"/> Holders <input type="checkbox"/> Project proponents <input type="checkbox"/> Technical advisors	<input type="checkbox"/> Recipient of funds <input type="checkbox"/> Project implementation <input type="checkbox"/> Data aggregation <input type="checkbox"/> Project monitoring & evaluation <input type="checkbox"/> Beneficiary
<input type="checkbox"/> Municipalities	<input type="checkbox"/> Toronto <input type="checkbox"/> Peel <input type="checkbox"/> York <input type="checkbox"/> Durham <input type="checkbox"/> Niagara <input type="checkbox"/> Hamilton <input type="checkbox"/> Brampton <input type="checkbox"/> Brant <input type="checkbox"/> Guelph <input type="checkbox"/> Lower-tier	<input type="checkbox"/> Investors <input type="checkbox"/> Issuers <input type="checkbox"/> Holders <input type="checkbox"/> Project proponents <input type="checkbox"/> Technical advisors	<input type="checkbox"/> Recipient of funds <input type="checkbox"/> Project implementation <input type="checkbox"/> Data aggregation <input type="checkbox"/> Project monitoring & evaluation <input type="checkbox"/> Beneficiary
<input type="checkbox"/> Indigenous communities	<input type="checkbox"/> Specify	<input type="checkbox"/> Investors <input type="checkbox"/> Issuers <input type="checkbox"/> Holders <input type="checkbox"/> Project proponents <input type="checkbox"/> Technical advisors	<input type="checkbox"/> Recipient of funds <input type="checkbox"/> Project implementation <input type="checkbox"/> Data aggregation <input type="checkbox"/> Project monitoring & evaluation <input type="checkbox"/> Beneficiary
<input type="checkbox"/> Private landowners	<input type="checkbox"/> Agricultural producers <input type="checkbox"/> Forestry/woodlots <input type="checkbox"/> Land trusts <input type="checkbox"/> Private conservation	<input type="checkbox"/> Investors <input type="checkbox"/> Issuers <input type="checkbox"/> Holders <input type="checkbox"/> Project proponents <input type="checkbox"/> Technical advisors	<input type="checkbox"/> Beneficiary <input type="checkbox"/> Project implementation <input type="checkbox"/> Data aggregation
<input type="checkbox"/> Financial institutions	<input type="checkbox"/> Deposit-taking <input type="checkbox"/> Insurance <input type="checkbox"/> Investment	<input type="checkbox"/> Investors <input type="checkbox"/> Issuers <input type="checkbox"/> Holders <input type="checkbox"/> Project proponents <input type="checkbox"/> Technical advisors	<input type="checkbox"/> Investor <input type="checkbox"/> Project monitoring & evaluation
<input type="checkbox"/> ENGOs & Charities	<input type="checkbox"/> Specify	<input type="checkbox"/> Investors <input type="checkbox"/> Issuers <input type="checkbox"/> Holders <input type="checkbox"/> Project proponents <input type="checkbox"/> Technical advisors	<input type="checkbox"/> Recipient of funds <input type="checkbox"/> Project implementation <input type="checkbox"/> Data aggregation <input type="checkbox"/> Project monitoring & evaluation
<input type="checkbox"/> Capacity Supporting organizations	<input type="checkbox"/> Technical consultants <input type="checkbox"/> Financial partners	<input type="checkbox"/> Investors <input type="checkbox"/> Issuers <input type="checkbox"/> Holders <input type="checkbox"/> Project proponents <input type="checkbox"/> Technical advisors	<input type="checkbox"/> Recipient of funds <input type="checkbox"/> Project monitoring & evaluation

Best Practices for Indigenous engagement

Indigenous engagement is a critical step towards truth and reconciliation in Canada. Land management projects, such as nature conservation and restoration, have strong potential for meaningful partnerships. The following steps outline recommended best practices for indigenous engagement.¹⁴⁴

1. Identify which nations have overlapping territory with your project site.
2. Learn about the Indigenous people and communities the project will be engaging with, in particular the history and cultural connections with the land under study.
3. Create an engagement plan to outline goals, strategy, and record-keeping methods. Allow for time and effort in the beginning as well as follow-up efforts to maintain positive relationships.
4. Engage early in the process, reaching out to representative offices as a first point of contact. Once the conversation is opened, offices can advise on the best next steps.
5. Maintain relationships through familiarity and openness, building trust and understanding.



3.2 Project design assessment

Step 6: What type of conservation finance instrument is appropriate?

Conservation finance mechanisms are not calibrated to be suitable in all contexts on the ground. Some models are better suited for restoration projects and natural resource management schemes, whereas others are better suited to advance long-term conservation goals.

Models that are more readily applicable to advance conservation goals tend to benefit from blended finance models—i.e., the

use of public and private finance—and models better adapted to restoration and natural resource management schemes tend to be well suited for private investment vehicles.

In each case, the suitability of different models depends on the level and type of stakeholder participation, whether data are available, and the project is technically feasible, and the type of revenue streams targeted by the project outcomes. The table below is intended to help project proponents match what type of conservation finance instrument is best suited for their project based on the outputs generated in Steps 1-4, as well as any additional considerations on the ground that are important for understanding the context of the project.

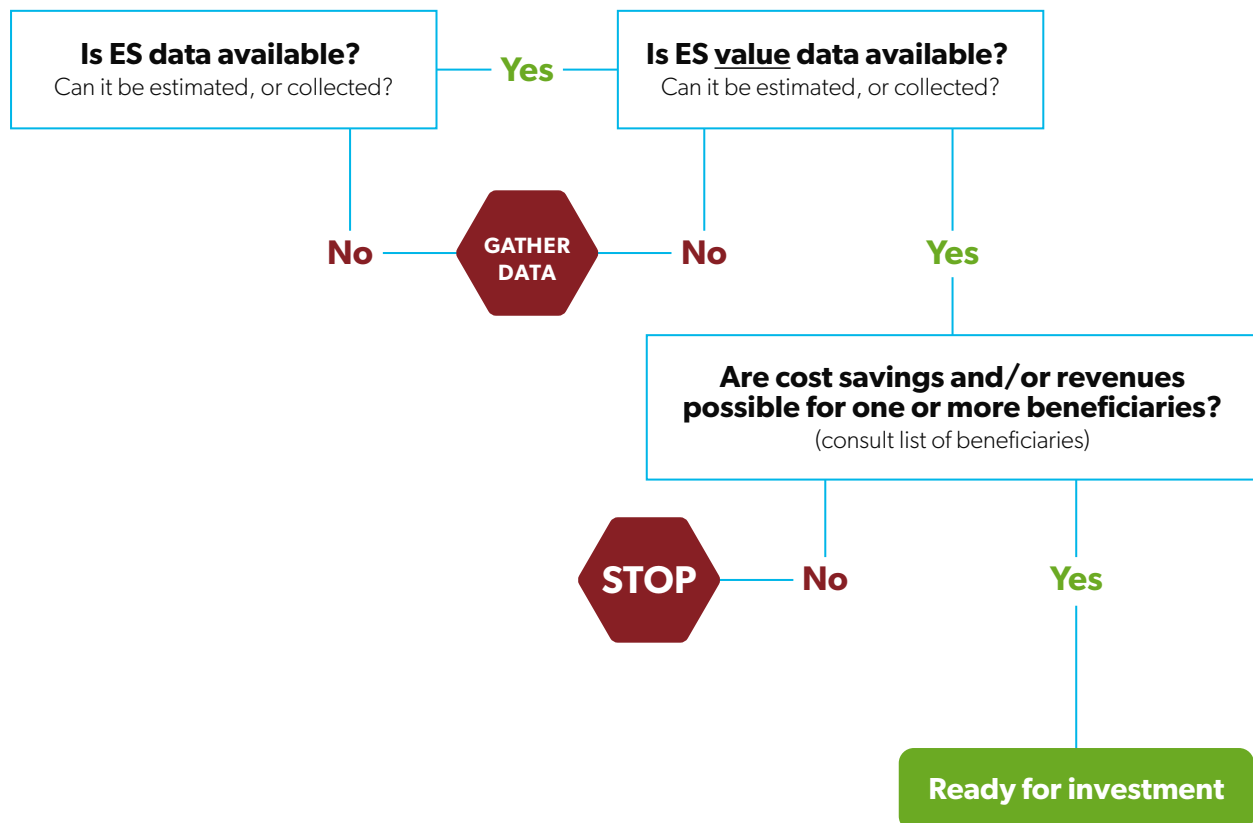
Summary of project-level design needs for different conservation finance mechanisms

Conservation finance instrument	Source of revenue stream	Data/technical needs	Most likely investors	Key stakeholder (type)	Additional considerations
Recreation Bond	Visitor fees (direct), economic input to region (indirect)	Vistations statistics at different timescales, tourism revenues	Municipal/regional gov't, impact investors,	Bond holder (financial institution)	
Resilience Bond	Estimated Cost Savings from restoration/conservation	Evidence that intervention will reduce risk and/or cost of damage (fire, flood, BMPs)	Financial sector, Insurance	Bond holder (financial institution)	
Insurance Product	Estimated Cost Savings to insurer (remediation) Estimated Cost Savings to client (lower-premiums)	Flood maps, historic cost data for water damage to property in region and/or anticipated costs in future	Insurer, municipality, others with assets at risk (public and private landowners)	Insurer	
Revolving Fund	Loan repayment/interest	Depends on project, loanee requires confidence that loan repayment can be generated from activity	Foundations, private sector, municipalities, other levels of government to create and house initial fund.	Fund holder	
Carbon Offsets	Selling of carbon offsets	Protocol (voluntary or regulatory) appropriate to land type, up front capital to assess viability and scale for credit sales	Private sector, those with net-zero commitments	Outcome payer Certification agency	

Feasibility verification

Ecosystem Service of Interest <i>(List from Step 1)</i>	Associated Revenue streams available <i>(List from Step 3)</i>

For each ecosystem service of interest and associated revenue stream, answer the following verification questions to confirm project feasibility before passing to the instrument assessment phase.



Step 7: What type of investment model is appropriate?

Selecting the appropriate conservation finance mechanism requires close consideration of the outcomes from each of the preceding steps. Upon verifying the feasibility of a proposed

conservation finance project, the next step is project design which will require the selection of an appropriate conservation finance mechanism and investment model, as well as determining the right metrics and project partners. The **InDES Tool** serves as a template to capture and organize the requisite information to design a successful conservation finance project.

InDES Tool – Investment design for Conservation Finance in the Greenbelt

Ecosystem Service of Interest			
List ecosystem services from Step 1.			
Ecological objective			
List ecological metrics from Step 2 to establish project data needs			
Economic outcomes			
List values and anticipated project revenues from Step 3.			
Regulatory considerations			
List key regulations from Step 4			
Key Stakeholders			
Is there an opportunity to engage with Indigenous stakeholders and/or further efforts toward Reconciliation?	If yes: Follow best practices outlined in Step 5	If no: List reasons why:	
List assumed stakeholder roles from Step 5	Stakeholder Roles		
	Investor:	Beneficiary:	Implementer:
	Data provider:	Monitoring agency:	Outcome payer:
Anticipated Investment model			
Term: <input type="checkbox"/> Short <5 years <input type="checkbox"/> Medium 5-15 years <input type="checkbox"/> Long-term >15	Repayment trigger: <input type="checkbox"/> Time horizon <input type="checkbox"/> Ecological objective achieved <input type="checkbox"/> Cost savings	Repayment rate: <input type="checkbox"/> No net-loss <input type="checkbox"/> Below-market rate <input type="checkbox"/> Market-rate <input type="checkbox"/> Above-market rate	
Additional considerations			

Step 8: Perform risk assessment and establish implementation objectives

Advancing conservation finance projects represents an opportunity to reduce the immediate and long-term risks associated with climate change and build economic resilience in the Greenbelt. However, at the project-level, addressing these risks presents a unique challenge for project proponents and potential investors.

Investments in natural assets are inherently susceptible to unpredictable weather patterns and extreme weather events, and the number of conservation projects in Canada remains relatively low, providing a greater risk for potential investors in pursuing untested project financing mechanisms. These risks do not preclude conservation finance projects from moving forward, as evidenced by those undertaken in Canada and abroad,

but advancing or scaling these projects carries several unique considerations that need to be addressed based on differences in stakeholder perspectives, as well as the type of natural asset at the focus of the project.

The **PRA Tool** aims to help project proponents and potential investors identify these risks, outline possible actions to de-risk specific projects, and identify who is responsible for undertaking different actions to control potential risks.

The output from this tool, in conjunction with aggregate values collected from the previous sections above, can be input into the project scoring table below to generate an aggregate score regarding the viability of your project. These outputs can be used to easily compare the viability of different projects within and across different regions of the Greenbelt.

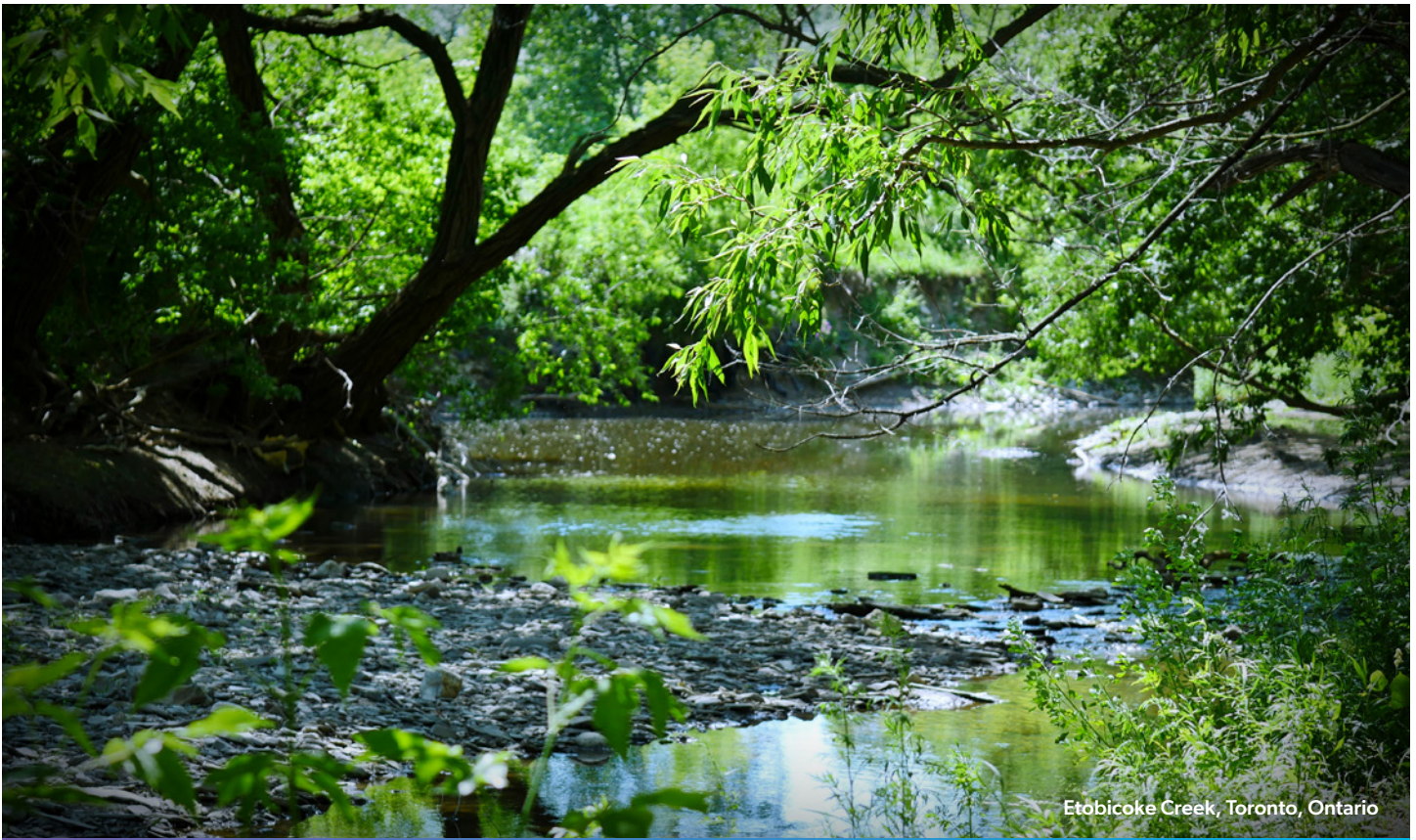
PRA Tool – Project Risk Assessment for Conservation Finance in the Greenbelt

Fill out this table for each project you are assessing

Type of project:	<input type="checkbox"/> Water quality	<input type="checkbox"/> Carbon sequestration	<input type="checkbox"/> Stormwater management	<input type="checkbox"/> Community enjoyment	<input type="checkbox"/> Provisioning support
Category of risk:	Ecological	Regulatory	Financial	Political	
Description	<i>e.g., threats to ecosystem services?</i>	<i>e.g., future land use change, including zoning by-laws</i>	<i>e.g., ease of monitoring progress; data availability; cost of data acquisition</i>	<i>e.g., potential impact of regime change on project</i>	
Severity (1-5)					
Likelihood (1-5)					
Action to control risk					
Who is responsible?					
New rating					

Project Scoring Table		
Existing data availability (1 to 5)		
Cost of data acquisition (1 to 5)	+	
Value stream potential (1 to 5)	+	
Regulatory environment and stakeholder support (1 to 5)	+	
Combined Risk level (subtract 1 to 5)	-	
Project viability (1-20)	=	

Scoring rubric to determine viability of proposed conservation finance projects in the Greenbelt	
Low (1-5)	<p>Political: high potential for impact of regime change on project</p> <p>Financial: high cost to the organization funding the project</p> <p>Regulatory: major litigation impact on project</p> <p>Ecological: irreparable damage to the environment and the permanent loss of species or fauna</p>
Medium (6-10)	<p>Political: medium potential for impact of regime change on project</p> <p>Financial: medium cost to the organization funding the project</p> <p>Regulatory: minor litigation impact on project</p> <p>Ecological: greater than 20 years to repair damage to the environment and reverse loss of species or fauna</p>
High (11-15)	<p>Political: low potential for impact of regime change on project</p> <p>Financial: low cost to the organization funding the project</p> <p>Regulatory: minimal litigation impact on project</p> <p>Ecological: between 5 to 20 years to repair damage to the environment and reverse loss of species or fauna</p>
Shovel-ready (16-20)	<p>Political: no potential for impact of regime change on project</p> <p>Financial: low cost to the organization funding the project</p> <p>Regulatory: no litigation impact on project</p> <p>Ecological: less than 5 years to repair damage to the environment and loss of species or fauna</p>



Etobicoke Creek, Toronto, Ontario

4 HOTSPOTS FOR CONSERVATION FINANCE IN THE GREENBELT

While ecological, economic, and socio-cultural aspects of a project are critical, the ability of project proponents to present a business case for investors is equally crucial. This section demonstrates how the blueprint can be applied in the real world following the stepwise guidelines outlined in **Section 3** and applied across five different conservation finance mechanisms—**insurance products, resilience bonds, recreation bonds, revolving funds, and carbon offsets**.

The practical application of the blueprint offers a more direct path for project proponents to understand who the project beneficiaries are, what data are required, where gaps are to be anticipated, which stakeholders need to be consulted, and what type of investment model is the best fit.

4.1 Insurance products in the GTHA

By their very nature, insurance products are directly linked to the resilience of a region. Increased vulnerability of property to natural disasters increases the insurance risk and associated premiums. Insurance premiums are rising across Canada in part due to the ongoing climate crisis and increased frequency of natural disasters.¹⁴⁵

Climate change is projected to increase the severity and frequency of natural disasters in and around the Greenbelt. Droughts, floods, and tornados already impact the region and are expected to worsen in coming years. Key regulating ecosystem services, such as wetlands, are under threat, increasing the vulnerability of public infrastructure and private businesses and properties to economic losses and a growing number of liabilities. Cities with higher concentrations of high-value property—e.g., Toronto, Oakville, Burlington, Mississauga, and Hamilton—are facing the greatest threats, with rapid urbanization pushing regulating ecosystems further away from the areas that need them the most.

Insurance arrangements can be tailored to reward insured parties with lower premiums for investments in resilient natural infrastructure—**Figure 8** provides an example of an insurance-based conservation finance transactional model. They encourage

stakeholders to invest in conservation and restoration projects that reduce the impacts of natural disasters. Reduced premiums and lower remediation costs generate substantial long-term cost savings for businesses and public entities.

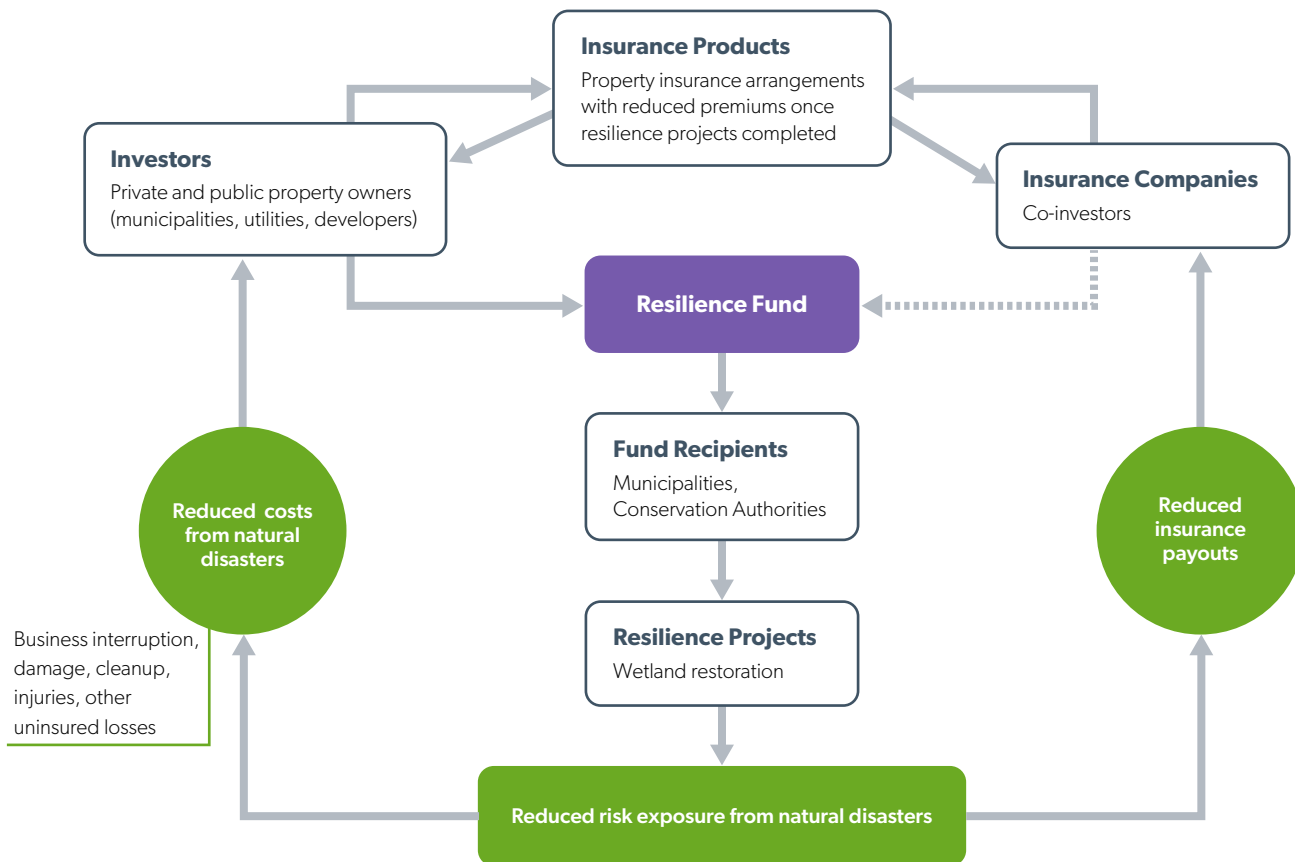


Figure 8. Example of an insurance-based conservation finance model



Insurance Products Hotspot Profile

The high value of key ecosystem services provided by the Greenbelt represents a significant opportunity. On average, each wetland in the Greenbelt provides \$1 million per year by

protecting property from flood damage.¹⁴⁶ Insurance products can be leveraged to enhance the functioning of these natural systems and protect high-value public and private infrastructure in the region.

Regional Hotspot Factors	Key Actions	Potential Stakeholders	
<ul style="list-style-type: none"> • Areas vulnerable to natural disasters and damage—e.g., floodplains, farmland, erosion, hazard trees, pollution, etc. • Areas upstream of at-risk high value properties 	<ul style="list-style-type: none"> • Wetland and natural restoration to increase flood protection and reduce stormwater flows • Farmland management practices to increase infiltration and reduce runoff • Bank stabilisation and channel naturalization to reduce erosion damage 	Investors Insurance companies in partnership with other participants, including municipalities and/or corporate contributors (especially those with property in the region).	Beneficiaries Private landowners within the watershed (especially downstream and along rivers), nearby municipalities and towns experiencing flood damage to transport networks and public property, insurance companies that have lower insurance payouts when risk is reduced through nature-based watershed management.
		Data providers Municipalities, conservation authorities, government departments, Insurance companies	Project implementers Private property owners, municipalities, or conservation authorities

Stepwise example of an insurance-based conservation finance project

Feasibility Assessment	Step 1: Identify ES	Improve flood mitigation (flood prevention)
	Step 2: Identify data needs	<ul style="list-style-type: none"> • Pre- and post- flood modelling • Value of properties at risk <ul style="list-style-type: none"> • Cost of remediation • Potential impacts to insurance premiums
	Step 3: Identify ES values	ES Value: \$1 million a year per wetland Value Stream: Cost savings from lower premiums and reduced flood damage
	Step 4: Identify relevant regulations	<ul style="list-style-type: none"> • Greenbelt Plan • Clean Water Act • Places to Grow
	Step 5: Identify potential partnerships	<ul style="list-style-type: none"> • Investor: Municipality • Beneficiary: Municipality • Implementer: Municipality, upstream landowners, and/or CAs <ul style="list-style-type: none"> • Data provider: Conservation authority, insurance companies • Monitoring agency: Conservation authority
Project Design Assessment	Step 6: Select CF mechanism	Insurance arrangement
	Step 7: Develop investment model	Lower premiums for investing in restoration of key ecosystems
	Step 8: Perform risk assessment	<ul style="list-style-type: none"> • Climate variability • Data requirements

Important considerations for Insurance Hot Spots in the Greenbelt

Since the Greenbelt is close to large population centers, insurance strategies could be applicable in many places and generate significant cost savings for a variety of stakeholders and target beneficiaries (Figure 9). However, it will be most compelling in regions that have experienced the high cost of flood recovery and are actively seeking prevention methods.

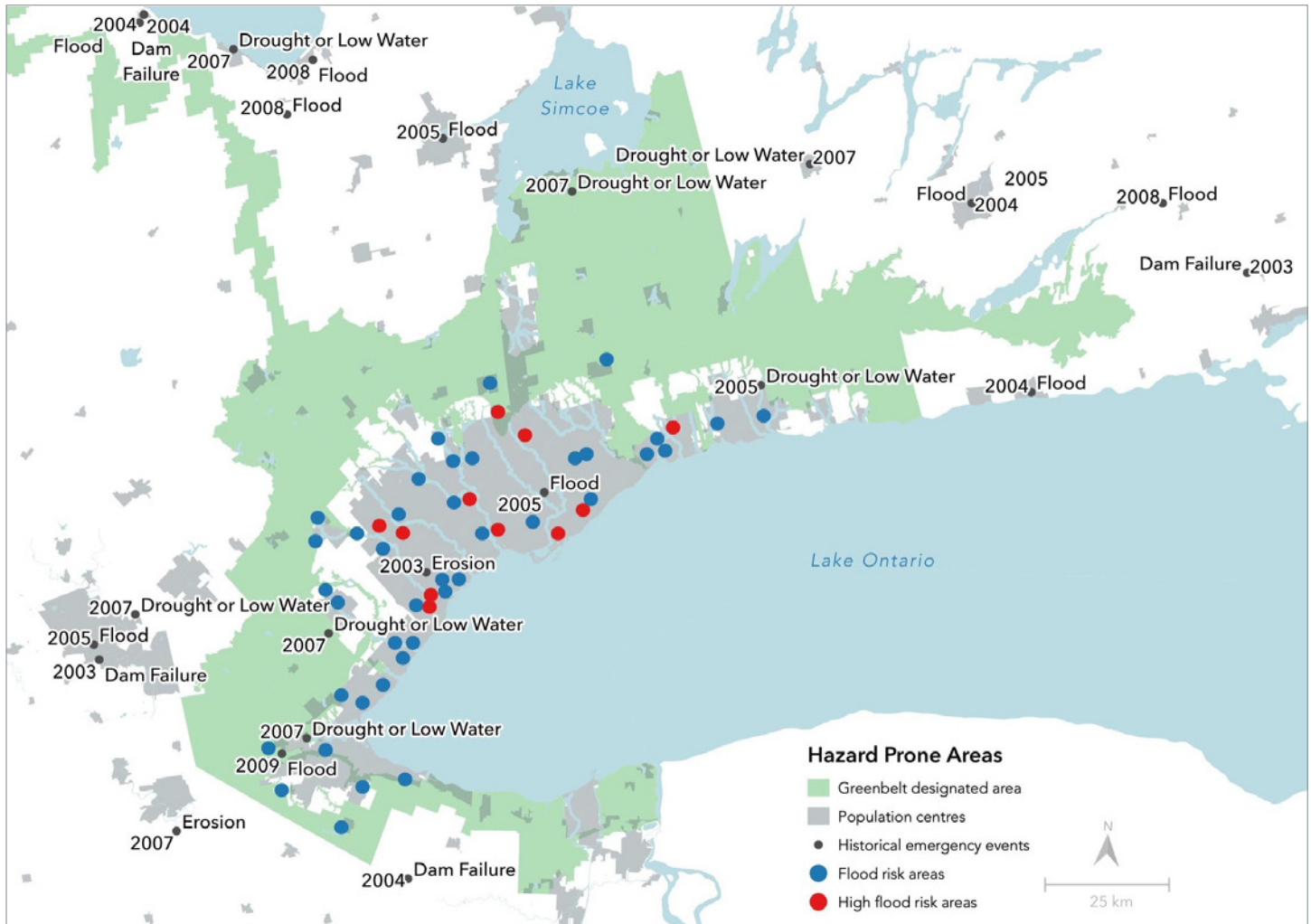


Figure 9. Hotspot for advancing insurance-based conservation finance projects in Ontario's Greenbelt



4.2 Resilience bonds in areas vulnerable to climate-induced natural disasters

With the number of people directly dependent on ecosystem services generated by the Greenbelt expected to reach 15 million people by 2051, the resilience of these ecosystems to withstand the pressures of urbanization and climate change is fast becoming a challenge for sustaining regional development.

Resilience Bonds provide an opportunity for investors to enhance the resilience of key ecosystem services by supporting activities that are targeted to ensure specific types of ecosystem services can continue supporting the growth of local communities—e.g., vegetation restoration on river embankment. Following the conclusion of the bond agreement investors are paid back with interest based on the anticipated cost savings the project delivers to target beneficiaries—e.g., municipalities—improved water quality (Figure 10). These types of Bonds can benefit individuals or collections of organizations whereby the return on the initial investment is projected to be less than the cost savings generated by the resilience building mechanisms of the project—i.e., watershed restoration.

Considerations for resilience bonds are similar to those for insurance arrangements, including the types of participants, but use a different financial model that may be better suited to participants linked by specific changes in ecosystem outcomes—e.g., forestry sector stakeholders, or agricultural producers. With the prospect of a financial return on the initial investment, there is also a greater potential to attract a broader set of investors across a larger geographic area. However, this also requires a high level of regulatory and administrative considerations to administer a bond, hold funds, and deliver returns—the availability of resources and site accessibility for ongoing monitoring and evaluation are key considerations.

Important considerations

Resilience Bonds require the coordination of multiple stakeholders, as well as the participation of intermediaries to coordinate the terms of the Bond and serve as potential outcome buyers—i.e., beneficiaries that stand to gain financial benefits and are positioned to fund repayments to investors. The structure of resilience bonds should aim to limit the exposure risk of outcome payers by establishing repayment schedules that are indexed to cost savings generated by project outcomes.

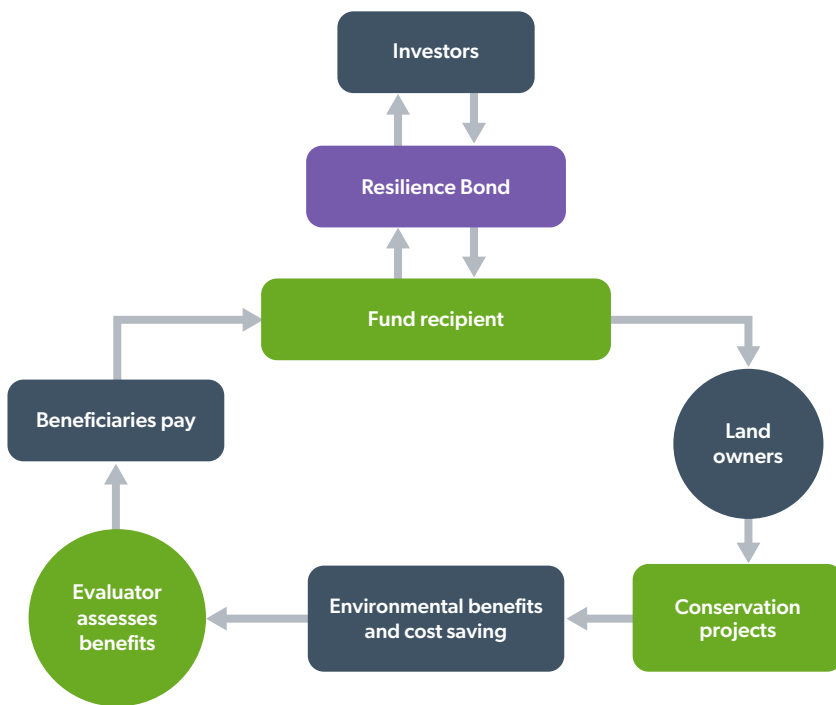
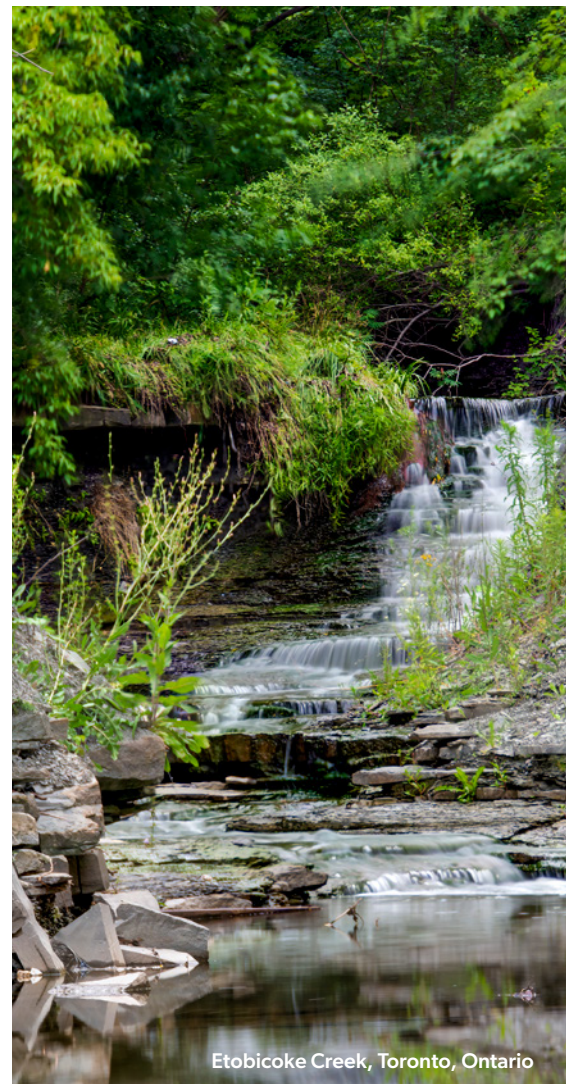


Figure 10. Example of a transactional model for a resilience bond



Etobicoke Creek, Toronto, Ontario

Resilience Bond Hotspot Profile

Regional Hotspot Factors	Key Actions	Potential Stakeholders	
<ul style="list-style-type: none"> • Areas vulnerable to natural disasters– e.g., coastal areas, floodplains, • Ecosystems vulnerable to degradation, land use change, • High value property at risk, • Public and private assets at risk 	<ul style="list-style-type: none"> • Water: wetland & habitat restoration to increase permeability, • Forest: fire prevention, afforestation, • Agricultural: BMPs to increase SOC, reduce erosion, or produce other climate/ environmental benefits 	Investors Municipalities, conservation authorities, governments, tourism organizations, outdoor recreation user groups.	Beneficiaries Municipalities, energy utilities, private property owners, and any other group of actors that bear the costs of damage from climate change and natural disasters.
		Data providers Any organization with a vested interest in ecosystem accounting. May include conservation authorities, municipalities, and/or local environmental NGOs.	Project implementers Any land owner with authorization to undertake conservation of restoration projects at the target site– e.g., Conservation Authorities, Municipalities, provincial or Federal Government.

Stepwise example of a conservation finance project using a resilience bond

Feasibility Assessment	Step 1: Identify ES	Mitigate agricultural run-off (water run-off control)
	Step 2: Identify data needs	<ul style="list-style-type: none"> • Dissolved O₂ • Nitrates • pH <ul style="list-style-type: none"> • Bioindicators • Removal rates • Remediation costs
	Step 3: Identify ES values	ES Value: \$366 per ha Value Stream: Cost savings from reduced expenditures on water treatment
	Step 4: Identify relevant regulations	<ul style="list-style-type: none"> • Clean Water Act • Conservation Authorities Act • Great Lakes Protection Act
	Step 5: Identify potential partnerships	<ul style="list-style-type: none"> • Investor: Impact investor • Beneficiary: Municipality (e.g., Hamilton or Toronto) • Implementer: Agricultural producers <ul style="list-style-type: none"> • Data provider: Conservation authority • Monitoring agency: Conservation authority • Outcome payer: Federal/provincial government
Project Design Assessment	Step 6: Select CF mechanism	Resilience Bond
	Step 7: Develop investment model	Capital investment repaid (+2%) once nitrates are reduced by 15%
	Step 8: Perform risk assessment	<ul style="list-style-type: none"> • Costs of monitoring • Securing project outcomes

4.3 Recreation bonds in high-value tourism areas

The Greenbelt supports one of Canada’s largest outdoor recreation markets, generating more than \$2.1 billion in direct annual revenues. Specifically, recreation and tourism opportunities on the Niagara and Bruce Peninsulas are two of the region’s busiest recreation areas, welcoming more than 15 million annual visitors and generating more than \$5 billion in tourism revenues (Figure 12). Halton and Toronto Region Conservation authorities also welcome more than 1 million annual visitors, and parks and protected areas across the region are welcoming a record number of visitors seeking opportunities for outdoor recreation closer to home.^{147,148,149}

Moving forward, investing in maintaining and enhancing high value recreation opportunities in the Greenbelt is an opportunity to leverage a growing interest among residents to further invest in the conservation and restoration of the ecosystems to ensure they remain accessible for current and future generations. Recreation Bonds, offer an innovative financing model that supports conservation and restoration initiatives by leveraging existing capital revenues to attract investor interest by undertaking project improvements that lead to greater recreation and

tourism opportunities. Recreation Bonds are applicable at a variety of scales and across a variety of project types—including both large-scale protected areas and micro-scale urban parks.

While investors provide the initial capital investment, repayment on the investment is triggered after the achievement of a predetermined project outcome (Figure 11)—e.g., local tourism increases 15% over 5 years. Establishing target outcomes for repayment can be direct to project outcomes—e.g., 25% increase in the collection of annual user fees, or indirect from sector-supporting activities—e.g., an increase of 10,000 non-resident visitors to local businesses.

Areas of the Greenbelt that currently attract many visitors seeking outdoor recreation opportunities and natural heritage experiences are high-potential areas to implement a recreation-based conservation finance project. High value urban and peri-urban natural areas that are either at-risk or under high-demand for visitation are also high potential areas to leverage recreation revenues to increase investments in conservation and restoration.

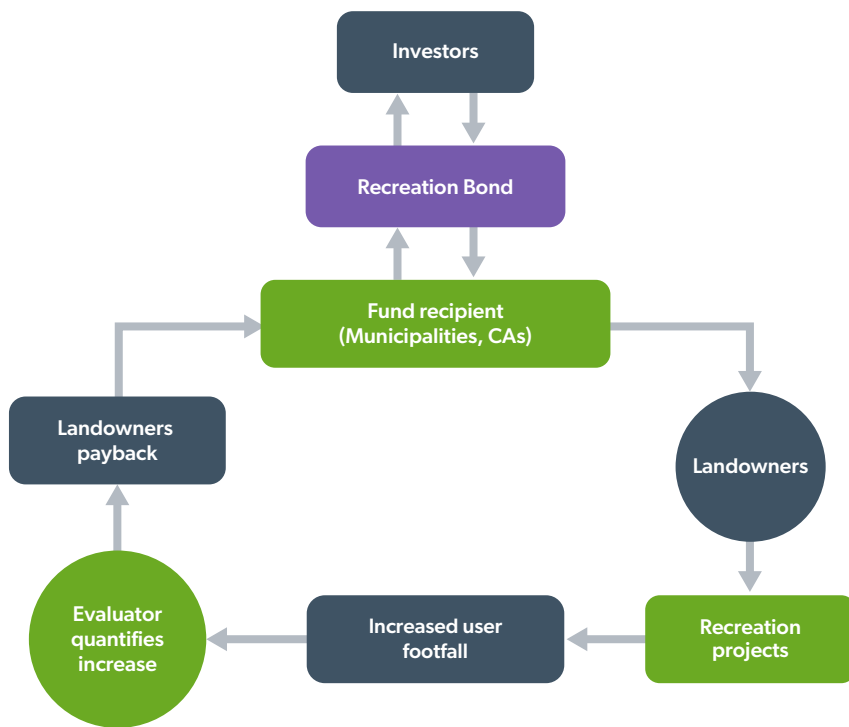
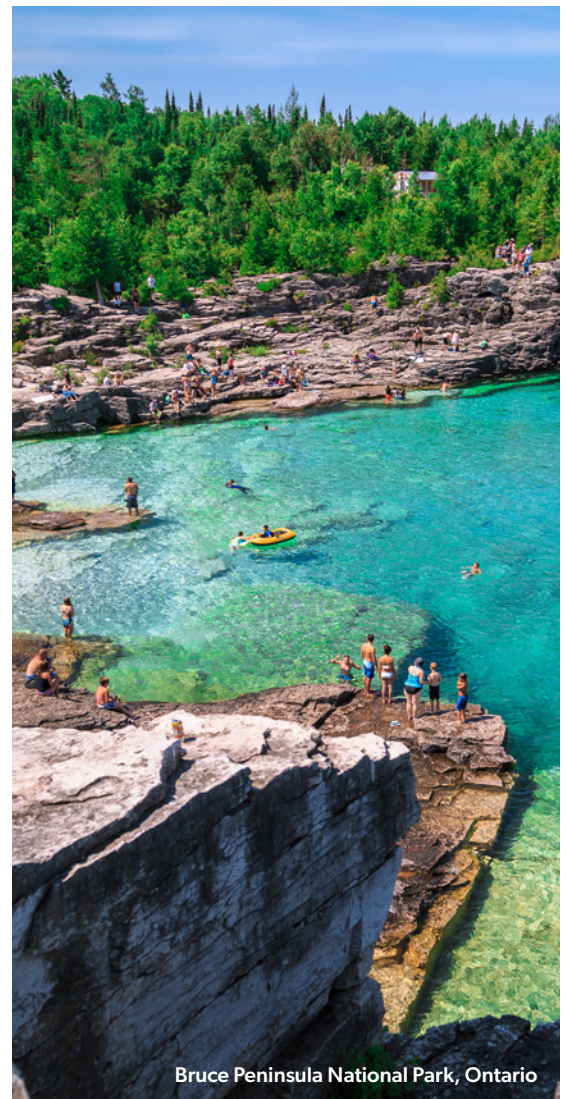


Figure 11. Example of recreation bond transactional model



Bruce Peninsula National Park, Ontario

Important considerations

The Greenbelt Foundation supports nature-based tourism by making it easier to experience the agricultural landscapes and natural beauty of the Greenbelt. For example, the Foundation supports the Bruce Peninsula Biosphere Association to host guided treks of the Bruce Peninsula called EcoAdventures. The revenue generated funds local conservation projects. Similarly, the Foundation supports agri-food and culinary tourism through rural tourism mainstays like farmer’s markets, microbreweries, cideries, wineries, and other experiences. The Foundation has partnered with the Culinary Tourism Alliance to develop

Greenbelt Discovery Routes, which highlight the unique and diverse food and drink experiences found near picturesque trails. In this way, the parks, trails, and agricultural areas of the Greenbelt offer numerous opportunities to explore and connect with nature. **Figure 12** provides an overview of some of the high value tourism and recreation opportunities available in the Greenbelt. Potential hotspots identify areas of the Greenbelt that are high-draw recreation and tourism areas.

Recreation Bond Hotspot Profile

Regional Hotspot Factors	Key Actions	Potential Stakeholders	
<ul style="list-style-type: none"> High value & accessible recreation areas Unique natural heritage Parks and greenspaces in urban areas Large scale parks and marine protected areas that offer high quality outdoor recreation experiences 	<ul style="list-style-type: none"> High-quality, low environmental impact wilderness experiences Improve park management Habitat restoration and conservation 	Investors Municipalities, conservation authorities, governments, tourism organizations, outdoor recreation user groups.	Beneficiaries Municipalities, conservation authorities, provincial and national parks, Canadians seeking high-quality outdoor recreation experiences.
		Data providers Park management offices, tourism departments, local/regional businesses.	Project implementers Parks departments, conservation authorities, environmental NGOs and charities with a focus on outdoor recreation

Stepwise example of a conservation finance project using a recreation bond

Feasibility Assessment	Step 1: Identify ES	Increase the capacity of provincial campsites (recreation)
	Step 2: Identify data needs	<ul style="list-style-type: none"> Visitation number Tourism statistics Habitat quality Restoration or conservation status
	Step 3: Identify ES values	ES Value: \$125 ha ⁻¹ Value Stream: User fees
	Step 4: Identify relevant regulations	<ul style="list-style-type: none"> Greenbelt Act Conservation Authorities Act More Homes Built Faster Act
	Step 5: Identify potential partnerships	<ul style="list-style-type: none"> Investor: Provincial government Beneficiary: Municipality; individuals Implementer: Ontario Parks Data provider: Destination Ontario; Conservation authorities Monitoring agency: Ontario Parks
Project Design Assessment	Step 6: Select CF mechanism	Recreation Bond
	Step 7: Develop investment model	Investors purchase a bond coupon (2%). Repayment is triggered once visitation levels increase +15% above baseline. Repayment can be financed from increased user revenues
	Step 8: Perform risk assessment	<ul style="list-style-type: none"> Understanding user changes in behaviours Outdoor recreation trends Pandemic; safety



Bruce Peninsula National Park, Ontario

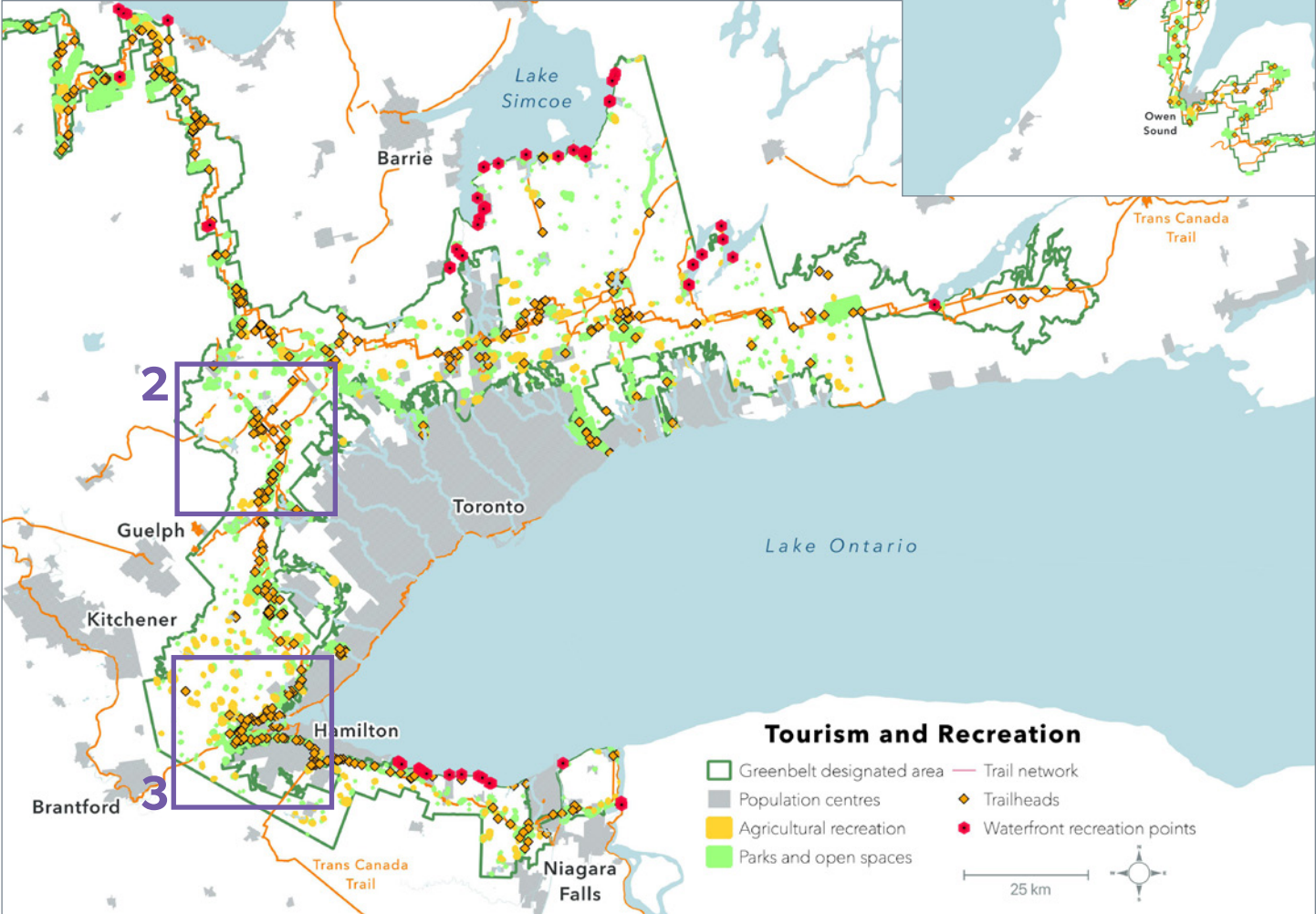
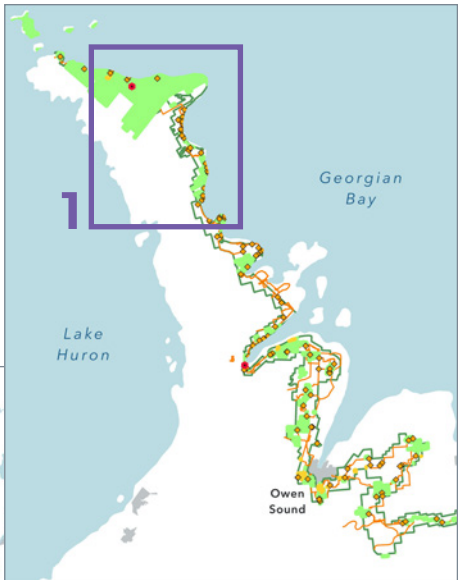


Figure 12. Tourism and Recreation Hotspots

1. **Bruce Peninsula National Park** features dramatic cliffs, the turquoise waters of the Georgian Bay, large tracts of forest, and wetlands that make it a highly popular destination. In 2019, Bruce Peninsula National Park welcomed 490,000 visitors and generated \$326 million in revenue and 2.5 million visitors for Bruce County. Located nearby, the **Fathom Five National Marine Park** is another popular destination with the **Tobermory**, located on the tip of Northern Bruce Peninsula offering views of the park's islands. The park welcomes up to 900,000 visitors every year. Recreation activities in these two areas attract up to 1.4 million visitors each year and generate \$129 million in yearly revenue.
2. **Forks of the Credit Provincial Park** offers visitors scenic waterfall views and opportunities to see a diversity of wildlife. It is situated next to very dense population centres. It also includes the **Bruce Trail**, an iconic part of the Greenbelt that runs nearly 900 kilometres along the edge of the Niagara Escarpment, stretching from the Niagara River in the south to Tobermory in the North.
3. **Escarpment Expedition** is part of Greenbelt Discovery Routes, a collaboration between the Greenbelt Foundation and the Culinary Tourism Alliance. Here visitors can explore the dramatic Niagara Escarpment along trails that make easy connections into nearby historic downtowns offering unique and diverse food and drink experiences.

4.4 Scaling projects using a revolving fund for a Greenbelt-wide impact

The distribution of ecosystems and current land use in the Greenbelt is highly heterogeneous and generates significant value from the delivery of key ecosystem services. These services include \$409 million per year in water filtration benefits from freshwater ecosystems; \$568 million in avoided water treatment costs and flood mitigation from forests and wetlands; and \$329 million per year in non-market value for agricultural lands.

As such, ecosystems in the Greenbelt hold a high potential to benefit from a revolving fund. A revolving fund offers opportunity to advance projects at a variety of scales—micro to landscape—and involves a large pool of assets that can be invested upfront to advance any project that meets the funds criteria. The range of activities, value streams, and land use types in the Greenbelt offers the potential for a diverse project portfolio to attract investors and minimize the risks of investing in individual projects. Examples of projects that could benefit from applying a revolving fund mechanism in the Greenbelt include, recreation improvements, stormwater management enhancements, wetland restoration, agriculture conservation, riparian zone restoration, and improved nutrient management. Overall, revolving

funds must include a critical mass of ‘investable’ projects that generate enough revenues, or cost savings, to ensure investors can be repaid—i.e., projects under a revolving fund model need to collectively generate sufficient returns to fund repayments to investors, as well as incentivize new investments on a revolving basis.

Revolving funds tend to operate at a regional level to attract an appropriate number of investors to finance larger conservation and restoration initiatives. The investment is typically paid back from cost savings over time but can also be paid back using other revenue streams, such as increased revenues from nature-based service deliveries or from revenues diverted into a sinking fund (Figure 13).

The advantage of a revolving fund mechanism is that it can spread risk across projects at different scales and that it can deliver relatively consistent returns to investors by investing in projects with staggered timelines. Revolving Funds are not bound by specific ecosystem services, or project types, and can be applied in a variety of contexts, which can enhance investor confidence by offering a diverse investment portfolio.

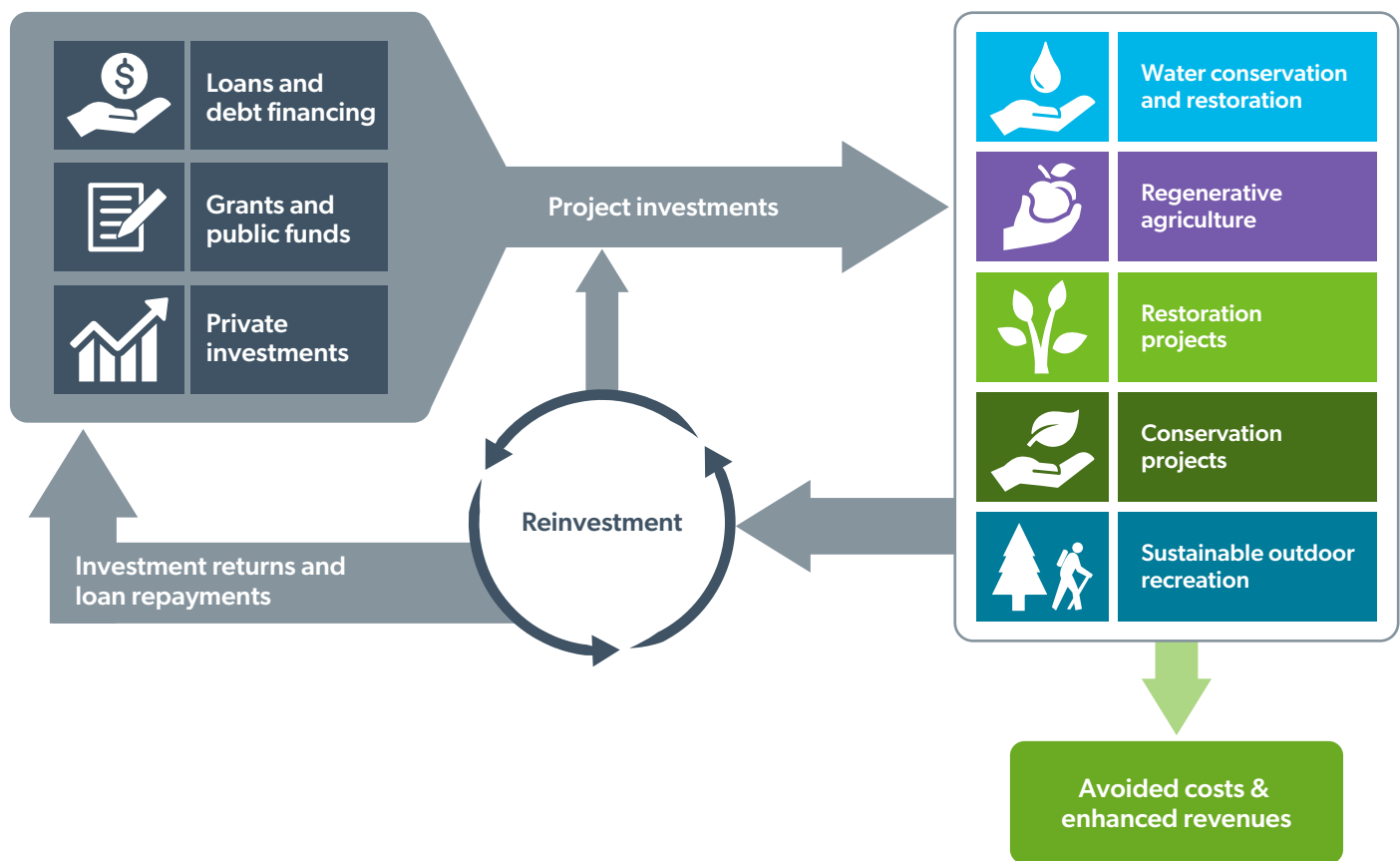


Figure 13. Example of a revolving fund transactional model

Revolving Fund Hotspot Profile

Regional Hotspot Factors	Key Actions	Potential Stakeholders	
<ul style="list-style-type: none"> • Areas facing a common problem, such as stormwater, wetland degradation. • Areas with revenue opportunities such as recreation sites. • Public and private assets at risk 	<ul style="list-style-type: none"> • Wetland restoration • Nature-based flood mitigation • Maintenance or upgrades to recreation sites • Best management practices to control of nutrient runoff, enhance forest fire management, and reduce soil erosion 	Investors Financial institutions, governments, charitable foundations, ENGOs.	Beneficiaries Municipalities, conservation authorities, private property owners, etc.
		Data providers Conservation authorities and municipalities	Project implementers Conservation authorities, municipalities, provincial government

Stepwise example of a conservation finance project using a revolving fund

Feasibility Assessment	Step 1: Identify ES	Identify threats to the ecosystem, and associated actions that can result in cost saving, or generate revenue.	
	Step 2: Identify data needs	<ul style="list-style-type: none"> • Intensity of threats to ecosystem 	<ul style="list-style-type: none"> • Cost savings or revenue per \$ of investment
	Step 3: Identify ES values	ES Value: \$409 million per year for water filtration by wetlands in Greenbelt	Value Stream: Cost savings from reduced expenditures on, say, water treatment
	Step 4: Identify relevant regulations	<ul style="list-style-type: none"> • Not-for-profit Corporations Act • Clean Water Act • Greenbelt Plan 	
	Step 5: Identify potential partnerships	<ul style="list-style-type: none"> • Investor: Impact investor • Beneficiary: Municipality, conservation authority • Implementer: Municipality, conservation authority 	<ul style="list-style-type: none"> • Data provider: Conservation authority • Monitoring agency: Conservation authority, municipality, provincial government • Outcome payer: Provincial government, municipality, farmers
Project Design Assessment	Step 6: Select CF mechanism	Revolving fund	
	Step 7: Develop investment model	Capital investment repaid through cost savings	
	Step 8: Perform risk assessment	<ul style="list-style-type: none"> • Costs of monitoring • Securing project outcomes 	

Important considerations

Revolving funds can also be used as an effective tool to channel resources between different conservation and restoration projects, enabling the advancement of environmentally critical projects that may be less cost-effective from an investment standpoint. For example, shoreline restoration projects have the potential to provide long-term ecological and economic benefits in terms of flood resilience and water quality improvements, but the time horizon to realize these benefits may limit interest among certain investors. Under a revolving fund model, packaging these types of projects with others that can generate

immediate and consistent revenue streams—e.g., carbon offsets—can help limit the risk of investing in projects with longer investments terms. With an established rate of return, Revolving Funds provide project proponents and fund managers with a high level of flexibility to finance projects and optimize the allocation of resources to achieve both short- and long-term goals.

4.5 Carbon offsets in the Ganaraska Forest, specialty crop areas in the Niagara Peninsula, and in the 'Whitebelt'

Applying carbon offsets in the Greenbelt could result from the natural sequestration ability of ecosystems, including forest conservation, wetland restoration, wildlife habitat restoration, and agriculture best management practices. The Greenbelt's forests, wetlands, and soils cumulatively store over 102 million tonnes of carbon with a value of \$366 million per year based on the average damage cost of carbon emissions. The annual carbon uptake is an estimated 167,364 t C, worth \$11 million per year.¹⁵⁰

Carbon offsets can generate significant revenue for conservation, though the price for regulated and voluntary offset credits is influenced by demand. Demand is expected to increase in both the voluntary (net zero commitments) and the regulated markets, with new protocols emerging from the federal government. Although demand is the primary determinant for the value of offsets in both types of markets, credits with additional co-benefits—e.g., positive impacts on biodiversity—can be sold at a premium in voluntary markets. **Figure 14** illustrates an example of a carbon offsets transactional model that could be used to support the development of future offsets projects in the Greenbelt.

The first regulated federal offset protocols being developed in Canada include improved forest management, and enhanced soil organic carbon. Once implemented, project proponents in the Greenbelt would be able to take advantage of regulatory offsets markets to advance projects in these two thematic areas. Offset programs aligned with the conservation and restoration goals of Ontario's Conservation Authorities, and projects targeted to ecosystems in the "Whitebelt" (areas designated for future urban development) represent substantial opportunities to reduce the threat of land use change while generating significant value streams in the forms of carbon offsets.

Wetlands, forests, and agricultural soils in Ontario's Greenbelt is estimated to store 86Mt C translating to \$4.5 billion, or the equivalent of annual emissions from 76 coal fired power plants.¹⁵¹ However, certain areas of the Greenbelt store more carbon than others. Wetlands are the most substantial reservoirs of carbon as compared to other types of ecosystems.¹⁵² The magnitude of storage depends upon wetland type and size, vegetation, the depth of wetland soils, groundwater and nutrient levels, pH, and other factors. Agricultural soils can also be a significant carbon sink depending on local management practices and ecosystem conditions. Figure 15 shows the distribution of carbon stocks in the Greenbelt and identifies three potential hotspots for advancing offset projects.

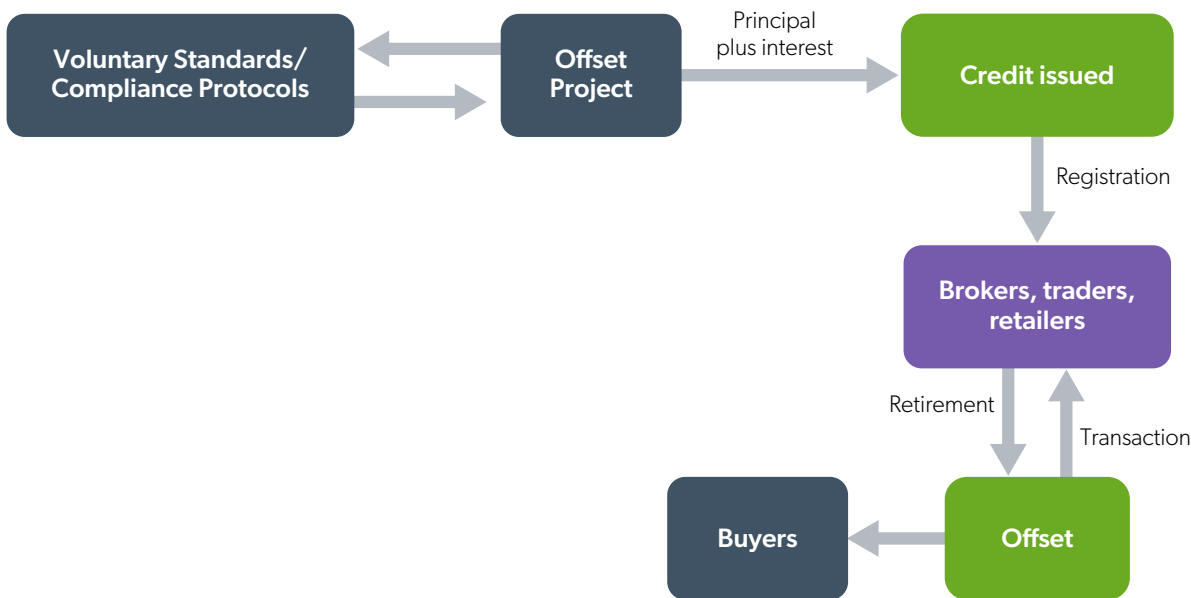


Figure 14. Example of a carbon offset transactional model

(Source S&P Global Commodity Insights, 2021)

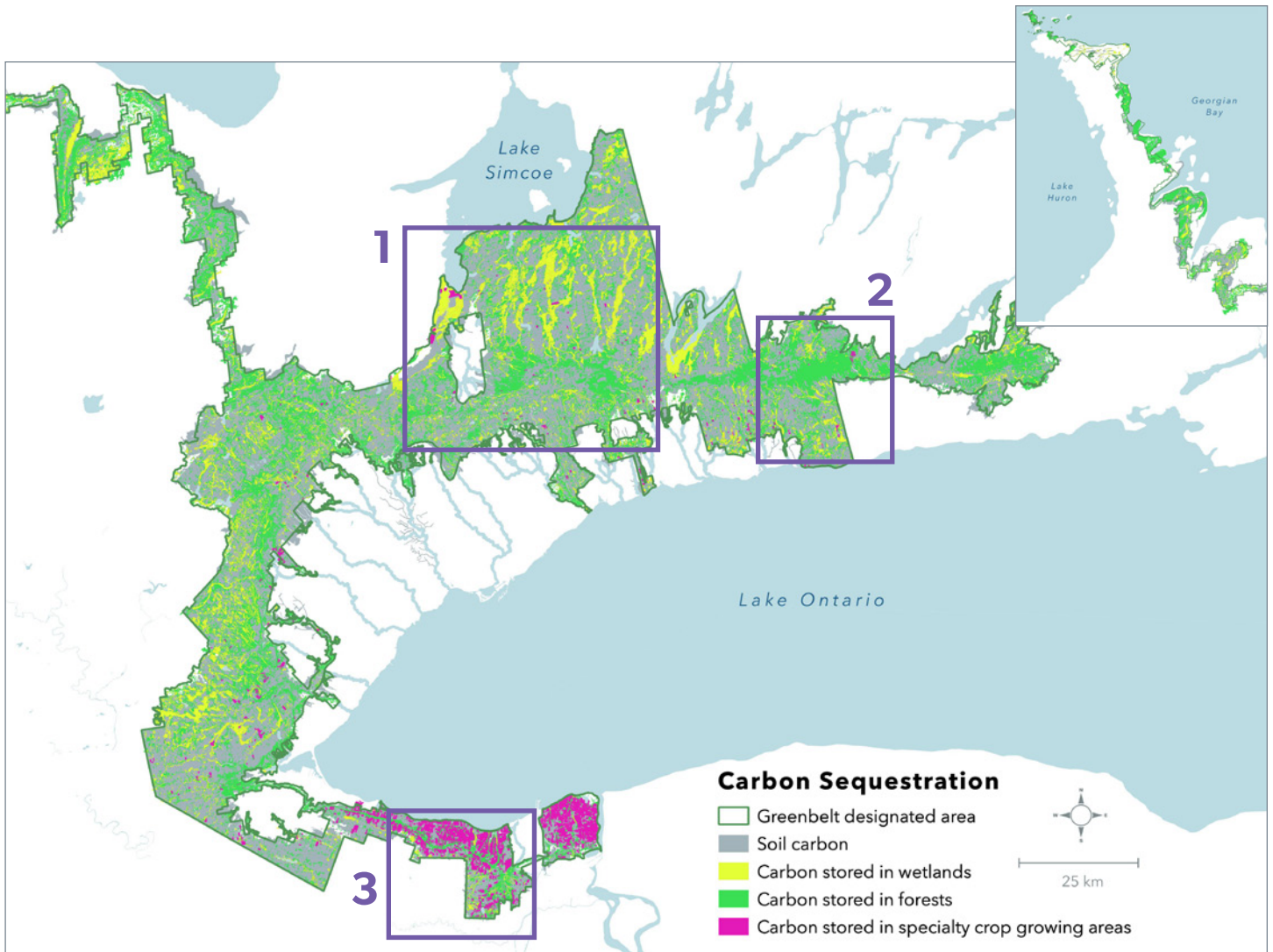


Figure 15. Hotspots for carbon sequestration in wetlands, forests, and specialty crop areas in the Greenbelt

Colored areas depict potential presence of carbon stored in wetlands, forests, and specialty crop growing areas

Carbon Offset Hotspots

1. **Large wetlands and forest ecosystems** in proximity are likely sequestering the highest carbon levels in the Greenbelt. The Zephyr Creek Wetlands are deemed “provincially significant wetlands” with significant carbon sequestration and storage capacity, as well as significant flood mitigation, groundwater recharge, and water quality improvement co-benefits. The wetland and forest ecosystems in this region also support the Holland Marsh specialty crop growing areas (located on the western edge of the hotspot) and its high-value agriculture and ecotourism experiences. Significant carbon stocks and a diverse range of co-benefits create a hotspot to advance carbon offset projects.
2. **Ganaraska Forest** is one of the largest forests in Ontario covering almost 4,500 ha. The forest protects and improves water resources, regulates stream flow and flooding, and provides valuable breeding habitats for local fish populations. It is also a high-value recreation area that includes the

Ganaraska Forest Centre, a large multi-use facility. The forest is actively managed by Ganaraska Conservation which offers an opportunity to not only conserve the carbon sequestered here but also to increase the levels of soil carbon through restoration and better management practices.

3. **Agricultural areas** near Hamilton support high-value tourism and recreation experiences. However, they also show a presence of wetlands and forests that, if restored and increased in size, offer an opportunity to increase the amount of carbon sequestered. In areas where agricultural land is not being used, reforestation and restoration of grasslands and wetlands can reduce the carbon deficit caused by years of agricultural production and can result in carbon gains. Other agricultural best management practices such as irrigation of pasture or rangelands can also increase carbon levels. The effect of agricultural land management on soil carbon levels is the subject of much current research and could play a significant role in improving soil carbon levels in the Greenbelt.

Important considerations

Carbon offsets typically require large pieces of contiguous land. As a result, conservation authorities, municipalities, and the federal and provincial governments are key stakeholders (likely as beneficiaries or investors). Following an established standard (e.g., Verra), or developing a standard, to certify emissions reductions is an integral part of providing assurances for the

permanence of offsets being generated by a given project and reduces the risk of double counting. Credits that follow a recognized standard can potentially fetch a higher price in voluntary markets. Similar to the resilience bond model, having an independent monitoring and evaluation agency that follows an accepted standard is a key step to incentivize potential buyers to participate in any type of carbon offset project.

Revolving Fund Hotspot Profile

Regional Hotspot Factors	Key Actions	Potential Stakeholders	
<ul style="list-style-type: none"> Areas with high carbon stock that are under threat of land use change 	<ul style="list-style-type: none"> Profiling existing carbon stock in area of interest, Feasibility assessment of projects that could enhance carbon stock 	Investors Financial institutions, provincial government	Beneficiaries Municipalities, conservation authorities, private property owners
		Data providers Provincial government, conservation authorities, municipalities.	Project implementers Conservation authorities, municipalities, Provincial government

Stepwise example of a conservation finance project using carbon offsets

Feasibility Assessment	Step 1: Identify ES	Carbon credits	
	Step 2: Identify data needs	Carbon stored per ha	
	Step 3: Identify ES values	ES Value: Carbon stored worth \$366 million per year	Value Stream: Increase in carbon sink, and co-benefits such as improved water table, wildlife habitat restoration
	Step 4: Identify relevant regulations	<ul style="list-style-type: none"> Federal Offset Protocol (pending) Places to Grow Act 	<ul style="list-style-type: none"> More Homes Built Faster Act Greenbelt Plan
	Step 5: Identify potential partnerships	<ul style="list-style-type: none"> Investor: Provincial government, conservation authority, municipality Beneficiary: Conservation authority, provincial government Implementer: Conservation authority 	<ul style="list-style-type: none"> Data provider: Conservation authority, municipality Monitoring agency: Conservation authority, municipality Outcome payer: Buyer of carbon credits
Project Design Assessment	Step 6: Select CF mechanism	Carbon credit	
	Step 7: Develop investment model	Sale of verified carbon credits in voluntary carbon markets	
	Step 8: Perform risk assessment	<ul style="list-style-type: none"> Cost of project design and monitoring Permanence Fluctuation of price of credits 	



Beamer Memorial Conservation Area, Grimsby, Ontario

CONCLUSION

Dynamic regional ecosystems have long supported the resilience and prosperity of Southern Ontario communities. Investing in the conservation and restoration of these ecosystems is crucial for maintaining agriculture production, conserving habitats, and reducing fragmentation, ensuring access to clean air and water, and for mitigating the growing impacts of climate change.

Over the next 20 years, the well-being of local communities will become increasingly dependent on the capacity for Ontario's Greenbelt to continue delivering vital ecosystem services. A diversity of regional stakeholders—including private landowners, municipalities, and financial institutions—are expressing an interest in the potential revenues and cost savings that could be generated by investing in the maintenance of key Greenbelt ecosystems. As a result, local communities are facing an unprecedented opportunity to enhance climate resilience and overall well-being by expanding investments in nature—a process that has the potential to be accelerated using a conservation finance approach.

However, despite a growing interest in the connection between the ecological and economic value of ecosystems across the Greenbelt, a few critical knowledge gaps remain. Connecting investments in nature to discrete, measurable economic value streams remains a challenge at the project level, which can increase the uncertainty and risk of pursuing conservation finance investment models. Direct investing in natural assets is also a relatively new concept in the Canadian context, adding further complexity when evaluating the investment potential of various new and innovative project designs. Finally, project proponents and potential investors are still speaking different languages when exploring the potential of conservation finance projects to secure necessary investments for crucial ecosystems—the resulting higher transaction costs of project designs often lead to few projects moving beyond the concept phase. The result is a recognition of the importance of ecosystems in the Greenbelt for building ecological and economic resilience, but also a continued willingness to prioritize short-term growth over long-term prosperity.

The conservation finance blueprint outlined in this report provides local stakeholders with consistent and clear information on how to enhance these benefits using a variety of innovative financial mechanisms; and to equip decision-makers with guidelines for selecting the appropriate approach and corresponding tools to design projects that can attract greater public and private investment to achieve key conservation and restoration objectives. Following the stepwise process of the blueprint is intended to provide project-level clarity on what is needed to attract new forms of financing to conservation and restoration initiatives in Ontario's Greenbelt region. A few of the 'shovel-ready' opportunities include:

1. **Develop insurance products that incentivize investments in nature-based infrastructure.** Climate change is increasing the frequency of natural disasters. As a result, public utilities, private property owners, businesses, farms, parklands, and municipalities are vulnerable to an increasing number of economic losses and liabilities. Designing insurance products that incentivize investments in climate resilient infrastructure, water source protection, and disaster mitigation present a clear opportunity to minimize the risks of future natural disasters.
2. **Explore recreation bonds to improve the health and well-being of local communities.** With many ecosystems in the Greenbelt already considered to be vulnerable to pressures of overuse and increasing habitat fragmentation, the impact of these pressures on local communities places the health and well-being of residents directly at risk. More work is needed to connect conservation and restoration to specific health outcomes in the Greenbelt, but there is significant potential to design conservation finance projects using health-based value streams.
3. **Design resilience bonds that reduce flooding and improve source water protection.** Flooding is a serious risk in the Greenbelt. Municipal stormwater systems are under increasing pressure due to urbanization and more frequent extreme rainfall events due to climate change. The Greenbelt also helps protect crucial regional water resources that support local agriculture and recreation activities. Resilience bonds can help protect and improve regional water while boosting the value of key economic sectors and helping municipalities avoid costly infrastructure upgrades and flood damage.
4. **Design a Revolving Fund to mitigate habitat loss and biodiversity.** The risk of habitat loss, habitat fragmentation, and invasive species affects ecological function and economic productivity in the Greenbelt, and across Southern Ontario. **Revolving funds** provide the opportunity to de-risk investments in conservation and restoration projects at a scale that is attractive to large private investors. With diverse ecosystems in the Greenbelt already generating substantial revenues from tourism and agriculture, a coordinated approach could represent an opportunity to develop further low-risk, high-impact investments at scale.
5. **Explore the potential of carbon offsets in regional forests.** With 120,000 hectares of forest cover in the Greenbelt, using a voluntary offset protocol, revenues from a carbon offset project could amount to an additional \$17 million in annual revenues. The implementation of federal offset protocols for forest and soil carbon will only serve to increase the confidence of potential investors and expand the potential markets for developing these types of conservation finance projects.

By highlighting the underlying data requirements, outlining the roles and responsibilities of key stakeholders, and identifying appropriate performance measurement tools to better connect conservation efforts with novel forms of public and private investment there is a real opportunity to improve environmental quality, provide cost savings to landowners and municipalities, and offer resilience in the face of a changing climate, ultimately improving the quality of life and human well-being in Ontario's Greenbelt and its surrounding communities.

Appendix 1: Additional conservation finance mechanisms

Environmental Impact Bonds (EIB) are another form of bond structure that is directly tied to specific conservation or restoration actions that reduce the risk of costly disaster-related events. Under this structure, buyers provide an initial capital investment to undertake conservation or restoration projects (e.g., wetland restoration to improve hydrological functioning) that reduces the risk of future disaster-related events (e.g., improved flood mitigation). Cost savings delivered to project beneficiaries (e.g., cost savings of reduced flood damage for municipalities or insurance companies) are used to calculate a predictable repayment structure that incentivizes the participation of both EIB buyers and beneficiaries. The main purpose of EIBs is to mitigate climate and environmental risks but they may also generate additional value streams (e.g., generating carbon credits).

Soil carbon credits are another form of tradable market-based mechanism that focuses on the stock and sequestration capacity of soil complexes. Soils store more than half of the available carbon biomass and credit programs that calculate changes in soil carbons and regulate markets for the purchase and exchange of these credits are being piloted in several jurisdictions in North America. Establishing markets for soil carbon credits in Ontario's Greenbelt will depend on the details of the anticipated soil organic carbon protocol being developed under the *Federal Greenhouse Gas Offset System*. With regenerative agriculture driving the growth of intermediary markets for soil carbon credits elsewhere in North America, a favorable regulatory framework would likely represent a sizable opportunity to pursue similar credit programs in the Greenbelt.

Species and habitat mitigation and conservation banks are legal instruments of compensatory mitigation that involve the creation and sale of credits for a specific species or ecosystem of concern. The landowner protects and conserves their land to earn credits which can be sold to a project developer to offset damages done elsewhere. Canada has some experience with habitat banking in the fisheries context. Most habitat and species offsets in Canada are regulated federally under the Impact Assessment Act and provincial policies also apply (e.g., Alberta Wetland Policy). In the Greenbelt, the lack of an enabling provincial regulatory framework limits the suitability of these types of credits for developing conservation finance projects.

- **Applicability in the Greenbelt:** Federally regulated land in the Greenbelt (e.g., Lake Ontario or the Trent Severn Waterway) provides a more favourable regulatory environment to advance projects using these types of instruments, but the size and scope of these areas is limited under current legislation.

Stormwater management credits (SMC) are a market-based mechanism to offset or reduce environmental damages of development. It may be possible to leverage these credits for restoration projects in the Greenbelt.

Stormwater management is expensive and many municipalities in Southern Ontario have begun to charge property owners a stormwater fee to support infrastructure projects. Currently, stormwater charges are in place in Mississauga,¹⁵³ Kitchener-Waterloo,¹⁵⁴ Guelph,¹⁵⁵ Newmarket,¹⁵⁶ Brampton,¹⁵⁷ Markham,¹⁵⁸ Burlington,¹⁵⁹ and Vaughn.¹⁶⁰ Barrie's stormwater charge will start in 2023.¹⁶¹ In the wake of flooding events in 2018 and 2020, consultations to implement similar charges in Toronto are ongoing.¹⁶² Stormwater charges often appear as part of a water bill. These charges are typically based on property size or the amount of hard surface on the site.

- **Applicability in the Greenbelt:** Of the cities which charge stormwater fees, some have also instituted Stormwater Management Credit (SMC) programs. Mississauga and Guelph, for instance, permit non-residential landowners to save up to 50% of stormwater service fees by installing on-site best management practices to reduce the quantity and improve the quality of stormwater. On-site restoration and green infrastructure investments would qualify for these incentives, including rain gardens, bioswales, buffer strips, and bioretention systems.

Inspiration for using stormwater credits to incentivize conservation and restoration can be found in many cities across the United States. For example, Washington, DC, has operated a Stormwater Retention Credit Program since 2013 and has been able to attract substantial private investment into local stormwater projects.¹⁶³ **Currently, the regulatory environment in the Greenbelt lacks key elements to stimulate the adoption of similar credit programs**, but recent changes in provincial legislation may create an enabling environment—i.e., strict quality regulations, discharge standards, and limited municipal funding.

Parametric insurance can be used to insure natural assets, such as forests and wetlands. This includes payments to the insured entity (municipality or conservation authority) after a predetermined nature-based event (e.g., level of rainfall or wind speed). The success of these types of mechanisms is based on the availability of rapid and up-to-date site data that is used to determine whether payments should be triggered.

Appendix 2: Design instruments and measurement tools

Design instruments

Cost Effectiveness Analysis (CEA)

CEAs measure the efficiency and efficacy of a proposed solution for achieving desired outcomes. To achieve these goals, CEAs typically use 'natural units' when evaluating different project options. A CEA approach can be a useful tool for identifying the comparative economic benefits of implementing a watershed restoration project, or similar grey infrastructure project, to reduce nitrogen levels in freshwater ecosystems by 10%. CEAs are effective for projects with clear ecological outcomes, but where connections to discrete economic benefits may be more challenging to measure; or where the extent of benefits or potential for negative externalities are harder to compare between project types—e.g., comparing investments in shoreline restoration versus a large-scale mechanical N-removal process. Comparing the efficiency of different project types to achieve a common outcome expressed in natural units—e.g., N can lead to more accurate analyses of the most cost-effective approach to achieve conservation and restoration outcomes.¹⁶⁴ CEAs can express project benefits in one of the following two ways:

1. **For projects that are less cost-effective than the status quo**, which is often the case for projects with preventative effects—e.g., reducing the risk of flood damage—the net benefits are expressed as total project costs minus total costs averted for anticipated negative impacts. These costs are then divided by the total number of 'natural' units from the proposed intervention to calculate the cost-effectiveness ratio that provides a dollar value per incremental unit of benefit.
2. **For projects that are more cost-effective than the status quo**, which is often the case for projects producing cost savings—e.g., improvements to water quality reducing expenditures on treatment facilities. The net benefits are also initially expressed as the total project costs minus those avoided from a reduction in necessary expenditures. However, in this case, the cost-effectiveness of a project to achieve a desired outcome is a function of the total cost savings due to direct improvements provided by the project calculated at different timescales.

Multi-criteria assessment

Multi-criteria assessments (MCA) are a semi-quantitative approach to rank project alternatives based on their performance according to multiple, pre-set project criteria. MCAs aim to achieve a balanced assessment of project alternatives by including both quantitative and qualitative data, as well as socio-cultural, economic, and environmental considerations.¹⁶⁵

Table 4. Instruments to support making a business case for conservation finance projects

Instruments	What can it measure	Benefits	Limitations	When to use
Cost benefit analysis	<ul style="list-style-type: none"> Upfront economic costs compared to economic benefits from project outputs 	<ul style="list-style-type: none"> Easy to understand Widely used Easy to compare across projects and jurisdictions 	<ul style="list-style-type: none"> Difficult to integrate social, environmental returns Does not weight short and long-term benefits Standard discount rates (7-10%) disadvantage conservation & restoration outcomes.¹⁶⁶ 3-5% is more suitable for nature-based projects.¹⁶⁷ 	<ul style="list-style-type: none"> Initial Project design Seeking external funding
Cost effectiveness analysis	<ul style="list-style-type: none"> Efficiency of different project options for achieving a predetermined objective 	<ul style="list-style-type: none"> More accurate when cost assumptions are limited Able to consider variety of means in measuring project outcomes Project outcomes are comparable Benefits from strategic partnerships 	<ul style="list-style-type: none"> Comparisons across jurisdictions and different project outcomes are limited Requires expert input to determine accuracy of potential project outcomes Limited capacity to understand the distribution of project outcomes to beneficiaries 	<ul style="list-style-type: none"> Integrating non-economic costs and benefits for achieving a well-defined objective – e.g., reducing GHGs by 15% EIB, Resilience Bonds and Pay for Performance schemes
Social Return on Investment	<ul style="list-style-type: none"> Social costs/benefits Economic costs/benefits Environmental costs/benefits 	<ul style="list-style-type: none"> Prioritizes stakeholder engagement Most comprehensive accounting for potential project benefits 	<ul style="list-style-type: none"> Cross-comparison is limited Success is resource dependent Contextual factors and who participates can shape outcomes 	<ul style="list-style-type: none"> Project design, implementation Monitoring and evaluation Projects with socio-cultural, health, or other community considerations
Life Cycle Costing	<ul style="list-style-type: none"> Upfront and long-term management and maintenance costs Value of benefits later in project life cycles 	<ul style="list-style-type: none"> Less resource intensive than MCAs Accurate assessment between green and grey infrastructure options Easy to replicate and compare across cases 	<ul style="list-style-type: none"> Sensitive to discount rates due to long-term cost assumptions Less able to integrate climate risks Connection to benefits may not meet the threshold to attract investors 	<ul style="list-style-type: none"> Comparisons of restoration projects; or conservation projects with long-term timelines
Multi-criteria analysis	<ul style="list-style-type: none"> Balanced considerations of quantitative/qualitative indicators Social costs/benefits Economic costs/benefits Environmental costs/benefits 	<ul style="list-style-type: none"> Integrates stakeholder engagement in project planning and design Provides a framework to include a diversity of considerations in project planning — environmental, health, social, economic, etc. 	<ul style="list-style-type: none"> More time consuming; collaborative ranking of project priorities can lead to stakeholder conflicts during project design Can be a challenge to scale. Locally specific evaluation metrics — may limit cross-jurisdictional comparison above the micro-meso level Can produce highly subjective project level decisionmaking structures 	<ul style="list-style-type: none"> Risk assessments Comparing different CF mechanisms Establishing stakeholder roles

Project evaluation tools

Integrated Valuation of Ecosystem Services and Trade-offs (InVEST)

Developed by the Natural Capital Project, InVEST is a free-to-use software suite designed to evaluate changes in urban ecosystems and establish values for the corresponding changes in benefits experienced by local communities. InVEST includes models designed to support decision-makers in evaluating ecosystem services derived from land, freshwater, marine, and coastal areas at scales ranging from local to global. The tool allows for the comparison of multiple potential scenarios and allows decision-makers to map changes in potential benefits and trade-offs when deciding to invest in natural assets. The platform includes Urban InVEST—a tool that uses biophysical and socio-economic models to quantify the impact of urban designs on benefits derived from ecosystem services. InVEST also includes several ‘helper’ tools to support the creation of alternative policy scenarios and the collection of necessary local datasets.

Toolkit for Ecosystem Service Site-Based Assessment v2.0 (TESSA)

TESSA is an interactive tool that provides practical guidance on how to identify which ES to assess at a site, what data are needed, what methods or sources can be used to obtain the data, the steps required for each method, and how to communicate the results to inform decision making.¹⁶⁸ The toolkit uses two primary steps. First, a Preliminary Scoping Appraisal (conducted through a stakeholder workshop) produces qualitative information regarding ecosystem services at the target site. Second, a full assessment provides the use with possible methods for

quantifying different ecosystems services. Multiple methods are included for individual ecosystem services, which increases the applicability of outputs from the tool across different habitat types and under different resource constraints. The toolkit prioritizes the collecting of local data where possible and integrates consultation with target beneficiaries throughout the assessment and interpretation process.

Ecosystem Services Toolkit (EST)

The Ecosystem Services Toolkit is a stepwise set of guidelines for conducting ecosystem service assessments, as well as an extensive compendium of available analytic tools and methods and data sources that might be applied.¹⁶⁹ The toolkit includes templates and project worksheets that can assist with the completion of each step. EST also provides a typology of ecosystem services and relevant descriptions; addresses cross-cutting issues (such as scale and uncertainty); provides guidance on conducting ES assessments through engagement with Indigenous communities; is adaptable to economic and socio-cultural valuations of ecosystem services and contains additional resources to support the identification of applicable metrics, potential value streams, and data needs. The EST advises users to start by defining the question that is driving their need for an assessment and to choose indicators, data, and analysis methods to answer that question in a relevant and credible way (a problem-oriented approach). In addition, the EST contains advice about how to integrate ecosystem services assessment results and other ecosystem services considerations into the established practices associated with a wide range of policy and decision-making contexts.

Table 5. Tools to support the evaluation of conservation finance projects

Tool	Ease of use	What can it measure?	Benefits	Limitations	When to use
SAVi	4	<ul style="list-style-type: none"> • Cost implications of changes in risks and externalities • Recreation benefits • Carbon sequestration rates • Flood damage 	<ul style="list-style-type: none"> • Can be used from project design to outcome evaluation • Values benefits outside traditional project valuation methods (e.g., health, social impacts) • Canadian examples (Pelly’s Lake, MB) 	<ul style="list-style-type: none"> • Highly technical; requires extensive local datasets • Required data collection may be cost-prohibitive 	<ul style="list-style-type: none"> • Highlighting the benefits of nature-based projects • Evaluating the long-term cost savings of green infrastructure • Changes in project risk profiles over time
TESSA	1	<ul style="list-style-type: none"> • Coastal resilience • Agricultural production • Cultural/ Recreation • Climate regulation • Hydrological services 	<ul style="list-style-type: none"> • Integrates qualitative and quantitative data in assessment outputs • Compares ES across target sites • Low-cost, easy to use 	<ul style="list-style-type: none"> • Static outputs, does not track changes over time • No spatial outputs • Does not integrate discount rates and resilience 	<ul style="list-style-type: none"> • Initial project scoping and design • Identifying key ES and suitable project sites
EST	2	<ul style="list-style-type: none"> • Ecosystem services and beneficiaries • Resource requirements and technical needs • Indicators and data needs to measure project outcomes 	<ul style="list-style-type: none"> • Provides step-by-step guidelines and work sheets • Comprehensive guidelines for additional assessment tools (e.g., ARIES, InVEST) • Provides guidelines on how to incorporate outputs into land-use planning • Integrates consultation with Indigenous stakeholders 	<ul style="list-style-type: none"> • Time consuming • Internal methods and tools are selected by the user 	<ul style="list-style-type: none"> • Identifying key ES and suitable project sites • Consultation with Indigenous stakeholders • Priority ES Screening Tool—useful for rapid assessments under resource constraints • Adaptable to all project stages
RROIT	3	<ul style="list-style-type: none"> • Vulnerability to flooding & erosion • Changes in vulnerability under different climate scenarios • Cost implications of mitigation projects • Spatial considerations of social, economic and health impacts of mitigation projects 	<ul style="list-style-type: none"> • Spatial output that identifies areas of high vulnerability to climate change • Integrated life cycle and cost-benefit analysis 	<ul style="list-style-type: none"> • Lack of clarity around values and metrics for measuring environmental and social outcomes • Can be resource intensive in certain cases. Success hinges on substantial resources being devoted to stakeholder consultation and engagement 	<ul style="list-style-type: none"> • Identifying the vulnerable of assets and infrastructure • Identifying costs of natural disasters related to climate change • Assessing costs of flood damage, erosion
InVEST	4	<ul style="list-style-type: none"> • Changes in ecosystem service benefits at different scales—e.g., local, regional, global • Changes and impacts for groups of beneficiaries • Economic value of ecosystem services 	<ul style="list-style-type: none"> • Integrated tool optimized for restoration, mapping ES for socio-economic benefits and urban resilience • Generates clear, user-friendly spatial outputs • Possibility to generate alternative scenarios based on user-set parameters 	<ul style="list-style-type: none"> • Technical specialization and GIS experience is required • Accuracy is dependent on high-quality local datasets • Highly technical 	<ul style="list-style-type: none"> • Mapping tradeoffs in the flow of ecosystem services and the management of natural resources • Monitoring, measuring and evaluating changes in ecosystems
MNAI	2	<ul style="list-style-type: none"> • Capacity of natural assets to provide core services, and the value of these services • Baseline conditions of natural assets and changes in conditions overtime. 	<ul style="list-style-type: none"> • Guided process for integrating natural assets in project planning and budget accounting • Resources and case studies available to support project advancement 	<ul style="list-style-type: none"> • Conservation finance is outside the MNAI framework for natural assets management and accounting • In preliminary stages for incorporating Indigenous perspectives in the framework design 	<ul style="list-style-type: none"> • Developing natural asset inventories • Seeking to integrate natural assets into budget accounting frameworks • Developing risk profiles for natural asset management

Ease of use:

1: User-friendly, no specialization required

2: Some technical and/or specialized knowledge may be required

3: Requires technical or specialized knowledge

4: Requires technical and specialized knowledge

Appendix 3: Estimated value of ecosystem services by land use type¹⁷⁰

Table 6. Estimated value of ecosystem services by land use type

Ecosystem service	Forests		Wetlands		Farmlands		Total	
	Total(\$M)	Per ha(\$)	Total(\$M)	Per ha(\$)	Total (\$M)	Per ha(\$)	Total(\$M)	Per ha(\$)
Regulating Services								
Air Quality	69	378	-	-	-	-	69	91
Carbon stored	168	920	42	447	157	330	366	481
Annual carbon uptake	7	38	1	11	3	6	11	14
Flood protection	-	-	380	4,042	-	-	380	500
Water runoff control	278	1,523	-	-	-	-	278	366
Water filtration	87	476	45	479	-	-	131	172
Erosion control and sediment retention	n/a	n/a	n/a	n/a	1	2	1	1
Pollination (agr.)	203	1,112	-	-	95	200	298	392
Pollination (trees)	98	537	-	-	-	-	98	129
Waste treatment	11	60	284	3,021	-	-	294	387
Biological control	5	27	n/a	n/a	3	6	8	11
Provisioning services								
Soil formation	3	16	-	-	3	6	6	8
Supporting services								
Nutrient cycling	n/a	n/a	n/a	n/a	2	4	2	3
Habitat/ Refugia	n/a	n/a	548	5,829	-	-	548	721
Genetic resources	n/a	n/a	n/a	n/a	-	-	n/a	n/a
Cultural services								
Recreation	61	334	32	340	-	-	95	125
Cultural/ Spiritual	n/a	n/a	n/a	n/a	66	139	66	87
Total	989	5,416	1,331	14,157	329	692	2,651	3,486

Appendix 4: Conservation Authorities in the Greenbelt

Table 7. Key indicators and revenue streams for Conservation Authorities in Ontario's Greenbelt*

CA	Watershed (ha)	Land owned (ha)	Total Revenue (in millions)	Top revenue generating activities (in millions)	Visitors	Value of ES (in millions)
Toronto Region	350,000	14,000	\$162.2 (2020) Gov. grants: \$132.3 Authority-generated: \$29.3 Investment income: \$0.6	Water risk management: \$71.4 Tourism & recreation: \$16.2 Regional biodiversity: \$14.3 Planning & development review: \$10.4 Education & outreach: \$9.5 Corporate services: \$8.1 Greenspace securement & management: \$7.8 Sustainable communities: \$6.5	1,165,000 (2021)	\$1,220 ¹⁷¹
Credit Valley	86,000	2,400	\$32.3 (2020) Municipal levies & Gov. grants: \$26.7 Authority-generated: \$3.6 Other: \$2	Recreational programs: \$1 Environmental advisory services: \$0.9 Watershed stewardship & natural heritage: \$0.62 Conservation lands management: \$0.56 Water resource restoration & management: \$0.17 Communications & education: \$0.13	874,277 (2020)	\$371 (2009) ¹⁷²
Grand River	680,000	19,400	\$31.4 (2021) Municipal levies: \$13 Gov. grants: \$2.4 Authority-generated: \$16	Recreation & education: \$10.4 Watershed monitoring & management: \$6.8 Corporate services: \$3.8 Conservation land management: \$3.7 Watershed stewardship: \$3.5 Resource planning: \$2.4	1,000,000	\$2,371 ¹⁷¹
Halton Region	105,900	4,000	\$29.3 (2020) Municipal levies: \$9.6 Authority-generated: \$11.4 Other: \$8.3	Planning & watershed management: \$3.5 Major projects: \$2.8 Partnership projects: \$0.7 Science & partnerships: \$0.4 Corporate services: \$0.3 Watershed management and support: \$0.27 Project management office: \$0.17	1,263,208 (2021)	\$369 ¹⁷¹
Hamilton	56,800	4,400	\$16.3 (2021) Municipal levies: \$6.7 Gov. grants: \$0.47 Authority-generated: \$7.5 Other: \$1.6	Land management operations: \$9.6 Corporate support: \$3.9 Watershed management services: \$2 [Recreation] Westfield Heritage Village: \$0.8	1,200,000 (2021)	\$198 ¹⁷¹
Niagara Peninsula	242,400	2,946	\$12.9 (2021) Municipal levies: \$8.6 Gov. transfers: \$0.52 Authority-generated: \$3.7	Corporate resources (conservation land management, programming & development, and vehicles & equipment): \$8.4 Includes user fees, sales, and admissions: \$2.6 Watershed (monitoring, regulating, protecting, and improving): \$2.8 CAO & administration services: \$1.6	90,500 (2021)	\$845 ¹⁷¹
Lake Simcoe	128,000	2,276	\$13.7 (2020) Municipal levies: \$9.6 Gov. grants: \$1.1 Authority-generated: \$2.8	Corporate services: \$4.2 Planning & development services: \$3.1 Water risk management: \$2.0 Ecological management: \$1.9 Watershed studies & strategies: \$1.1 Education & engagement: \$0.5 Greenspace services: \$0.8	312,000 (2021)	\$923 ¹⁷³

CA	Watershed (ha)	Land owned (ha)	Total Revenue (in millions)	Top revenue generating activities (in millions)	Visitors	Value of ES (in millions)
Kawartha	256,300	1,300	\$3.7 (2021) Municipal levy: \$2.2 Gov. grants: \$0.2 Authority-generated: \$1.3	Planning & regulation: \$0.5 Special projects management: \$0.3 Stewardship & conservation lands: \$0.3 Integrated watershed management: \$0.06 Corporate services: \$0.03	30,000 (per year)	\$894 ¹⁷¹
Otonabee	195,100	10,300	\$3.3 (2021) Municipal levy: \$1.6 Gov. grants: \$0.5 Authority-generated: 1.2	Natural hazard program: \$1.4 Corporate services: \$0.8 Conservation lands program: \$0.7 Drinking water source protection program: \$0.2 Natural resources conservation program: \$0.2	25,477 (2021)	\$680 ¹⁷¹
Lower Trent	207,000	1,500	\$2.1 (2021) Municipal levy: \$1 Gov. grants: \$0.2 Authority-generated: \$0.9	Legal inquiries, fill permits, and plan review: \$0.33 Source water protection program: \$0.41 Sundry (stewardship, tree planting, and dam improvement programs): \$0.14	n/a	\$722 ¹⁷¹
Ganaraska	93,498		\$3.9 (2021) Municipal levy: \$1.6 Gov. grants: \$0.07 Authority-generated: \$2.2	Watershed services: \$0.44 Forest membership & sales: \$0.42 Watershed stewardship: \$0.39 Forest timber sales: \$0.14 Sundry and other: \$0.13 Forest center: \$0.12	n/a	\$326 ¹⁷¹
Central Lake Ontario	63,000	2,700	\$7.2 (2020) Municipal levy: \$4 Gov. grants \$0.05 Authority-generated: \$2.9	Environmental plan review & regulation services: \$1.2 Oak Ridges Moraine groundwater program: \$0.93 Land management: \$0.58 Community engagement: \$0.12	125,000 (2021)	\$130 (2021) ¹⁷⁴
Nottawasaga	370,000	4,856	\$5.8 (2021) Municipal levy: \$2.8 Gov. grant: \$1.3 Authority-generated: \$1.7	Planning: \$0.9 Environmental education: \$0.14 Conservation lands: \$0.11 Contributions & donations: \$0.5 Stewardship services: \$0.06	40,773 (2020)	\$1,290 ¹⁷¹
Grey Sauble	319,100	11,734	\$3.2 (2021) Municipal levy: \$1.4 Gov. grant: \$0.1 Authority-generated: \$1.7	User fees (planning, env. education, conservation lands, stewardship): \$0.7 Forestry & forest management: \$0.5 Source water protection: \$0.2	200,000 (per year)	\$68 to \$75

*Data for this table was drawn from the annual reports of each conservation authority with the year outlined in the revenue column, unless stated otherwise.

Toronto Region Conservation Authority (TRCA)

TRCA is one of the largest watershed conservation agencies in Ontario. Almost 5 million people live within TRCA-managed watersheds and the population is expected to grow significantly in years to come. To manage its watersheds, TRCA's environmental monitoring work includes tracking aquatic and terrestrial habitat and species, surface and groundwater quality and quantity, climate conditions, hydrology (streamflow and baseflow), and the condition of lands and trails.

Credit Valley Conservation Authority (CVCA)

CVCA partners with several agricultural producers in the region to implement more sustainable practices. CVCA provides funding for the installation of solar water pumps, restoration of

grassland areas, and promotion of rotational grazing practices. These initiatives reduce ecological costs of agricultural production while improving water resource efficiency and key ecosystem functions. Collectively, these activities produce diverse value streams and generate cost savings through reductions in energy use, incidence of soil erosion, and downstream need for water treatment through mitigation of problems with agricultural run-off at the source. CVCA is also engaged in a forest restoration project that aims to improve management of 2,600 ha of forest land and plant new trees across 6,800 ha of land to achieve a total regional forest cover of 30% by 2030 and gain its associated benefits. Such revenue-generating and cost-saving activities being undertaken by CVCA would be attractive to both target beneficiaries and private investors.

Grand River Conservation Authority (GRCA)

The GRCA was established in 1932 to address declining water quality and worsening flood and drought conditions that were the result of significant deforestation and urbanization in the Grand River watershed. Today, the GRCA manages water and other natural resources on behalf of 39 municipalities and close to one million residents. Environmental monitoring activities include collecting data on river and stream flows, reservoir levels, water quality, weather, forest cover, and natural characteristics of the Grand River watershed. The GRCA enacts several grant programs to improve revenue streams and foster cost savings. Through the Rural Water Quality Program, the GRCA helps farmers undertake projects that protect water quality on the farm through best management practices that improve soil health and water quality without sacrificing farm productivity. GRCA's Habitat Stewardship Program supports landowners conducting projects that contribute to the recovery of endangered, threatened, and other aquatic species at risk. GRCA also supports tree planting efforts by enabling eligible landowners to order trees and assisting large-scale tree planting projects through site visits with a GRCA Forestry Specialist.

Halton Region Conservation Authority (HRCA)

HRCA manages over 1000 sq. km of land, 17 flowing creeks, approximately 26 km of Lake Ontario shoreline, extensive forest cover, and 80 km of Ontario's Niagara Escarpment. HRCA's mandate is to create avenues for sustainable synergy between nature and the 450,000 residents that make up the Conservation Halton watershed. Areas of focus include water and forest resources management and lifelong education and recreation. HRCA's Long-term Environmental Monitoring Program (LEMP) guides information collection on species, ecosystems, and changes to the environment over time. It includes aquatic, terrestrial, and wildlife monitoring protocols. The HRCA enacts several programs to improve the quality of the natural environment it manages. Every year, HRCA offers financial support to landowners to undertake water quality and habitat improvement projects on their properties. This includes agricultural best management practices, creek restoration, and wetland restoration among other types of projects. HRCA is also committed to planting 60-75,000 trees and shrubs, with a goal of reaching overall forest cover of 30%. HRCA encourages eligible landowners interested in planting trees on their properties to apply for funding that can offset the costs of tree planting projects.

Hamilton Conservation Authority (HCA)

The HCA watershed is located within the west end of the Greater Toronto and Hamilton area, home to over six million people. Key areas of activity include environmental protection, water resource management, and educational experiences. To assess the health of natural areas, HCA monitors water quality, plants, fish, and wildlife. HCA also engages in Nature Counts™, a complete inventory of natural areas in Hamilton, which makes available current information on plant and wildlife species, vegetation communities, and site boundaries to agencies

responsible for protecting and enhancing natural features. HCA is enacting several programs to better manage and improve the quality of the environment under its management. HCA's Watershed Stewardship Program offers free on-site consultation services to help landowners identify and learn about the natural features on their properties. This program also helps landowners identify opportunities to improve wildlife habitat, water quality, and offers grants to assist with the cost of developing ecological restoration projects that create, enhance, and restore natural features.

Niagara Peninsula Conservation Authority (NPCA)

The NPCA watershed area supports 520,000 people. It boasts approximately 30% natural cover—including forests and coastal wetlands that support biodiversity. The Niagara Escarpment is a notable natural feature in the area. Its unique microclimate combines with rich soils to support vital agriculture systems that include vineyards, tender fruit orchards, livestock, and various specialty crops. To manage the health of its watershed, NPCA monitors flood risk (stream flow, rainfall, and other meteorological information), water quality (surface water, groundwater, and aquatic ecosystems), and existing forests. NPCA water quality monitoring shows that most of the surface waters in the watershed are either poor or impaired making it a priority for restoration and improvement. Through its Restoration Grant Program, NPCA is funding projects that improve the health of the watershed. Projects eligible for funding include wetland habitat restoration to improve water quality and floodplain capacity, conservation farming practices to protect soil and reduce erosion, and tree planting to improve wildlife habitat and increase forest cover. Together, these activities are increasing the value of the watershed area managed by NPCA.

Lake Simcoe Region Conservation Authority (LSRCA)

The LSRCA watershed is home to over 500,000 people with 36% of the watershed classified as agricultural land, 13% as wetlands, and another 13% as forest cover. LSRCA has several funding programs to improve the health of its watershed. Projects eligible for funding include restoration and enhancement of wetlands, grasslands, and other wildlife habitats, planting trees and shrubs to increase canopy cover, diverting clean water away from agriculture systems while fencing livestock away from watercourses, and protecting valuable soil resources through planting cover crops, testing soil, and measures to control cropland erosion.¹⁷⁵

Kawartha Conservation Authority (KC)

The Kawartha watershed covers an area of 256,300 hectares with 46% of the watershed designated as agricultural land, 21% under forest cover, 14% as wetlands (including 55 Provincially Significant and 49 Locally Significant wetlands), and 13% as

freshwater lakes. Kawartha Conservation (KC) owns and manages over 1,300 hectares of natural areas within this watershed. KC's green spaces and natural areas welcome approximately 30,000 visitors per year.¹⁷⁶ To protect people and property across the watershed, KC enacts flood contingency and response plans, conducts daily monitoring of water levels and precipitation, assesses potential flood threats, and communicates with municipalities and the community. Prioritized activities, as indicated in KC's Strategic Plan for 2022-2026, include: protecting lakes and water resources; partnering with agricultural, shoreline, and urban communities to advance stewardship; developing watershed science; educating and sharing; conserving natural heritage; and improving the health, safety, and vitality of communities. KC provides sites on its conservation lands for species and habitat restoration and provides advice and support for private land restoration projects.¹⁷⁷ KC's Stewardship Strategy for 2020-2030 is looking to engage landowners, business owners, municipalities, and partners across the watershed to have a positive impact on their own land. This includes conserving healthy and resilient ecosystems, protecting water resources, and restoring natural features and function.

Otonabee Region Conservation Authority (ORCA)

The Otonabee watershed covers 195,100 hectares and is home to more than 100,000 residents across eight municipalities. ORCA directly manages more than 4,000 hectares of protected and conserved areas, 58% of which is designated as forested land, 41% wetlands, and 10% as Areas of Natural and Scientific Interest. In 2021, ORCA welcomed almost 25,000 visitors to conservation areas and regional campsites. 32% of ORCA's expenses in 2021 were dedicated to the Natural Hazards Protection Program. This program offers services such as natural hazards mapping, flood and drought monitoring, and dam operations. 28% of ORCA's expenses supported the Natural Resources Conservation Program. This program provides support and advice for private and public land restoration activities including native planting, habitat enhancement, and shoreline naturalization projects in partnership with municipalities, schools, public agencies, and community service groups. In 2021, ORCA sold 11,475 native trees and shrubs to 101 local landowners through their Tree Seedling Sales Program. 25% of ORCA's expenses involved undertaking activities on their own lands to conserve, protect, rehabilitate, establish, and manage natural heritage by planting trees and native plants, and naturalizing shorelines. Where appropriate, ORCA manages some of its lands for resource development including commercial forestry, aggregate extraction, and agriculture. Finally, 7% of ORCA's expenses were dedicated to Drinking Water Source Protection to conduct water quality and quantity monitoring programs in partnership with provincial agencies.¹⁷⁸

Lower Trent Conservation Authority (LTCA)

The Lower Trent watershed covers 207,000 hectares including the Trent River and the watersheds of eight main tributaries, as

well as areas that flow directly into Lake Ontario and the Bay of Quinte between Grafton and Quinte West. LTCA directly manages 1,540 hectares of natural open space. In 2021, 48% of LTCA's expenditure was on watershed science and services. These funds support regulation of construction activities in environmentally sensitive areas such as wetlands, shorelines, and waterways to prevent property damage and protect important natural features. They support flood forecasting and protection systems, including flood control structures to protect existing development in flood susceptible areas. Weather forecasts and conditions along the region's waterways are monitored daily to provide the earliest possible notification to municipalities and the public of the potential for flooding. These funds also support education, outreach, and stewardship activities including tree planting programs and education for landowners and the community to get involved in the protection of natural resources. 26% of expenditure in 2021 was on conservation lands. These funds supported LTCA's 10 Conservation Areas that offer outdoor recreational activities, including over 27 kilometers of trails. They also supported the monitoring of endangered species (butterflies and moths) and the removal of invasive species (autumn olive).¹⁷⁹

Ganaraska Region Conservation Authority

The GRCA oversees a watershed that spans 93,498 hectares and is home to over 45,000 people. In 2021, 23% of GRCA's expenditure was on the Ganaraska Forest. The 4,450-hectare Ganaraska Forest is host to an extensive trail network incorporating forest roads, and dual and single-track trails. The forest is also home to the Ganaraska Forest Centre (GFC) which hosts the GRCA's outdoor education programs. 14% of expenditure was on watershed stewardship which includes programs to engage residents in environmental restoration through activities such as upgrading water wells, planting pollinator shrubs, and conserving rainwater. 7% of expenditure was on the Ganaraska Forest Centre which is a multi-use facility that also hosts GRCA's outdoor education programs.¹⁸⁰

Central Lake Ontario Conservation Authority

Established in 1958, the Central Lake Ontario Conservation Authority (CLOCA) oversees 63,900 hectares of land with 24 watersheds and 2,700 hectares of land owned and managed by CLOCA. In 2021, 27% of expenditure was on land management, which includes implementing habitat improvement projects, updating aging public-use infrastructure like trails, signage, parking areas and other amenities, and invasive species management. 16% of expenditure was on the integrated watershed management program, which includes collecting data on watershed functioning and health and conducting stewardship and restoration (i.e., planting trees and enacting Managed Forest Plans). 11% of expenditure was on the Oak Ridges Moraine groundwater program to better understand and manage water resources.¹⁸¹

Nottawasaga Valley Conservation Authority

Nottawasaga Valley Conservation Authority (NVCA) oversees approximately 370,000 hectares of land which includes 5,260 hectares of conservation land owned and managed by NVCA. In 2021, 26.9% of expenditure was on planning services, 18.8% on stewardship, 10.9% on conservation lands, 9% on watershed science, and 5.4% on flood forecasting and warning, among other sources of expenditure. In 2021, the NVCA Watershed Wetland Evaluation and Prioritization Report identified a total of 3,333 Provincial Significant Wetlands (PSW), 34 evaluated non-PSWs, and 80 unevaluated wetland complexes. To help restore grasslands and enhance hay and pasture management, NVCA started eight projects covering over 82.9 hectares with farmers, rural landowners, volunteers, and the Nature Conservancy of Canada. Similarly, the Nottawasaga River Restoration Program (NRRP) is a stream restoration initiative coordinated by NVCA which aims to improve water quality in the Nottawasaga River to restore native fish habitat and enhance the world class trout and salmon sport fishery.¹⁸²

Grey Sauble Conservation Authority

Grey Sauble Conservation's jurisdiction covers 314,600 hectares within northern Grey and Bruce Counties and includes approximately 155 kilometres of shoreline on Lake Huron and Georgian Bay. Within this expansive area, GSCA owns and manages over 11,000 hectares of the most scenic and environmentally sensitive lands in Grey and Bruce Counties and delivers programs and services throughout its watershed boundary. Grey Sauble welcomes over 200,000 visitors per year to its conservation lands. In 2021, 25% of expenditure was on conservation lands, 11% on forestry and species, 7% on drinking water source protection, and 6% on flood forecasting, control, and erosion management, among other sources of expenditure.¹⁸³

Appendix 5: Selection of funding secured by Conservation Ontario to support conservation and restoration initiatives

Table 8. Selection of funding secured by Conservation Ontario to support conservation and restoration initiatives in Ontario

Initiative	Type	Funding received by Conservation Ontario	Outcomes (to date)
Nature Smart Climate Solutions	Government of Canada Funding Program (ECCC) \$631 million (2020-2030)	\$9 million to fund NBS for the conservation and restoration of wetlands, grasslands and riparian areas, as well as land management practices to enhance carbon sequestration	Over 50 projects are being funded by 17 CAs
Canada Nature Fund	Government of Canada Funding Program (ECCC) \$100 million (2019-2023)	\$1.2 million to secure land for biodiversity conservation	CAs and municipalities are working to secure \$4.53 million in matching contributions
Climate Change Vulnerability Assessment Tool	Conservation Ontario	Practical guidelines to assess the impacts of and vulnerability of drinking water in Ontario	Training sessions held in 2021, 2022, and are currently ongoing for conservation authorities, municipal staff and private consultants
Open Data Hub	Conservation Ontario Funded by Great Lakes Observing System (GLOS)	Increase the capacity for CAs to make data more accessible and available in the Great Lakes region	300 public datasets with 460,000 records collected from 1,000 sites Great Lakes DataStream launched in 2021: 7 CAs share data

Appendix 6: Upper-tier Municipalities in the Greenbelt

Table 9. Expenditures and conservation/restoration priorities for upper-tier municipalities in the Greenbelt

Region	Conservation Authorities (\$M)	Water, Wastewater, Stormwater (\$M)	Waste Mgmt (\$M)	Other (\$M)	Total (\$M)	Priorities & Areas of Opportunity
Toronto	\$10.9	\$471.2	\$391	\$482 (Parks, Forestry, and Rec)	\$1,355	<ul style="list-style-type: none"> • Growing and retaining the ecological integrity of parkland, forests, and ravines • Mitigating the impacts of extreme weather events on assets and infrastructure • Investing \$274 million over ten years on land acquisition and infrastructure for parks • Investing \$257 million over ten years for flood protection and critical erosion control • Investing \$138 million in 2022 on protecting and expanding ravine system
Peel	\$46	\$622.3	\$158.1	n/a	\$826	<ul style="list-style-type: none"> • Protecting and restore natural features including wetlands, woodlands, habitats, natural corridors, and environmentally sensitive areas • Protecting prime agricultural area • Investing \$0.8 million in 2022 and \$7.5 million over next ten years for the protection of the Greenlands System • Investing \$3.4 million in 2022 on planting 10,000's of trees, shrubs, and water plants as part of Jim Tovey Lakeview Conservation Area project • Establishing trail systems in the Oak Ridges Moraine and the Greenbelt
York	\$6.6	\$552.1	\$84.4	\$13.2 (Forestry)	\$656	<ul style="list-style-type: none"> • Building sustainable communities while protecting the natural environment • Enhancing and securing more land for the regional forest • Purchased 142 hectares of land in the Greenbelt to reforest 82 hectares, build trails, and remove derelict buildings over the next several years. • Enacting land conservation programs offering incentives to landowners
Durham	\$8.9	\$477.9	\$320.3	\$0.24 (Regional Forest)	\$807	<ul style="list-style-type: none"> • Protecting, enhancing, and restoring the natural environment (including river valleys, waterways, parks, and trails) • Reducing severity, frequency, and impact of urban flooding • Protecting regional forest and prime agricultural land
Niagara	\$6.4	\$113.4	\$67.6	n/a	\$187	<ul style="list-style-type: none"> • Protecting agricultural land base—farmland generates \$1.4 billion in GDP • Protecting natural areas (including wetlands, woodlands, valley lands, and wildlife habitat) and water resource systems • Looking to expand eco and agricultural tourism
Hamilton	\$8.6	\$257.8	\$62.0	\$48.5 (Forestry, Horticulture, and Parks)	\$377	<ul style="list-style-type: none"> • Protecting prime agricultural lands—agriculture is a \$1 billion industry • Protecting ecological systems, including watersheds and significant woodlands • Stormwater management strategy includes protection and restoration of natural areas, including forests and watersheds
Halton	\$10.5	\$228.5	\$53.7	\$3.1	\$296	<ul style="list-style-type: none"> • Protecting agricultural areas • Protecting and restoring natural heritage system (including wooded areas, wetlands, and regional forests) • Investing \$23.8 million for park development and \$25 million for property acquisition to increase recreational opportunities along Halton Waterfront

Region	Conservation Authorities (\$M)	Water, Wastewater, Stormwater (\$M)	Waste Mgmt (\$M)	Other (\$M)	Total (\$M)	Priorities & Areas of Opportunity
Brant	\$0.57	\$13.3	\$3.9	\$1.5 (Parks and trails)	\$19	<ul style="list-style-type: none"> Protecting natural heritage system Protecting prime agricultural land base Protecting, enhancing, and restoring quality and quantity of water resources
Guelph	n/a	\$75.8	\$23.8	\$21.5 (Parks and Rec)	\$121	<ul style="list-style-type: none"> Protecting, enhancing, and restoring natural heritage system Protecting, enhancing, and managing water resources Ensuring accessible and connected park and trail system
Brantford	n/a	\$46.9 (incl. waste management)	n/a	\$16.2 (Parks services)	\$63	<ul style="list-style-type: none"> Protecting, maintaining, and restoring natural areas and agricultural lands Protecting the Grand River's natural features and water supply while enhancing its recreational amenity Promoting eco-tourism, agritourism, and other outdoor recreational opportunities Creating "first-flush" floodplain wetlands

City of Toronto

The City of Toronto is undertaking several financially significant programs to protect from flooding and heatwaves while enhancing natural areas. Located on the shores of Lake Ontario, the city is vulnerable to flooding, which is being exacerbated by more frequent and extreme rain and snowfall events. In July 2013, a record rainfall event caused severe flooding resulting in more than \$850 million in insured property losses, while costing the municipal government over \$70 million. Consequently, Toronto is spending \$2.27 billion over the next ten years to help homeowners prepare for extreme flooding events. To mitigate the impact of heat waves, Toronto is expanding its tree canopy from 30% to 40%. More than 100,000 trees, shrubs, and native plants are planted in Toronto's ravines each year. Toronto is also maintaining, improving, and expanding its 11,000-hectare ravine system, which is estimated to be worth \$822 million in annual ecosystem service value.

Region of Peel

The Region of Peel prioritizes protection and restoration of its natural and agricultural areas, water resources, in addition to promoting recreation and climate adaptation. In the Greenlands System—which includes wetlands, woodlands, significant habitats, and natural corridors—Peel is restoring and enhancing degraded components of the ecosystem and extending the network of natural areas. Agricultural land is of major importance to the economic viability of Peel. The Region protects its agricultural areas from incompatible activities that limit agricultural productivity or result in fragmentation of agricultural land. Peel is also minimizing negative impacts of development on water resources and related natural systems to protect the supply of potable water and maintain ecosystem integrity. Furthermore, as more frequent intense rainfall causes localized flooding, Peel is protecting existing development using methods that do not negatively impact the integrity of the surrounding ecosystem. To support recreational opportunities, Peel is establishing trail systems on the Oak Ridges Moraine, Greenbelt, and Niagara Escarpment.

Region of York

To reduce the impacts of climate change and maintain and enhance green spaces, the Region of York is planting 70,000 trees and shrubs in 2022. With no direct access to Lake Ontario, York relies on Peel and Toronto for most of its drinking water. Therefore, York is leveraging water reuse and other innovative long-term water conservation strategies to reduce pressure on water resources and related natural areas. York is working on opportunities to secure more land for the Regional Forest to balance public use with ecological integrity. In 2021, York purchased 142 hectares of land in the Greenbelt to reforest 82 hectares, build trails, and remove derelict buildings over the next several years. The region is also looking to plant trees and other greenery to capture carbon as part of its Climate Change Action Plan. Furthermore, York is enacting land conservation programs that offer landowners the opportunity to protect environmentally important land through easements, donations, and tax incentives.

Durham Region

The Greenbelt in Durham Region includes significant natural, rural, and agricultural systems and resources that are of great value to the region. Approximately 30,000 jobs are dependent on the Greenbelt in Durham, mostly through agriculture. About 80 percent of the region is rural, and almost 300,000 acres of Durham are in agricultural production, a majority of which are in the Greenbelt. Therefore, the region prioritizes supporting agriculture and the agri-food business by protecting prime agricultural land and encouraging sustainable farming practices. The region also protects, enhances, and restores its natural environment, which includes river valleys, waterways, parks, and trails. In its regional forest, Durham is mitigating the environmental impacts of projects and restoring areas impacted by construction projects. These activities preserve valuable ecological functions while supporting recreational opportunities and reducing the severity and impact of urban flooding.

Niagara Region

The Greenbelt in Niagara Region includes the Niagara Escarpment, urban river valleys, and prime agricultural land. Approximately 23,000 jobs are dependent on the Greenbelt in Niagara Region, mostly through agriculture. Farmland generates over \$1.4 billion in GDP and has a high employment impact on the region. Over 90% of all Ontario tender fruit production is based in the Niagara Peninsula. Therefore, Niagara prioritizes a strong, diverse, and resilient agricultural economy. The region protects its agricultural land base by restricting and controlling non-agricultural uses and ensuring long-term sustainability of uses within the agricultural system. The region also prioritizes managing urban growth responsibly by protecting and restoring natural areas (including wetlands, woodlands, valley lands, and wildlife habitat) and water resource systems that comprise the region's natural environment system. To support economic growth, the region is expanding its role in areas such as sport, eco, agricultural and cultural tourism.

City of Hamilton

The Greenbelt in Hamilton includes the Niagara Escarpment, prime agricultural lands, and significant woodlands. Approximately 21,000 jobs are dependent on the Greenbelt in Hamilton. The city's prime agricultural lands are a major contributor to Hamilton's economic base—agriculture is a \$1 billion industry with significant growth potential. In addition to agricultural lands, the city prioritizes protecting other ecological systems, including its watersheds and significant woodlands. As part of its stormwater management strategy, the city emphasizes protection, enhancement, and restoration of the natural resources of the watersheds. The city recognizes that changes in urban, rural, and industrial activities have resulted in destruction of sustainable natural ecosystems. This has led to increases in erosion, demand on wastewater and treatment plants, and number and volume of toxic substances entering the watersheds. In line with this, when undertaking infrastructure work, the city is committed to protecting, preserving, and restoring forests and other natural features.

Halton Region

In the Region of Halton, 50% of the land area is protected as part of Halton's Natural Heritage System, which includes wooded areas, wetlands, and regional forests. The region also includes significant agricultural lands. Approximately 1,655 jobs are dependent on the Greenbelt in Halton Region. The region prioritizes protecting its agricultural areas for a permanently secure, economically viable agricultural and agritourism industry. The region also seeks to balance agricultural interests and goals with those of the region's natural heritage system. This involves assessing the health of the natural heritage system to determine when restoration and remediation may be required. To offer more recreational opportunities, the region is looking to increase the amount of well-distributed public access to the Halton Waterfront. Flooding caused by severe weather is also a concern for the region. Halton Region is spending \$85.3 million between 2015 and 2025 on subsidies to help homeowners prepare for future flooding.

Brant County

The County of Brant promotes a culture of conservation and protection of its comprehensive connected natural heritage system, prime agricultural land base, and water resources. The county is taking steps to limit development in natural areas, including wetlands, forests, trees, and riparian areas. The county is looking to manage these natural areas in a way that maximizes carbon storage and sequestration in vegetation and soils. The county wants to ensure no net loss of wetland areas with a focus on maintaining and restoring wetland hydrological functions and ecological functions at a watershed and sub-watershed scale. To protect the prime agricultural land base and ensure the long-term economic prosperity of the significant agriculture sector, the county is ensuring that negative impacts of development on farm practices are minimized. Similarly, the county is taking a comprehensive, long-term approach to the protection, enhancement, and restoration of the quality and quantity of the county's water resources.

City of Guelph

The City of Guelph prioritizes protection, maintenance, enhancement, and restoration of the natural features, ecological functions, and biodiversity of the city's natural heritage system and water resources. To support the natural heritage system and water resources the city is identifying biodiversity and ecosystem targets and developing recommendations to enhance biodiversity. The city is also considering the application of land securement tools to protect the natural heritage system. The city's restoration strategy identifies areas where opportunities exist to plant native vegetation, restore stream functions, create pollinator and wildlife habitats, and restore wetlands. To offer more leisure pursuits and active transportation routes, the city is looking to enhance provision of parkland, open space opportunities, and a connected trails system. Furthermore, the city's Stormwater Services Fee Credit Program provides landowners with opportunities to reduce stormwater runoff on private property for a credit towards the stormwater service fee they pay. In turn, this helps support improved water quality and protection of the natural environment.

City of Brantford

The City of Brantford prioritizes protection, maintenance, and restoration of its natural heritage system (including wetlands, woodlands, valley lands, and wildlife habitats) along with the Grand River, its tributaries, and adjacent natural areas. The city is mainly protecting its natural heritage system by prohibiting development in core natural areas. To achieve an aim of 40 percent tree canopy cover by 2051, the city is protecting, enhancing, and acquiring woodlands and forested areas within the municipal boundary. The Grand River is central to the city's conservation efforts. The city is restricting development to reduce threats to the water supply from the Grand River. The city also aims to restore and enhance natural areas adjacent to the Grand River and its tributaries by reforesting land and planting dense shrubs to repair the ecosystem and prevent erosion. The city is creating "first-flush" floodplain wetlands to improve water quality and water retention during floods. The city is also looking for economic development from the Grand River by creating destinations along the Grand River to promote eco-tourism and recreation.

Appendix 7: Programs to support conservation and restoration in the agricultural sector and among rural landowners

Table 10. Programs to support conservation and restoration in the agricultural sector and among rural landowners

Actor	Supporting Organization	Programs
Agricultural sector	Financial Institutions	<ul style="list-style-type: none"> Desjardins Farms offers agricultural loans and financing for growing farm businesses (financing projects while maintaining adequate cash flow), transferring or taking over a farm business, or starting a farm. Area One Farms invests with farmers to acquire land and related assets to achieve critical scale, improve land to maximize productivity, add value, and sustain assets, manage for profitability, and prioritize using regenerative practices for drought resistance and increased profitability.
	Government Agencies	<ul style="list-style-type: none"> Agriculture and Agri-food Canada (AAFC) supports agricultural climate solutions through its On-Farm Climate Action Fund which supports farmers in adopting beneficial management practices (BMPs) to store carbon, reduce greenhouse gases (GHGs), promote biodiversity, and improve soil health. Ontario Soil and Crop Improvement Association supports farms in learning about and implementing best management practices (BMPs). Their Species at Risk initiatives provide funding to agricultural landowners to support the recovery of species at risk on agricultural land through habitat creation, enhancement, and protection.
	Conservation Authorities	<ul style="list-style-type: none"> Partner with agricultural producers to implement sustainable livestock management practices by funding the installation of solar water pumps, the restoration of grassland areas, and promoting rotational grazing practices. Rural Water Quality Programs (RWQP) offer farmers grants to help them undertake projects that protect water quality on the farm through best management practices (BMPs) that improve soil health and water quality without sacrificing farm productivity. Restoration Grant Programs fund conservation farm practices (i.e., soil stabilization projects to reduce erosion, compaction, and sedimentation, and improve habitat connection through wildlife corridors), nutrient management (i.e., improve local water quality through the reduction and elimination of excess nutrients from animal waste contamination and elimination or recycling of wastewater streams to recover nutrients before discharging to watercourses), and promoting the establishment of cover crops (living or dead), which help provide soil protection and reduce soil erosion, sedimentation, and nutrient loading to watercourses.
Rural landowners	Government agencies	<ul style="list-style-type: none"> Managed Forest Tax Incentive Program (MFTIP) offered by the Province of Ontario encourages private land stewardship by reducing the municipal property tax rate on qualifying forested land by 75 per cent. The aim of this program is to promote sustainable forest management and plant new trees to achieve a total regional forest cover of 20% by 2030. The Habitat Stewardship Program of Aquatic species at Risk offered by Fisheries and Oceans Canada offers grants for projects that contribute to the recovery of endangered, threatened, and other aquatic species at risk.
	Conservation Authorities	<ul style="list-style-type: none"> Landowner Action Funds: provide technical advice and financial assistance to support land and water management projects that enhance wetlands, streams, and ponds, and protect groundwater. Tree planting programs like native plant sales may cover up to 90% of the cost of eligible tree planting projects. Offer landowner stewardship activities to provide opportunities to learn and get involved in the protection of natural resources.

Appendix 8: Programs being enacted by private sector actors that involve the protection and restoration of natural areas

Table 11. Programs being enacted by private sector actors that involve the protection and restoration of natural areas

Organization	Role	Focus	Initiatives
Actor: Pension Funds			
Ontario Teachers Pension Plan (OTPP)	Pension investment manager	Investing in natural resource businesses including timberland, agriculture, aquaculture, and natural climate solutions	<ul style="list-style-type: none"> • Alternatives to harvesting timberland: across timberland assets in Canada, looking to use timber as a source of carbon credits while looking at other natural climate solutions to improve agricultural methods • Regenerative farming: working with Vayda on regenerative farming for higher profitability, improved resiliency, and better ecological outcomes
Canadian Pension Plan (CPP) Investment Board	Pension investment manager	Investing in projects that protect nature, reduce emissions, provide sustainable sources of income for local communities, and are economically attractive	<ul style="list-style-type: none"> • Investing \$26 million in nature-based projects (e.g., reduced deforestation and forest degradation) that reduce global carbon emissions, enable the private sector to purchase certified carbon credits, and provide a return to investors • Partnering with other investors, including Conservation International, to lead large-scale, global development of nature-based solutions
Caisse de dépôt et placement du Québec (CDPQ)	Pension investment manager for public retirement and insurance plans	Investing in land with partners as part of Sustainable Land Management initiative	<ul style="list-style-type: none"> • Acquired almost 31,000 ha of high-quality pine timberland in Southeast Georgia in partnership with Westervelt (an environmental stewardship and innovation organization) for sustainable timberland management • Consider working forests to be unique assets that will become of increasing importance in the fight against climate change and the transition to a greener economy
Ontario Municipal Employees Retirement System (OMERS)	Pension investment manager for local government employees in Ontario	In 2021, added climate change risk to Investment Risk Policy, Risk Appetite Statement and Statement of Investment Policies and Procedures	<ul style="list-style-type: none"> • At year-end 2021, investments in green assets totaled more than \$18 billion including green buildings, renewable energy, and energy efficiency assets
Public Sector Pension (PSP) Investments	Pension investment manager	Invest in agriculture and timber assets, focusing on direct, long-term investments with a heavy land, water, or biological asset component	<ul style="list-style-type: none"> • As of March 2022, have \$11.6 billion of natural resource assets under management, 8.9% of which are in Canada, and include 66.1% agriculture and 30.9% timber • Working with Pure Flavor Farms, with greenhouse operations in Windsor, ON, to provide year-round supply of high-quality produce to key grocery retailers and food service companies within the US fresh produce market
Insurance Bureau of Canada (IBC)	National association representing Canada's private home, auto, and business insurers	Reducing risk from floods, wild-fire and heat. Strengthen resilience and reduce vulnerability for households in high-risk flood zones. Reduce risk of heat illness by considering natural solutions, biodiversity preservation, and valuation of natural assets	<ul style="list-style-type: none"> • Using natural infrastructure to mitigate financial losses from flooding: in pilot studies, wetlands were found to reduce flood damage costs by \$3.5 million (29%) at a rural site and \$51.1 million (38%) at an urban site in Southern Ontario • Financing nature-based infrastructure using pooled fund mechanisms. For example, using municipal trust fund to finance wetland resilience studies followed by restoration and conservation of wetlands on private lands
SwissRE	Provider of reinsurance, insurance, and other forms of insurance-based risk transfer	Building an effective marketplace to help protect and strengthen the natural environment and biodiversity	<ul style="list-style-type: none"> • Use re/insurance solutions and investments to build societal resilience (e.g., support sustainable agriculture through risk knowledge and solutions) • Developed Biodiversity Ecosystem Services (BES) Index in 2021 to assess and score the state of ecosystem services to facilitate risk, underwriting, and environmental policy recommendations • Use spatial analysis in risk matrices to provide financial service providers with an overview of economic activity in areas of global ecological significance
Desjardins FARM	Provider of agricultural loans, financing, and business advice	Team of agriculture specialists works with farm businesses across Quebec and eastern Ontario to find financing and better manage operations	<ul style="list-style-type: none"> • Term loans to finance agriculture projects to grow farming business • Revolving credit for agriculture to invest in growing farming business and ensuring long-term success • Line of credit to help continue farming operations during periods of lower income • Provide financial strategies and advice about transferring or taking over a farm business • Provide tools, resources, and advice about government programs to start a farming business

Organization	Role	Focus	Initiatives
Actor: Financial institutions			
VERGE Capital	Social finance program of the Pillar Nonprofit Network	Supporting local economies and communities across Southwestern Ontario by investing in social enterprises that put people and planet	<ul style="list-style-type: none"> Part of the first phase of the Carolinian Canada Conservation Impact Bond (CIB), combining impact investment with business and government contributions to improve and protect 69 ha of biodiversity and freshwater reserves in southern Ontario Supporting development of second phase of the CIB to restore and conserve over 100 ha of forests in the Norfolk, Halton, and Niagara Regions
VanCity CoPower	Investment platform—subsidiary of Vancity Community Investment Bank (VCIB)	Lending to green projects with steady, predictable returns and pooling that debt into bonds that are then offered to investors	<ul style="list-style-type: none"> Primarily interested in clean and renewable energy generation using innovating investment vehicles May be an opportunity to pivot toward more restoration, conservation based funding
Desjardins	Financial services cooperative	Resilience in the face of climate change and natural disasters, conservation and restoration of ecosystems, food security, natural resource management, and green and inclusive finance	<ul style="list-style-type: none"> In 2020, supported the following carbon capture and emission reduction initiatives: Niagara Escarpment Forest Carbon Project (Ontario): Managing, promoting, and maintaining the function and diversity of ecosystems along the Niagara escarpment Amazon Forest REDD (Reduced Emissions from Deforestation and Degradation) Project (Peru): Preventing deforestation and preserving the natural habitats of endangered species and tribal communities in a conservation area
Rally Assets	Impact investing firm	Developing a wider array of innovative financial approaches to conservation to attract other sources of capital, especially from the private sector	<ul style="list-style-type: none"> In 2020, released the “Financing Conservation” report in collaboration with the Nature Conservancy of Canada to set out the state of conservation financing in Canada and how it could protect Canada’s ecosystems
Area One Farms	Investment group providing equity financing for Canadian farmers	Invest with farmers to acquire land and related assets to achieve critical scale, Improve land to maximize productivity, add value, and sustain assets, and manage for profitability	<ul style="list-style-type: none"> Helping farms be more drought resistant by employing no-till farming and regenerative practices, while rain-feeding majority of land Maximizing ability of farms to pull carbon from the atmosphere and store it in biomass and soil Looking at which regenerative practices also allow for increased profitability Forming partnerships with mixed farms (crops and beef cattle) where the manure is a key component to creating healthier soils and more sustainable farms
Genus Capital	Investment management firm	Investing in companies with impact on people and the planet as well as attractive risk-adjusted returns	<ul style="list-style-type: none"> Fossil Free High Impact Equity Fund is a pooled fund that invests in companies (including water and waste management and sustainable agriculture) that improve communities and climate while appearing attractive based on quality, value, momentum, and other investment criteria
NatureVest	Impact investing team at The Nature Conservancy (TNC)	Investing in natural assets and nature-based solutions that deliver impact and financial returns and bringing together conservation leaders, communities, policymakers, and investors to build the field of conservation finance	<ul style="list-style-type: none"> \$900 million+ Sustainable Water Impact Fund (SWIF), which closed in April 2020, seeks to provide competitive, risk-adjusted returns to investors by acquiring land and water assets, improving agricultural practices, conserving water sources and habitat for biodiversity, and addressing climate change TNC serves as technical advisor providing conservation and ecological evaluation and management guidance for the Fund’s growing portfolio of assets
Manulife Investment Management	Global wealth and asset management segment of Manulife Financial Corporation	Investing in timberland and agriculture for environmental and social impact, while addressing the need for climate change mitigation and adaptation through natural climate solutions	<ul style="list-style-type: none"> Hancock Natural Resource Group (HNRG) is part of Manulife’s comprehensive Private Markets platform, which includes timber and agriculture HNRG’s timber division manages approximately 2.3 million ha of timberland (including Canada) HNRG’s agricultural investment group oversees approximately 0.16 million ha of prime farmland in major agricultural regions (including Canada)

Appendix 9: Further Details on land designations under prevailing acts in the Greenbelt

Niagara Escarpment

Natural Area – relatively undisturbed wetlands, woodlands, and valleylands that may be important for cultural heritage, in addition to containing a variety of natural features that support essential ecosystem services. These areas include all escarpment slopes, provincially designated Areas of Natural and Scientific Interest (ANSI), and woodlands within a 300m setback from the edge (brow) of the escarpment. Designation typically requires the natural area to be greater than 20ha and some of the permitted uses include single dwellings, unserviced camping, non-motorized recreation, and any other existing uses including agricultural uses and on-farm diversified use.

Protection Areas – land use areas that have been significantly altered by land use activities but contain significant natural heritage and hydrologic features that are essential for maintaining vital ecosystem services. These areas are considered to hold high scenic value and may overlap with prime agricultural areas, including altered escarpment slopes and landforms, areas in close proximity to scenic landforms, and provincially designated ANSIs. Permitted uses are similar to those for natural areas but allow for new and expanded agricultural uses as well as local recycling operations.

Rural Areas – land use designation acting as a buffer between key natural and protected areas of the Niagara Escarpment and the surrounding areas. These areas overlap with the regulatory designation of rural lands under the Greenbelt Act (2005) and permit an even greater scope of potential land uses, including mineral resource extraction <20,000 tons per day (tpd), motorized recreation, and small-scale industrial use.

Minor Urban Center – rural settlements within the Niagara Escarpment area. The designation is intended to provide these communities with the opportunity to develop new lots and provide adequate services for residents, while respecting the main principles of NEP. Urban growth is permitted, but is limited in terms of infill, and the size and placement of new urban areas — development in natural and protected areas are not permitted.

Urban Area – urban areas located in the Niagara Escarpment area that have either encroached (e.g., Warton) or surrounded (e.g., Hamilton) key ecological areas. This land designation provides the lowest level of protection for surrounding areas — expansion into natural and protected areas is permitted under certain conditions

Recreation Area – land designated with existing or potential recreational potential that offers visitors the opportunity to engage with natural and cultural heritage features of the escarpment. Permitted uses include all those designated in protection areas, as well as commercial developments to support tourism activities such as ski hills, golf courses, and billboards. Similar to urban areas, new and expanded lots are permitted within the principles of the NEP.

Mineral Resource Extraction Area – designated land use areas where mineral resource extraction >20,000 tpd is permitted under the regulatory framework set out in the Aggregate Resources Act (1990). **Once operations are concluded, surrendering the license for extraction requires an amendment to the NEP that targets site rehabilitation and restoration to enhance the conservation of regional natural heritage.**

Oak Ridges Moraine

Natural core areas – areas with a high concentration of natural features that are key for maintaining the integrity of the wider eco region. Existing uses (pre-dating The Plan), agricultural uses, and restricted new resource management uses are permitted in these areas. In addition, these areas allow for low-intensity recreation and infrastructure.

Natural linkage areas – areas of crucial connection between natural core areas and along the edges of key river and stream ecosystems. Permitted uses include those allowed in natural core areas, in addition to limited aggregate resource extraction.

Countryside areas – areas of agricultural and rural settlement land use that act as transition zones between natural core and linkage areas. These areas include Prime Agricultural Areas as defined in the Greenbelt plan and allow for the expansion of agricultural activities and urban settlements in accordance with the overarching aims of the Plan — urban growth plans are required for all expansions of rural settlements.

Settlement areas – current or planned urban land use established under existing municipal plans that are needed to meet the needs of existing urban settlements. Expansion of settlement areas is not permitted in natural core or linkage areas under the Plan.

Greenbelt Act

Agricultural system – Southern Ontario contains 50% of Canada’s Class 1 agricultural soil and farmland across the GTHA, has long been a pillar of the provincial agricultural economy, as well as an important region for a growing number of agri-food businesses. The purpose of the agricultural system policy within the Greenbelt Act is to protect *prime agricultural area* from the encroachments of urbanization, while also promoting the agricultural and natural heritage of the region by encouraging a regional *agricultural system* that protects specialty crop areas and ensures an economically viable agricultural network that is connected to areas outside of the Greenbelt.

The following are a summary of agricultural system land designation policies under the revised Greenbelt Plan (2017), implemented under the provisions of the Greenbelt Act, 2005:

- **Prime agricultural areas (PMA)** include all land designated as agricultural in Ontario’s Greenbelt. This includes specialty crop areas, rural lands, and agri-food infrastructure. Land use change in PMAs for infrastructure and settlement are discouraged, but allowed under certain conditions—i.e., specialty crop areas are protected and encroachment on existing agricultural systems and agri-food networks is limited.
- **Specialty crop areas (SCA)** are agricultural areas designated with additional protections against land use change—e.g., Niagara Peninsula Tender Fruit and Grape Area and Holland Marsh. Municipal expansion is prohibited in SCAs, and agricultural impact assessments are required for all changes to non-agricultural land use designations.
- **Rural lands** consist of all other PMAs that are not designated as SCA. These lands can fall under a variety of land-use designations, including agricultural, non-farm residential, recreational, tourism, institutional, and resource-based commercial and industrial use. New settlements are permitted, but limited in terms of their density and scale, as well as the land use priorities from being a PMA.
- **Agri-food network** land use policies are intended to support the regional agricultural system. Changes in land use designations for the economic benefit of the agri-food sector are permitted as long as negative impacts on existing agricultural resources and land use are minimized. Requires the creation or consultation with a regional agricultural advisory committee (e.g., Hamilton Agriculture and Rural Affairs Advisory Committee).

Natural system policies consist of *natural system* and *water resource system* land designations designed to protect ecological and human health in the Greenbelt region through the conservation of biodiversity and a balanced approach to managing regional ecological integrity and development.

- **Natural system** land use designations consist of core conservation areas that are identified as having significant ecological features and ecosystem service functions. These areas include either high concentrations of ecological functions, or those most sensitive to encroachments. Expansion of settlement areas into these systems is prohibited, but development, site alteration, and new agricultural land use may be permitted as long as there are no negative impacts on identified key ecosystems. Key natural systems and features covered by these policies include:
 - Habitats for endangered and threatened species
 - Fish habitats
 - Wetlands, valleylands, woodlands
 - Sand barrens, savannahs, tall grass prairies, alvars
 - Areas of natural and significant interests (ANSIs)
- **Water resource system** land use designations consist of above and below ground hydrological systems and the surrounding watershed and requires all authorities operating within these systems to develop long-term, integrated watershed management plans. Municipalities are required to consider relevant acts and management plans for any activities in coastal areas of the Great Lakes. Key hydrological areas and features covered by these policies include:
 - Groundwater recharge areas
 - Vulnerable aquifers
 - Surface water areas
 - Lakes, streams, and springs
 - Wetlands

These policies are intended to protect and conserve essential ecosystem services, including water regulation, habitat conservation, carbon sequestration, and resilience to climate change. Nature system policies are intended to provide a multi-scalar approach for regional land management:

3. **Landscape** by supporting broad ecosystem functioning across Southern Ontario—e.g., Great Lakes Coastal Areas or the Carolinian Zone
4. **Regional** by connecting natural systems across the GTHA and developing integrated approaches for conservation and restoration that intersect with the regional [Growth Plan](#), the Niagara Escarpment Plan (NEP), and the Oak Ridges Moraine Conservation Plan (ORMCP).
5. **Ecosystem** by supporting detailed plans to manage the ecological health of numerous watersheds, sub-watersheds and groundwater resources linked to regional river systems that are outside of the NEP and ORMCP.

Parkland, open space, and trails policies prioritize the development of a system of parks, trails, and open spaces that provide opportunities for outdoor recreation and tourism. These policies form a foundational element of the province's vision of *complete communities* by providing high-quality regional parklands that support community well-being while also providing a variety of environmental and climate co-benefits (e.g., Rouge National Urban Park). These policies support strategic land use planning in the Greenbelt at both local and regional levels and are intended to create a range of publicly accessible outdoor recreation opportunities across the region.

Settlement areas are towns, villages, and hamlets adjacent to protected areas of the Greenbelt, whereby the governance over land use and land use change fall under the jurisdiction of official municipal plans. However, where expansions to settlement areas are proposed in the Greenbelt, the policies of both the Greenbelt Plan and the Growth Plan apply to such expansions. Notably, settlement areas outside the Greenbelt are not permitted to expand into areas designated as protected countryside under the Greenbelt Act.

The **Urban River Valley** designation applies to lands within the main corridors of river valleys connecting the rest of the Greenbelt to the Great Lakes and inland lakes. The lands in this designation comprise river valleys and associated lands and are generally characterized by being: (a) lands containing natural and hydrologic features, including coastal wetlands; and/or (b) lands designated in official plans for uses such as parks, open space, recreation, conservation, or environmental protection. Only publicly owned lands are subject to the policies of the Urban River Valley designation. Any privately owned lands within the boundary of the Urban River Valley area are not subject to the policies of this designation.

Appendix 10: Methods for valuing different ecosystem services¹⁸⁴

Table 12. Methods for valuing different ecosystem services

Method	Ecosystem service	Strength	Limitation	Proposed Application
Market Price (Direct and indirect)	Market traded services— e.g., food, water, genetic resources	Data are established and objective. Easy to integrate this type of valuation into existing project-decision making structures	Partial valuation benefits (Costs only) Limited scope for application— Requires market transactions – e.g., fee-based services or tourism revenues	Pay for access outdoor recreation sites and programs Carbon sequestration and pollution removal potential
Cost based (Direct and indirect)	Services that have grey infrastructure counterparts – e.g., storm protection and water filtration services from wetlands	Data are established and objective. Easy to integrate this type of valuation into existing project-decision making structures Easy to compare green and grey infrastructure	Partial valuation benefits (Costs only) Indirect estimates of changes in health outcomes— limited by the direct value of natural infrastructure	Comparing the effectiveness of NBS to grey infrastructure projects to achieve set project objectives
Production function (Indirect use)	Regulating services that impact provisioning services – e.g., water quality affecting food production	Data are established and objective. Easy to integrate this type of valuation into existing project-decision making structures	Data-intensive Prone to data gaps in connecting changes in regulating services to outcomes in provisions	Performance-based conservation and restoration finance initiatives
Travel cost (Direct and indirect)	Recreation-based, cultural, and spiritual services	Semi-objective assumed WTP based travel-costs to access greenspace Uses established market prices to infer benefits from access Evaluates user preferences	Limited by data sampling design Quality of project outcomes often outside of scope Limited use in conservation finance projects	Estimating the value of investments in conservation and restoration to support recreation and tourism outcomes
Random utility modeling (Direct and indirect)	Recreation-based, cultural, and spiritual services	Able to capture direct and indirect values from changes in access and quality of ecosystems Useful at scale and easily understood Able to assess value based on site attributes, as well as other explanatory variables	Assumes zero sum decision-making processes Challenge to analyze correlations from large, diverse datasets Instrumental variables are challenging to integrate (e.g., weather, day of the week)	Comparing the potential and measuring the efficacy of recreation opportunities and cultural/spiritual values of improvements to ecosystems
Hedonic Price Model (Direct and indirect)	Habitat enhancing and aesthetic services	Data are established and objective. Easy to integrate this type of valuation into existing project-decision making structures	Unable to account for externalities affecting changes in market value— changes in ecosystem services risk be under or overestimated Accuracy depends on consumer knowledge of changes to services	Estimating the total value of enviro-health benefits in urban areas Evaluating differences in health benefits between neighborhoods

Contingent Valuation (Use and non-use)	All services	Ability to measure hypothetical scenarios and existence values	Sensitive to survey design and respondent affirmation bias	Estimating the existence value of greenspaces
Choice modeling (Use and non-use)	All services	Able to capture direct and indirect values Reduces affirmation bias of WTP by offering multiple responses Can identify marginal values with proper design	Value is wholly ascribed to utility—may not capture indirect value Survey design may influence value choices—i.e., inflated values may make certain choices more attractive to respondents	Understanding preferences and motivations the underlie value choices
Value/ Benefits Transfer (Use and non-use)	All services	Methods are established and can be quickly applied to different project contexts Good option where resources and local data are limited	Limited by the availability and rigour of existing case studies Assumes equal socio-economic and welfare conditions across cases	Rapid assessments for health benefits of NBS in low resource settings

REFERENCES

- 1 Office of the Auditor General of Ontario. (2021). Value-for-Money Audit: Land-Use Planning in the Greater Golden Horseshoe. Office of the Auditor General of Ontario. https://www.auditor.on.ca/en/content/annualreports/arreports/en21/AR_LandUse_en21.pdf
- 2 SONC. (2021). Near-Urban Nature Network: A Solution to Climate Change and Biodiversity Loss. Southern Ontario Nature Coalition. https://s3.ca-central-1.amazonaws.com/greenbelt.ca/Resources/GB_SONC_technical_report_E-ver.pdf
- 3 Office of the Auditor General of Ontario. (2021). Value-for-Money Audit: Land-Use Planning in the Greater Golden Horseshoe. Office of the Auditor General of Ontario. https://www.auditor.on.ca/en/content/annualreports/arreports/en21/AR_LandUse_en21.pdf
- 4 Greenbelt Foundation (2022). Improving Access to Large Parks in Ontario's Golden Horseshoe Policy, Planning, and Funding Strategies. The Greenbelt Foundation & Green Infrastructure Ontario Coalition. https://greeninfrastructureontario.org/app/uploads/2022/04/3384-LargeParks_Report_Sm_upd4-13-22.pdf
- 5 SONC. (2021). Near-Urban Nature Network: A Solution to Climate Change and Biodiversity Loss. Southern Ontario Nature Coalition. https://s3.ca-central-1.amazonaws.com/greenbelt.ca/Resources/GB_SONC_technical_report_E-ver.pdf
- 6 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510
- 7 Ministry of Municipal Affairs and Housing. (2020). A Place to Grow Growth Plan for the Greater Golden Horseshoe Office Consolidation 2020. Government of Ontario. <https://files.ontario.ca/mmah-place-to-grow-office-consolidation-en-2020-08-28.pdf>
- 8 Olmsted, P., & Sushant (2021). Invest in Nature: Scaling Conservation Finance in Canada for a Nature-Smart Economy. Smart Prosperity Institute. https://institute.smartprosperity.ca/sites/default/files/Invest-in-Nature-Report_SPI.pdf
- 9 Estimate is based on an equal proportion of the funding gap identified in Canada being shared across subnational jurisdictions.
- 10 SONC. (2021). Near-Urban Nature Network: A Solution to Climate Change and Biodiversity Loss. Southern Ontario Nature Coalition. https://s3.ca-central-1.amazonaws.com/greenbelt.ca/Resources/GB_SONC_technical_report_E-ver.pdf
- 11 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510
- 12 Wilson, S. J. (2008). Ontario's Wealth, Canada's Future: Appreciating the Value of the Greenbelt's Eco-Services. David Suzuki Foundation. <https://david Suzuki.wpenginepowered.com/wp-content/uploads/2018/02/ontario-wealth-canada-future-value-greenbelt-eco-services.pdf>
- 13 SONC. (2021). Near-Urban Nature Network: A Solution to Climate Change and Biodiversity Loss. Southern Ontario Nature Coalition. https://s3.ca-central-1.amazonaws.com/greenbelt.ca/Resources/GB_SONC_technical_report_E-ver.pdf
- 14 SONC. (2021). Technical Background Report: A Solution to Climate Change and Biodiversity Loss. Southern Ontario Nature Coalition. https://s3.ca-central-1.amazonaws.com/greenbelt.ca/Resources/GB_SONC_technical_report_E-ver.pdf
- 15 SONC. (2021). Near-Urban Nature Network: A Solution to Climate Change and Biodiversity Loss. Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/12322/attachments/original/1627576318/GB_SONC_FINAL_report_E-ver.pdf?1627576318
- 16 Olmsted, P., & Sushant (2021). Invest in Nature: Scaling Conservation Finance in Canada for a Nature-Smart Economy. Smart Prosperity Institute. https://institute.smartprosperity.ca/sites/default/files/Invest-in-Nature-Report_SPI.pdf
- 17 Twigg, M. and Awan, T. (2022). Investing in the future of Ontario's Greenbelt: In-person stakeholder consultation workshop. Smart Prosperity Institute. Toronto: October 3, 2022
- 18 Standardization of these measures is crucial for encouraging cross-sectoral and interjurisdictional collaboration, facilitating necessary monitoring and evaluation activities, and opening a pathway for scaling conservation and restoration efforts using a conservation finance approach by identifying best practices.
- 19 Twigg, M. (2021). The Nature of Health: Integrating Health Considerations in Urban Nature-based solutions. Smart Prosperity Institute. https://institute.smartprosperity.ca/sites/default/files/EN_Report_NBS_Final.pdf
- 20 Fowler, H. S., Lalonde, P., Mák, G., & Gyarmati, D. (2016). Considerations for assessing the economic value of population health interventions. Social Research and Demonstration Corporation. <https://www.srdc.org/media/200027/phac-report-en.pdf>
- 21 Somarakis, G., Stagakis, S., Chrysoulakis, N. (2019). ThinkNature Nature-based Solutions Handbook. <https://doi.org/10.26225/jerv-w202>
- 22 MNAI. (2022). Making Nature Count. Municipal Natural Assets Initiative. <https://mnai.ca/>
- 23 IISD. (2021). How Can Investment in Nature Close the Infrastructure Gap. Global Resource Centre. <https://nbi.iisd.org/wp-content/uploads/2021/10/investment-in-nature-close-infrastructure-gap.pdf>
- 24 RSI. (2022). Risk and Return on Investment Tool (RROIT). Risk Sciences International. <https://risksciences.com/rroit/>
- 25 SONC. (2021). Near-Urban Nature Network: A Solution to Climate Change and Biodiversity Loss. Southern Ontario Nature Coalition. https://s3.ca-central-1.amazonaws.com/greenbelt.ca/Resources/GB_SONC_technical_report_E-ver.pdf
- 26 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510

- 27 Wilson, S. J. (2008). Ontario's Wealth, Canada's Future: Appreciating the Value of the Greenbelt's Eco-Services. David Suzuki Foundation. <https://davidsuzuki.wpenginepowered.com/wp-content/uploads/2018/02/ontario-wealth-canada-future-value-greenbelt-eco-services.pdf>
- 28 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510
- 29 SOLRIS. (2022). Southern Ontario Land Resource Information System v3.0. Government of Ontario: Ministry of Natural Resources and Forestry. <https://geohub.lio.gov.on.ca/documents/0279f65b82314121b5b5ec93d76bc6ba/about>
Note: Our percent of "Agricultural land" for the Greenbelt contains "undifferentiated land" which is known to have a high probability of containing tilled lands and a small number of diverse other land types.
- 30 SONC. (2021). Near-Urban Nature Network: A Solution to Climate Change and Biodiversity Loss. Southern Ontario Nature Coalition. https://s3.ca-central-1.amazonaws.com/greenbelt.ca/Resources/GB_SONC_technical_report_E-ver.pdf
- 31 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510
- 32 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510
- 33 Wilson, S. J. (2008). Ontario's Wealth, Canada's Future: Appreciating the Value of the Greenbelt's Eco-Services. David Suzuki Foundation. <https://davidsuzuki.wpenginepowered.com/wp-content/uploads/2018/02/ontario-wealth-canada-future-value-greenbelt-eco-services.pdf>
- 34 Wilson, S. J. (2008). Ontario's Wealth, Canada's Future: Appreciating the Value of the Greenbelt's Eco-Services. David Suzuki Foundation. <https://davidsuzuki.wpenginepowered.com/wp-content/uploads/2018/02/ontario-wealth-canada-future-value-greenbelt-eco-services.pdf>
- 35 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510
- 36 <https://trcaca.s3.ca-central-1.amazonaws.com/app/uploads/2022/02/25141858/TRCA-AR-2021-v8-web.pdf>
- 37 <https://www.conservationhalton.ca/wp-content/uploads/2022/04/2021-CH-Annual-Report.pdf>
- 38 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510
- 39 <https://www.newswire.ca/news-releases/parks-canada-seeks-providers-of-innovative-and-sustainable-visitor-experiences-at-fathom-five-national-marine-park-810868882.html#:~:text=Together%2C%20Fathom%20Five%20National%20Marine,economic%20activity%20within%20the%20region.>
- 40 <https://www.conservationfinancenetwork.org/2019/07/24/pay-for-success-financing>
- 41 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510
- 42 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. Figure 7, p60 https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510
- 43 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510
- 44 Berardi, U., Zahra, J. & J. Graham. (2020). Cooling Corridors: The Role of Green Infrastructure in Building Resilience to Extreme Heat. Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/12295/attachments/original/1589917754/Final_Working_paper_URV_GL_Heat_Modeling_Report.pdf?1589917754
- 45 IBC. (2022). Derecho Storm Ranks 6th Largest Insured Loss Event in Canadian History. Insurance Bureau of Canada: Media Release. <http://www.ibc.ca/on/resources/media-centre/media-releases/derecho-storm-ranks-6th-largest-insured-loss-event-in-canadian-history>
- 46 City of Toronto. (2021). City of Toronto 2022 rate-supported budget for Toronto Water. Media Release: <https://www.toronto.ca/news/city-of-toronto-2022-rate-supported-budget-for-toronto-water/>
- 47 Bedient, P. B., Huber, W. C., & Vieux, B. E. (2008). Hydrology and floodplain analysis (4th Ed.). Upper Saddle River, NJ: Prentice Hall.
- 48 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510
- 49 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510

- 50 https://ontarionature.org/wp-content/uploads/2017/10/protecting_greenbelt_wetlands_report.pdf
- 51 Greenbelt Foundation. (2019). Investing in the Future: The Economic Case for Natural Infrastructure in Ontario. Greenbelt Foundation Occasional Papers. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/12305/attachments/original/1591017841/GB_EconomicCase_REPORT_e-ver.pdf?1591017841
- 52 Greenbelt Foundation. (2019). Investing in the Future: The Economic Case for Natural Infrastructure in Ontario. Greenbelt Foundation Occasional Papers. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/12305/attachments/original/1591017841/GB_EconomicCase_REPORT_e-ver.pdf?1591017841
- 53 <https://www.quantifiedventures.com/wetlands-environmental-impact-bond>
- 54 <https://www.ontario.ca/page/oak-ridges-moraine-conservation-plan-2017>
- 55 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510
- 56 <https://www.toronto.ca/news/city-of-toronto-2022-rate-supported-budget-for-toronto-water/>
- 57 Viessman, W., & Hammer, M. J., Perez, E. M., & Chadick, P. (1993). Water supply and pollution control. Pearson.
- 58 JRG Consulting (2018). Agriculture Trends and Updates: Understanding the Greenbelt's Unique Advantages. Greenbelt Foundation. https://assets.nationbuilder.com/greenbelt/pages/9724/attachments/original/1550261687/Agriculture_by_the_Numbers_Understanding_the_Greenbelt%E2%80%99s_Unique_Advantages_2018-FINAL.pdf?1550261687
- 59 David Suzuki Foundation. (2011). Biodiversity in Ontario's Greenbelt. <https://david Suzuki.wpenginepowered.com/wp-content/uploads/2011/12/biodiversity-ontario-greenbelt.pdf>
- 60 <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3210015301&pickMembers%5B0%5D=1.7&cubeTimeFrame.startYear=2001&cubeTimeFrame.endYear=2021&referencePeriods=20010101%2C20210101>
- 61 JRG Consulting. (2018). Agriculture Trends and Updates: Understanding the Greenbelt's Unique Advantages. Greenbelt Foundation. https://assets.nationbuilder.com/greenbelt/pages/9724/attachments/original/1550261687/Agriculture_by_the_Numbers_Understanding_the_Greenbelt%E2%80%99s_Unique_Advantages_2018-FINAL.pdf?1550261687
- 62 <https://www.fruitandveggie.com/greenbelt-foundation-invests-in-niagara-tender-fruit-production/>
- 63 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation.
- 64 https://verra.org/wp-content/uploads/2019/09/SDV_MON_REP_ENG_DRAFT_607_01JAN2017_31DEC2018.pdf
- 65 <https://www.newswire.ca/news-releases/td-securities-invests-in-canada-s-largest-ever-private-conservation-project-announces-formation-of-esg-solutions-carbon-advisory-practice-864212215.html>
- 66 <https://en.unesco.org/biosphere/eu-na/niagara-escarpment>
- 67 OMAFRA. (2021). Statistical Summary of Ontario Agriculture. Retrieved December 2, 2021, from http://www.omafra.gov.on.ca/english/stats/agriculture_summary.htm
- 68 <https://www.ontariotenderfruit.ca/uploads/file/1615489670FINAL-2020-OTFG-Annual-Report-w-FS-and-cover---email.pdf>
- 69 WGO. (2015). Canada's Wine Economy – Ripe Robust Remarkable. Wine Growers of Ontario. <https://www.grapegrowersofontario.com/62>
- 70 Niagara Region. (2019). Niagara Tourism Profile. Niagara Region. https://niagaracanada.com/wp-content/uploads/sites/7/2019/11/Niagara-Tourism-Profile_FINAL.pdf
- 71 Bruce County. (2019). Economic Impact of Tourism Report. Bruce County, Planning and Development Department. <https://www.brucecounty.on.ca/sites/default/files/file-upload/business/economic-impact-of-tourism-for-2019.pdf>
- 72 Oak Ridges Moraine Land Trust. (2020). Explore Our Moraine. <https://www.oakridgesmoraine.org/explore/>
- 73 Tomalty, R. (2012). Carbon in the Bank: Ontario's Greenbelt and its Role in Mitigating Climate Change. Vancouver: David Suzuki Foundation. <https://david Suzuki.org/wp-content/uploads/2012/08/carbon-bank-ontario-greenbelt-role-mitigating-climate-change.pdf>
- 74 LSRC. (2016). Lake Simcoe Watershed. Lake Simcoe Region Conservation Authority. <https://www.lsrca.on.ca/our-watershed>
- 75 Bartram, J., Swail, S. L., & B. Mausberg. (2007). The Holland Marsh: Challenges and Opportunities in the Greenbelt. The Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/14663/attachments/original/1615839004/The_Holland_Marsh_Challenges_and_Opportunities_in_the_Greenbelt.pdf?1615839004
- 76 SONC. (2021). Near-Urban Nature Network: A Solution to Climate Change and Biodiversity Loss. Southern Ontario Nature Coalition. https://s3.ca-central-1.amazonaws.com/greenbelt.ca/Resources/GB_SONC_technical_report_E-ver.pdf
- 77 Statistics Canada. (2021). Annual Demographic Estimates: Canada, Provinces and Territories, 2021. Government of Canada. <https://www150.statcan.gc.ca/n1/pub/91-215-x/2021001/sec1-eng.htm>
- 78 Population growth declined across Canada in 2021 due to the pandemic. A similar decline was observed in Ontario (<0.5%)
- 79 Office of the Auditor General of Ontario. (2021). Value-for-Money Audit: Land-Use Planning in the Greater Golden Horseshoe. Office of the Auditor General of Ontario. https://www.auditor.on.ca/en/content/annualreports/arreports/en21/AR_LandUse_en21.pdf

- 80 Passarelli, A., & Breidburg, I. (2021). Housing Market Insight Canada. Canadian Mortgage and Housing Corporation. <https://assets.cmhc-schl.gc.ca/sites/cmhc/professional/housing-markets-data-and-research/market-reports/housing-market-insight/2021/housing-market-insight-canada-68469-m03-en.pdf?re>
- 81 Gordon, J. (2021). Red-hot and rural: Canadian towns grapple with big-city-like real estate boom. Reuters. <https://www.reuters.com/world/red-hot-rural-canadian-towns-grapple-with-big-city-like-real-estate-boom-2021-05-13/>
- 82 Byun, E., Finkelstein, S. A., Cowling, S. A., & Badiou, P. (2018). Potential carbon loss associated with post-settlement wetland conversion in southern Ontario, Canada. *Carbon Balance and Management*, 13(1), 6. <https://doi.org/10.1186/s13021-018-0094-4>
- 83 Twigg, M. (2021). The Nature of Health: Integrating Health Considerations in Urban Nature-based solutions. Smart Prosperity Institute. https://institute.smartprosperity.ca/sites/default/files/EN_Report_NBS_Final.pdf
- 84 Slack, E. (2016). Sustainable Development and Municipalities: Getting the Prices Right. *Canadian Public Policy*, 42(S1), S73–S78. <https://doi.org/10.3138/cpp.2015-024>
- 85 Our World in Data. (2017). Transport CO2 emissions vs. Population density of cities. Our World in Data. <https://ourworldindata.org/grapher/transport-emissions-city-density>
- 86 Ontario Nature. (2011). Biodiversity in Ontario's Greenbelt. David Suzuki Foundation & Ontario Nature. https://ontarionature.org/wp-content/uploads/2017/10/REPORT-GB_Habitat-Dec2011.pdf
- 87 Caldwell, W., Epp, S., Wan, X., Singer, R., Drake, E., & Sousa, E. C. (2022). Farmland Preservation and Urban Expansion: Case Study of Southern Ontario, Canada. *Frontiers in Sustainable Food Systems*, 6. <https://www.frontiersin.org/articles/10.3389/fsufs.2022.777816>
- 88 Bedient, P. B., Huber, W. C., & Vieux, B. E. (2008). *Hydrology and floodplain analysis* (4th Ed.). Upper Saddle River, NJ: Prentice Hall.
- 89 Moffat, M. (2021). Baby Needs A New Home: Projecting Ontario's growing number of families and their housing needs. Smart Prosperity Institute. <https://institute.smartprosperity.ca/sites/default/files/Baby-Needs-a-New-Home-Oct-1.pdf>
- 90 The Greenbelt is also home to several highways such as the 400, 401, 404 and 407. Highway 401, the busiest highway in North America, passes through the Greenbelt region. Across Southern Ontario, 24 highway expansion projects are either underway or planned. These expansions amount to over 225 kms of new highway and approximately 57 km are in or near the Greenbelt. <https://www.ontario.ca/page/ontarios-highway-programs>
- 91 Siddiqui, A. (2021). Assessing the connectivity of natural systems in the Golden Horseshoe: an application of the effective mesh size. John H. Daniels' Faculty of Landscape, Architecture, and Design, University of Toronto. https://tspace.library.utoronto.ca/bitstream/1807/104544/1/Siddiqui_AmaL_202101_MFC_capstone.pdf
- 92 IBC (2022). Derecho Storm Ranks 6th Largest Insured Loss Event in Canadian History. Insurance Bureau of Canada: Media Release. <http://www.ibc.ca/on/resources/media-centre/media-releases/derecho-storm-ranks-6th-largest-insured-loss-event-in-canadian-history>
- 93 Tomalty, R., & Komorowski, B. 2011. Climate Change Adaptation: Ontario's Resilient Greenbelt. Occasional Paper series: Friends of the Greenbelt Foundation. https://d3n8a8pro7vnm.cloudfront.net/greenbelt/pages/41/attachments/original/1376571502/Climate_Change_Adaption_Ontario%27s_Resilient_Greenbelt.pdf?1376571502
- 94 Southern Ontario Nature Coalition (2021). Near-Urban Nature Network: A Solution to Climate Change and Biodiversity Loss. Southern Ontario Nature Coalition. https://s3.ca-central-1.amazonaws.com/greenbelt.ca/Resources/GB_SONC_technical_report_E-ver.pdf
- 95 Afroz, S., Rhodes, N., Park J., Yang M., & E. Crummey. (2021). CIPI: Buildings – Assessing the financial impacts of extreme rainfall, extreme heat and freeze-thaw cycles on public buildings in Ontario. Financial Accountability Office of Ontario. <https://www.fao.on.ca/en/Blog/Publications/cipi-buildings>
- 96 Caldwell, W., Epp, S., Wan, X., Singer, R., Drake, E., & Sousa, E. C. (2022). Farmland Preservation and Urban Expansion: Case Study of Southern Ontario, Canada. *Frontiers in Sustainable Food Systems*, 6. <https://www.frontiersin.org/articles/10.3389/fsufs.2022.777816/full>
- 97 JRG Consulting (2018). Agriculture Trends and Updates: Understanding the Greenbelt's Unique Advantages. Greenbelt Foundation. https://assets.nationbuilder.com/greenbelt/pages/9724/attachments/original/1550261687/Agriculture_by_the_Numbers_Understanding_the_Greenbelt%E2%80%99s_Unique_Advantages_2018-FINAL.pdf?1550261687
- 98 Cheng, R., & Lee, P. G. (2008). Urban sprawl and other major land use conversions in Ontario's greenbelt from 1993 to 2007: A change analysis project using satellite imagery. Report to the David Suzuki Foundation and the Greenbelt Foundation. Edmonton: Global Forest Watch Canada. <http://www.oufc.org/wp-content/uploads/2014/01/greenbelt-change-20080227.pdf>
- 99 JRG Consulting (2018). Agriculture Trends and Updates: Understanding the Greenbelt's Unique Advantages. Greenbelt Foundation. https://assets.nationbuilder.com/greenbelt/pages/9724/attachments/original/1550261687/Agriculture_by_the_Numbers_Understanding_the_Greenbelt%E2%80%99s_Unique_Advantages_2018-FINAL.pdf?1550261687
- Caldwell, W. & S. Epp (2021). Measuring Farmland Loss: Quantifying the Conversion of Prime Agricultural Land To Non-Farmland Uses Across Southern Ontario. School of Environmental Design and Rural Development, University of Guelph. <http://www.wayne-caldwell.ca/wp-content/uploads/2021/06/volume-1-FINAL.pdf>
- 100 Akimowicz, M., Cummings, H., & Landman, K. (2016). Green lights in the Greenbelt? A qualitative analysis of farm investment decision-making in peri-urban Southern Ontario. *Land Use Policy*, 55:24-36. <http://dx.doi.org/10.1016/j.landusepol.2016.03.024>
- 101 AAFC. (2021). Agri-Environmental Indicator – Risk of Soil Erosion. Government of Canada. <https://open.canada.ca/data/en/dataset/b52b3c91-e0eb-47d1-aea5-fa5428254512>

- 102 Macdonald, S., Monstadt, J., & Friendly, A. (2021). Towards smart regional growth: Institutional complexities and the regional governance of Southern Ontario's Greenbelt. *Territory, Politics, Governance*, 0(0), 1–21. <https://doi.org/10.1080/21622671.2021.1928540>
- 103 NRCAN. (2020). 2 Billion Trees Commitment. Government of Canada. <https://www.canada.ca/en/campaign/2-billion-trees.html>
- 104 AAFC. (2021). Agricultural Climate Solutions – On-Farm Climate Action Fund. Government of Canada. <https://agriculture.canada.ca/en/agricultural-programs-and-services/agricultural-climate-solutions-farm-climate-action-fund-0>
- 105 Conservation Ontario. (2021). Conservation Ontario and Conservation Authorities Tackling Climate Change with \$9M in Federal Funding. Conservation Ontario Media Release, July 28, 2021. https://conservationontario.ca/fileadmin/pdf/latest-news/2021_MediaRelease_July_28_Federal_Funding_Announcement_Nature_Based_Solutions.pdf
- 106 Greenbelt Foundation. Greenbelt Foundation to Build on 16 Years of Work with Renewed Provincial Funding. Greenbelt Foundation News Release, February 23, 2021. https://www.greenbelt.ca/news_release_funding_renewal#:~:text=Greenbelt%20Foundation%20to%20Build%20on%2016%20Years%20of%20Work%20with%20Renewed%20Provincial%20Funding,-A%20Renewed%20Three&text=TORONTO%2C%20February%2023%2C%202021%E2%80%94,from%20the%20Government%20of%20Ontario.
- 107 Conservation Ontario. (2022). About Conservation Authorities. Conservation Ontario. <https://conservationontario.ca/conservation-authorities/about-conservation-authorities>
- 108 Federal and Provincial funding for CAs collectively account for 10% of total annual funding
- 109 Conservation Ontario. (2022). Conservation Authorities: Partners for a More Resilient Ontario. Conservation Ontario. https://conservationontario.ca/fileadmin/pdf/conservation_authorities_section/CO_Resilient_Ontario_2021_FINAL.pdf
- 110 Twigg, M. (2022). Stakeholder interviews with Conservation Authorities in Ontario's Greenbelt. Smart Prosperity Institute, January to September, 2022.
- 111 Conservation Ontario. (2022). About Conservation Authorities. Conservation Ontario. <https://conservationontario.ca/conservation-authorities/about-conservation-authorities>
- 112 Conservation Ontario. (2021). Specific Comments on Mandatory Programs and Services Delivered by Conservation Authorities. Conservation Ontario. https://conservationontario.ca/fileadmin/pdf/policy-priorities_section/CA_Act/CA_Act_Attachment_1_Specific_Comments_on_Mandatory_Programs_and_Services_Delivered_by_CAs_June_22_2021_.pdf
- 113 Mitchell, A. (2021). Letter to MECP Minister. Conservation Ontario. https://conservationontario.ca/fileadmin/pdf/policy-priorities_section/CA_Act/CAAct_Letter_to_MECP_Minister_Piccini_from_AMitchell_June_22_2021_r.pdf
- 114 Gavine, K. (2021). CO ERO Response Letter June 22 – Phase 1 Regulatory Proposals under the Conservation Authorities Act. Conservation Ontario. https://conservationontario.ca/fileadmin/pdf/policy-priorities_section/CA_Act/CA_Act_CO_ERO_Response_Letter_June22-Phase_1_Regulatory_Proposals_under_the_Conservation_Authorities_Act.pdf
- 115 Conservation Authorities Act. (2022)O. Reg. 687/21: Transition Plans and Agreements for Programs and Services under section 21.1.2 of the Act. Government of Ontario. <https://www.ontario.ca/laws/regulation/210687>
- 116 MMAH. (2022). More Homes Built Faster Act, 2022: All levels of government working together to get more homes built faster. Government of Ontario Newsroom, October 25, 2022. <https://news.ontario.ca/en/backgrounder/1002422/more-homes-built-faster-act-2022>
- 117 Shaftoe, M. (2019). The Kayanase Connection. *Alternative Journal: Voice of Canada's Environment*. <https://www.alternativesjournal.ca/community/the-kayanase-connection/>
- 118 Kayanase. (2022). Kayanase: Restoring Mother Earth. <https://www.kayanase.ca/ecological-services/>
- 119 Twigg, M and T. Awan (2022). Investing in the future of Ontario's Greenbelt: In-person stakeholder consultation workshop. Smart Prosperity Institute. Toronto: October 3, 2022
- 120 Swiss Re (2020). Protecting and Enabling Nature-Based Solutions. Media Release: September 2020. https://mnai.ca/media/2020/09/Swiss-Re_NBS_Concept_Paper_Canada_0820.pdf
- 121 Twigg, M and T. Awan (2022). Investing in the future of Ontario's Greenbelt: In-person stakeholder consultation workshop. Smart Prosperity Institute. Toronto: October 3, 2022
- 122 NCC. (2022). Nature Conservancy of Canada accelerates conservation with TD carbon investment. Nature Conservancy of Canada: Media Release. <https://www.natureconservancy.ca/en/who-we-are/news-room/news-releases/boreal-TD-carbon.html>
- 123 Arjaliès, D. (2021). Deshkan Ziibi Conservation Impact Bond Project: On Conservation Finance, Decolonization, and Community-Based Participatory Research. *Deshkan Ziibi Conservation Impact Bond Project: On Conservation Finance, Decolonization, and Community-Based Participatory Research: Vol. 1 : Iss. 1 , Article 1*. <https://ir.lib.uwo.ca/impact-bond/vol1/iss1/1>
- 124 Arjaliès, D. (2021). Deshkan Ziibi Conservation Impact Bond Project: On Conservation Finance, Decolonization, and Community-Based Participatory Research. *Deshkan Ziibi Conservation Impact Bond Project: On Conservation Finance, Decolonization, and Community-Based Participatory Research: Vol. 1 : Iss. 1 , Article 1*. <https://ir.lib.uwo.ca/impact-bond/vol1/iss1/1>
- 125 Twigg, M. and T. Awan (2022). Investing in the future of Ontario's Greenbelt: In-person stakeholder consultation workshop. Smart Prosperity Institute. Toronto: October 3, 2022
- 126 MNRF. (2017). Niagara Escarpment Plan (2017). Government of Ontario. <https://escarpment.org/wp-content/uploads/2021/05/NEP-Consolidation-April-5-2021-FINAL.pdf>
- 127 <https://www.ontario.ca/laws/statute/06c22>

- 128 MMA. (2017). Oak Ridges Moraine Conservation Plan (2017). Government of Ontario. <https://files.ontario.ca/oak-ridges-moraine-conservation-plan-2017.pdf>
- 129 MMAH. (2020). A Place to Grow: Growth Plan for the Greater Golden Horseshoe. Government of Ontario. <https://files.ontario.ca/mmah-place-to-grow-office-consolidation-en-2020-08-28.pdf>
- 130 MMA. (2017). Greenbelt Plan (2017). Government of Ontario. <https://files.ontario.ca/greenbelt-plan-2017-en.pdf>
- 131 <https://www.ontario.ca/laws/statute/10n15>
- 132 Additional changes to the CAA may be forthcoming, which could alter the regulatory for advancing conservation finance projects in the Greenbelt.
- 133 TORAC. (2022). MAAP Online Reporting Tool. The Ontario Aggregate Resources Corporation. <https://toarc.com/legacy-pits-quarries-maap/maap-online-reporting-tool/>
- 134 <https://www.ontario.ca/page/source-protection>
- 135 <https://globalnews.ca/news/8416315/ontario-ministers-zoning-orders-auditor-general/>
- 136 <https://www.cbc.ca/news/canada/toronto/doug-ford-greenbelt-housing-vaughan-milani-rizmi-developer-1.5263980>
- 137 <https://thenarwhal.ca/carruthers-creek-ontario-greenbelt/>
- 138 <https://www.durhamregion.com/news-story/10135135-they-understand-what-flooding-means-ajax-opposed-to-development-in-carruthers-creek-headwaters/>
- 139 <https://www.durhamregion.com/news-story/10129182-durham-council-opposes-hasty-development-on-carruthers-creek-headwaters-in-pickering/>
- 140 <https://www.gtaconstructionreport.com/mzo-denied-for-richmond-hills-proposed-development-on-green-belt/>
- 141 DeWitt, T. H., Berry, W. J., Canfield, T. J., Fulford, R. S., Harwell, M. C., Hoffman, J. C., Johnston, J. M., Newcomer-Johnson, T. A., Ringold, P. L., Russell, M. J., Sharpe, L. A., & Yee, S. H. (2020). The Final Ecosystem Goods & Services (FEGS) Approach: A Beneficiary-Centric Method to Support Ecosystem-Based Management. In T. G. O'Higgins, M. Lago, & T. H. DeWitt (Eds.), *Ecosystem-Based Management, Ecosystem Services and Aquatic Biodiversity: Theory, Tools and Applications* (pp. 127–145). Springer International Publishing. https://doi.org/10.1007/978-3-030-45843-0_7
- 142 Wilson, S. J. (2008). Ontario's Wealth, Canada's Future: Appreciating the Value of the Greenbelt's Eco-Services. David Suzuki Foundation. <https://david Suzuki.wpenginepowered.com/wp-content/uploads/2018/02/ontario-wealth-canada-future-value-greenbelt-eco-services.pdf>
- 143 Nahlik, A. M., Kentula, M. E., Fennessy, M. S., & Landers, D. H. (2012). Where is the consensus? A proposed foundation for moving ecosystem service concepts into practice. *Ecological Economics*, 77, 27–35. <https://doi.org/10.1016/j.ecolecon.2012.01.001>
- 144 Gamble, S., & J. McQueen. (2019). Best Practices for Indigenous Engagement. Canadian Commission for UNESCO's Idealab. <https://en.ccunesco.ca/-/media/Files/Unesco/Resources/2019/08/BestPracticesForIndigenousEngagementGeoparks.pdf>
- 145 <https://rates.ca/resources/frustrated-rising-home-insurance-premiums-blame-climate-change>
- 146 Green Analytics. (2016). Ontario's Good Fortune: Appreciating the Greenbelt's Natural Capital. Friends of the Greenbelt Foundation. https://d3n8a8pro7vhm.cloudfront.net/greenbelt/pages/2825/attachments/original/1485878510/OP_20_Web_version_2017.pdf?1485878510
- 147 <https://www.conservationhalton.ca/wp-content/uploads/2022/04/2021-CH-Annual-Report.pdf>
- 148 <https://trcaca.s3.ca-central-1.amazonaws.com/app/uploads/2022/02/25141858/TRCA-AR-2021-v8-web.pdf>
- 149 <https://capitalcurrent.ca/concern-over-conservation-rising-as-number-of-visitors-to-ontario-parks-soars/>
- 150 Wilson, S. J. (2008). Ontario's Wealth, Canada's Future: Appreciating the Value of the Greenbelt's Eco-Services. David Suzuki Foundation. <https://david Suzuki.wpenginepowered.com/wp-content/uploads/2018/02/ontario-wealth-canada-future-value-greenbelt-eco-services.pdf>
- 151 Tomalty, R. (2012). Carbon in the Bank: Ontario's Greenbelt and its Role in Mitigating Climate Change. Vancouver: David Suzuki Foundation. <https://david Suzuki.org/wp-content/uploads/2012/08/carbon-bank-ontario-greenbelt-role-mitigating-climate-change.pdf>
- 152 Guerra, C. A., Berdugo, M., Eldridge, D. J., Eisenhauer, N., Singh, B. K., Cui, H., ... & Delgado-Baquerizo, M. (2022). Global hotspots for soil nature conservation. *Nature*, 1-6. <https://pubmed.ncbi.nlm.nih.gov/36224389/>
- 153 <https://www.mississauga.ca/services-and-programs/home-and-yard/stormwater/stormwater-charge/>
- 154 <https://www.kitchenerutilities.ca/en/rates/stormwater-rates.aspx#:~:text=We%20fund%20your%20stormwater%20management,on%20your%20monthly%20utility%20bill.>
- 155 <https://guelph.ca/living/environment/water/water-rates/>
- 156 <https://www.newmarket.ca/stormwatercharge>
- 157 [https://www.brampton.ca/en/residents/stormwater/pages/stormwater-charge.aspx#:~:text=The%20stormwater%20charge%20reduces%20the,%25%20\(%2489%20versus%20%24132\).](https://www.brampton.ca/en/residents/stormwater/pages/stormwater-charge.aspx#:~:text=The%20stormwater%20charge%20reduces%20the,%25%20(%2489%20versus%20%24132).) [https://www.brampton.ca/en/residents/stormwater/pages/stormwater-charge.aspx#:~:text=The%20stormwater%20charge%20reduces%20the,%25%20\(%2489%20versus%20%24132\).](https://www.brampton.ca/en/residents/stormwater/pages/stormwater-charge.aspx#:~:text=The%20stormwater%20charge%20reduces%20the,%25%20(%2489%20versus%20%24132).)
- 158 <https://www.markham.ca/wps/portal/home/neighbourhood-services/water-sewer/rates-meters-billing-fees/04-stormwater-fee>
- 159 <https://www.burlingtonvt.gov/stormwater/Billing#:~:text=Current%20Stormwater%20Rates,Triplex%3A%20%248.24%2Fmonth>

- 160 <https://www.vaughan.ca/services/residential/stormwater/Pages/default.aspx>
- 161 <https://www.barrie.ca/government-news/budget/stormwater-climate-action-fund>
- 162 <https://www.cbc.ca/news/canada/toronto/toronto-councillors-look-to-resurrect-stormwater-charge-proposal-after-years-of-flooding-and-delays-1.6090327>
- 163 <https://doee.dc.gov/src>
- 164 Jamison, Dean T., Joel G. Breman, Anthony R. Measham, George Alleyne, Mariam Claeson, David B. Evans, Prabhat Jha, Anne Mills, and Philip Musgrove. (2006). Cost-Effectiveness Analysis. Priorities in Health. The International Bank for Reconstruction and Development / The World Bank. <https://www.ncbi.nlm.nih.gov/books/NBK10253/>.
- 165 Somarakis, G., Stagakis, S., Chrysoulakis, N. (2019). ThinkNature Nature-based Solutions Handbook. <https://doi.org/10.26225/jerv-w202>
- 166 Treasury Board of Canada Secretariat (TBS). 2007. "Canadian Cost-Benefit Analysis Guide". Government of Canada. Accessed March 9, 2021. <https://www.tbs-sct.gc.ca/rtrap-parfa/analys/analys-eng.pdf>
- 167 Grey, E., Suzanne O., Altamirano J.C., Feltran-Barbieri R., & G. Morales. (2019). Green-gray assessment: How to assess the costs and benefits of green infrastructure for water supply systems. World Resources Institute: Washington, DC, USA. <https://doi.org/10.13140/RG.2.2.26788.01923>.
- 168 Neugarten R. A., Langhammer, P. F., Osipova, E., Bagstad, K. J., Bhagabati, N., Butchart, S. H., ... & Willcock, S. et al., (2018). Tools of measuring, modelling, and valuing ecosystem services: Guidance for Key Biodiversity Areas, natural World Heritage Sites, and protected areas. International Union for the Conservation of Nature. <https://portals.iucn.org/library/sites/library/files/documents/PAG-028-En.pdf>
- 169 Neugarten et al., (2018). Tools of measuring, modelling, and valuing ecosystem services: Guidance for Key Biodiversity Areas, natural World Heritage Sites, and protected areas. International Union for the Conservation of Nature. <https://portals.iucn.org/library/sites/library/files/documents/PAG-028-En.pdf>
- 170 Wilson, S. J. (2008). Ontario's Wealth, Canada's Future: Appreciating the Value of the Greenbelt's Eco-Services. David Suzuki Foundation. <https://david Suzuki.wpenginepowered.com/wp-content/uploads/2018/02/ontario-wealth-canada-future-value-greenbelt-eco-services.pdf>
- 171 The value of ecosystem services was unavailable. The figure was calculated by multiplying the average per ha value of ecosystem services (\$3,487) with the area of watershed. The per ha average value in the greenbelt was calculated by Wilson (2008).
- 172 Kennedy, M., & Wilson, J. (2009). Natural Credit: Estimating the Value of Natural Capital in the Credit River Watershed. Credit Valley Conservation. <https://cvc.ca/document/natural-credit-estimating-the-value-of-natural-capital-in-the-credit-river-watershed/>
- 173 Green Analytics. (2017). Valuing Natural Capital In The Lake Simcoe Watershed. Lake Simcoe Region Conservation Authority. <https://www.lsrca.on.ca/Shared%20Documents/reports/Ecosystem-Service-Values.PDF>
- 174 <https://www.cloca.com/year-in-review>
- 175 <https://www.lsrca.on.ca/Pages/Funding-Categories.aspx>
- 176 <https://www.kawarthaconservation.com/en/about-us/resources/Documents/2022-Budget.pdf>
- 177 <https://www.kawarthaconservation.com/en/about-us/resources/Documents/Strategic-Plans-Strategies/2022-2026-Strategic-Plan-Final.pdf>
- 178 https://www.otonabeeconservation.com/wp-content/uploads/2022/04/AnnualReport_2022_WithLinks_FINAL.pdf
- 179 <https://lrc.on.ca/newContent/2021%20LTC%20Annual%20Report%20-FINAL.pdf>
- 180 <https://storymaps.arcgis.com/stories/9a81be6b2aa249fcbcf3d367e58078f9>
- 181 <https://www.cloca.com/year-in-review>
- 182 <https://www.nvca.on.ca/Shared%20Documents/2021%20Annual%20Report.pdf>
- 183 https://www.greysauble.on.ca/wp-content/uploads/2020/11/2021_Grey_Sauble_Conservation_Budget_Companion.pdf
- 184 Adapted from Twigg, M. (2021). The Nature of Health: Integrating Health Considerations in Urban Nature-based solutions. Smart Prosperity Institute. https://institute.smartprosperity.ca/sites/default/files/EN_Report_NBS_Final.pdf, and DEFRA. (2007). An introductory guide to valuing ecosystem services. Department of Environment, Food and Rural Affairs UK. https://ec.europa.eu/environment/nature/biodiversity/economics/pdf/valuing_ecosystems.pdf



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