NIAGARA PENINSULA CONSERVATION AUTHORITY
Board of Directors Meeting
July 19, 2024, 9:00 a.m
Carolinian Hall
3350 Merrittville Hwy., Thorold ON
AGENDA

CALL TO ORDER – ROLL CALL

The Niagara Peninsula watershed is situated within the traditional territory of the Haudenosaunee, Attiwonderonk (Neutral), and the Anishinaabeg, including the Mississaugas of the Credit—many of whom continue to live and work here today. This territory is covered by the Upper Canada Treaties (No. 3, 4, and 381) and is within the land protected by the Dish with One Spoon Wampum agreement. Today, the watershed is home to many First Nations, Métis, and Inuit.

1. APPROVAL OF AGENDA

2. DECLARATIONS OF CONFLICT OF INTEREST

3. APPROVAL OF MINUTES

3.1. Minutes of the Full Authority Meeting dated, June 21, 2024

Page 1

3.2. Closed Session Minutes of the Full Authority Meeting dated June 21, 2024 *(distributed separately*)

4. CHAIR'S UPDATE

5. CORRESPONDENCE

5.1. Notice of Decision pertaining to correspondence dated May 10, 2024 from Conservation Ontario RE: Conservation Ontario's Comments on Proposed Planning Act, City of Toronto Act, 2006 and Municipal Act, 2001 Changes (Schedules 4,9 and 12 of Bill 185 – the proposed Bill 185, Cutting Red Tape to Build More Homes Act, 2024) ERO #019-8369

Page 6

5.2. Correspondence dated June 27, 2024, from the City of Port Colborne RE: Report No. FA-27-24 RE: NPCA Comments on Proposed Regulation Detailing Minister's Permit and Review Powers – ERO Posting 019-8320

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6. PRESENTATIONS

6.1. Watershed Natural Asset Analysis & Valuation
Presented by Amy Taylor, CEO (Green Analytics) and Tara Gaade, Program Coordinator Watershed Strategies & Climate Change (NPCA)

7. DELEGATIONS

8. CONSENT ITEMS

8.1. Report No. FA-37-24 RE: Planning and Development Semi-Annual Report

Page 12

8.2. Report No. FA-36-24 RE: NPCA Comments on Proposed Amendments to Ontario Regulation 828 – ERO Posting 019-8364

Page 17

8.3. Report No. FA-39-24 RE: Decarbonization Roadmap and NPCA's Corporate Climate Change Action Plan

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8.4. Report No. FA-40-24 RE: Progress Update on the Management of Drainage in the Wainfleet Bog Conservation Area

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9. DISCUSSION ITEMS

9.1. Report No. FA-32-24 RE: 2025 Conservation Areas Fees

Page 36

9.2. Report No. FA-38-24 RE: Watershed Natural Assets Analysis & Valuation

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9.3. Report No. FA-35-24 RE: Delegation of Authority under the *Conservation Authorities Act*

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9.4. Report No. FA-33-24 RE: Niagara Peninsula Conservation Authority (NPCA) – Appointment of Regulations Officers

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9.5. Report No. FA-41-24 RE: Contract Award – 12 Mile Creek Restoration Project *(forthcoming)*

9.6. Report No. FA-34-24 RE: Integrated Watershed Monitoring and Reporting Program *(forthcoming)*

10. COMMITTEE REPORTS

11. MOTIONS

12. NOTICES OF MOTION

13. NEW BUSINESS

13.1 Verbal update RE: Niagara Peninsula Conservation Foundation

14. CLOSED SESSION

14.1. A proposed or pending acquisition or disposition of land by the NPCA (Confidential Report No. FA-42-24 – *distributed separately*)

14.2. Personal matters about an identifiable individual(s), including NPCA employees (Verbal Update)

14.3. Labour relations, Human Resource or employee negotiations (CAO Recruitment Oversight Committee – Verbal Update)

14.4. Information explicitly supplied in confidence to the municipality or local board by Canada, a province or territory or a Crown agency of any of them (Confidential Memorandum – *distributed separately*)

15. ADJOURNMENT

NIAGARA PENINSULA CONSERVATION AUTHORITY
Board of Directors Meeting
June 21, 2024, 9:00a.m.
3350 Merrittville Hwy., Thorold ON
MINUTES

MEMBERS PRESENT: S. Beattie, Vice Chair
D. Cridland
B. Grant
D. Huson
J. Metcalfe, Chair
M. Seaborn
M. Tadeson

REGRETS: B. Clark
R. Foster
P. O'Neill

STAFF PRESENT: C. Sharma, CAO/Secretary–Treasurer
E. Augustino, Water Quality Specialist
J. Culp, Manager, Compliance & Enforcement
M. Davis, Manager, Office of the CAO & Board
J. Diamond, Manager, Watershed Monitoring & Reporting
L. Lee-Yates, Director, Planning & Development
T. Proks, Source Water Protection & Hydrogeology Specialist
G. Shaule, Administrative Assistant
S. Zavarella, Manager, Communications & Public Relations

Chair Metcalfe called the meeting to order at 9:08 a.m.

1. APPROVAL OF AGENDA

Resolution No. FA-67-2024
Moved by: Stewart Beattie
Seconded by: Michelle Seaborn

THAT the agenda for the Full Authority Board meeting held on June 21, 2024 **BE AMMENDED** to address Item 9.2 immediately following Item 6.1.

CARRIED

2. DECLARATIONS OF CONFLICT OF INTEREST

None.

3. APPROVAL OF MINUTES

3.1. Minutes of the Full Authority Meeting dated, May 17, 2024

Resolution No. FA-68-2024
Moved by: Diana Huson
Seconded by: Brian Grant

THAT the Minutes off the Full Authority Meeting dated May 17, 2024 **BE APPROVED.**

CARRIED

4. CHAIR'S UPDATE

- Chair Metcalfe yielded the floor to Chandra Sharma, CAO/Secretary – Treasurer for staff introductions.
- Introduced new Manager, Communications & Public Relations, Sofia Zavarella.

5. CORRESPONDENCE

Resolution No. FA-69-2024
Moved by: Donna Cridland
Seconded by: Stewart Beattie

THAT the following Correspondence received at the June 21, 2024 Full Authority Board Meeting, **BE RECEIVED**

- Correspondence dated May 14, 2024, from the Regional Municipality of Niagara RE: 2025 Budget Planning Update;
- Correspondence dated May 28, 2024, from the Regional Municipality of Niagara RE: Staff Comments on Proposed Provincial Planning Statement (2024); and
- Correspondence dated June 12, 2024, from the City of Niagara Falls RE: Motion of Support for NPCA's Completion of Land Acquisitions in Niagara Region and Haldimand County.

CARRIED

6. PRESENTATIONS

6.1. 2023 Annual Water Quality Monitoring Report

Eric Augustino, Water Quality Specialist provided a presentation regarding the above noted. Discussion ensued regarding XYZ.

Resolution No. FA-70-2024
Moved by: Brian Grant
Seconded by: Mark Tadeson

THAT presentation RE: 2023 Annual Water Quality Monitoring Report **BE RECEIVED.**

CARRIED

9.2. Report No. FA-29-24 RE: Water Quality Monitoring Program Summary Report for the Year 2023

Resolution No. FA-71-2024
Moved by: Michelle Seaborn
Seconded by: Donna Cridland

THAT Report No. FA-29-24 RE: Water Quality Monitoring Program Summary Report for the Year 2023 **BE RECEIVED**;

AND THAT the Water Quality Fact Sheet 2023 **BE RECEIVED;**

AND THAT the actions identified herein to inform municipalities, stakeholders, and the public about the report findings and best practices to improve local water quality **BE IMPLEMENTED**.

AND FURTHER THAT a copy of this report **BE CIRCULATED** to NPCA watershed municipalities, Ministry of Natural Resources and Forestry (MNRF), Ministry of the Environment and Parks (MECP) and the Federal Ministry of Environment and Climate Change Canada (ECCC).

CARRIED

7. DELEGATIONS

None.

8. CONSENT ITEMS

8.1. Report No. FA-30-24 RE: Compliance & Enforcement Q1 Statistics 2024

Resolution No. FA-72-2024
Moved by: Stewart Beattie
Seconded by: Brian Grant

THAT Report No. FA-30-24 RE: Compliance and Enforcement Q1 Statistics 2024 **BE RECEIVED**.

CARRIED

9. DISCUSSION ITEMS

9.1. Report No. FA-31-24 RE: 2023 Annual Report

Resolution No. FA-73-2024
Moved by: Diana Huson
Seconded by: Brian Grant

THAT Report No. FA-31-24 RE: Draft 2023 Annual Report **BE RECEIVED**;

AND THAT the Draft 2023 Annual Report **BE APPROVED;**

AND FURTHER THAT the final report **BE PUBLISHED** online and **DISTRIBUTED** to participating municipalities, government agencies, community stakeholders, the Public Advisory Committee, Drinking Source Water Protection Committee, and the public in various media formats.

CARRIED

10. COMMITTEE REPORTS

10.1. Governance Committee Minutes, dated May 17, 2024

Resolution No. FA-74-2024
Moved by: Stewart Beattie
Seconded by: Donna Cridland

THAT the Governance Committee Minutes, dated May 17, 2024 **BE RECEIVED.**

CARRIED

10.2. Public Advisory Committee Minutes, dated May 28, 2024

Resolution No. FA-75-2024
Moved by: Michelle Seaborn
Seconded by: Mark Tadeson

THAT the Public Advisory Committee Minutes, dated May 28, 2024 **BE RECEIVED.**

CARRIED

11. MOTIONS

None.

12. NOTICES OF MOTION

None.

13. NEW BUSINESS

13.1 Verbal update RE: Niagara Peninsula Conservation Foundation

- The Annual General Meeting for NPCF was held on May 30, where Adam Shoalts was appointed to the Board of Directors.
- Celebrated community achievements at the GNCC's Business Awards as a Dinner Sponsor on June 13 to highlight opportunities for corporate partnerships.
- Held a Fundraising Campaign Committee on June 13 and welcomed Member Tadeson to the Committee.

14. CLOSED SESSION

Resolution No. FA-76-2024
Moved by: Stewart Beattie
Seconded by: Mark Tadeson

THAT the Full Authority Board meeting scheduled June 21, 2024 **MOVE INTO CLOSED SESSION** at 9:53 a.m.

CARRIED

Resolution No. FA-76-2024
Moved by: Donna Cridland
Seconded by: Brian Grant

THAT the Full Authority Board meeting held June 21, 2024 **MOVE INTO OPEN SESSION** at 10:44 a.m.

CARRIED

Resolution No. FA-77-2024
Moved by: Stewart Beattie
Seconded by: Diana Huson

THAT NPCA staff **PROCEED** as directed by Full Authority Board Members while in closed session.

CARRIED

15. ADJOURNMENT

The Full Authority Board meeting on June 21, 2024 adjourned at 10:46 a.m.

May 10, 2024

Ministry of Municipal Affairs and Housing
Provincial Planning Policy Branch
777 Bay Street, 13th Floor
Toronto, ON M7A 2J3

RE: Conservation Ontario's Comments on the "Proposed Regulatory Changes under the Planning Act Relating to the Cutting Red Tape to Build More Homes Act, 2024 (Bill 185): Removing Barriers for Additional Residential Units" (ERO# 019-8366);

"Proposed Planning Act, City of Toronto Act, 2006, and Municipal Act, 2001 Changes (Schedules 4, 9, and 12 of Bill 185 - the proposed Bill 185, Cutting Red Tape to Build More Homes Act, 2024)" (ERO# 019-8369); and the,

"Proposed Changes to Regulations under the Planning Act and Development Charges Act, 1997 Relating to the Bill 185, Cutting Red Tape to Build More Homes Act, 2024 (Bill 185): Newspaper Notice Requirements and Consequential Housekeeping Changes" (ERO# 019-8370)

Thank you for the opportunity to comment on the proposed legislative and regulatory changes as part of "Bill 185, the proposed *Cutting Red Tape to Build More Homes Act, 2024*". Conservation Ontario is the network of Ontario's 36 Conservation Authorities (CAs). These comments are not intended to limit the consideration of comments shared individually by CAs.

To support the Province in reaching their goal to build more homes in a safe and expedited manner, Conservation Ontario offers two key recommendations from a natural hazard and source water protection perspective.

1. **Protect people and property from natural hazards and protect sources of drinking water.** Amend Bill 185 to clarify that proposed expedited development (i.e., Additional Residential Units (ARU's), institutional uses and student housing, standardized housing,) and settlement area boundary expansions are excluded from hazardous lands and hazardous sites, areas where safe access through a natural

hazard cannot be achieved, and where development should be restricted to protect the quality and quantity of drinking water supplies.

2. **Maintain legislation that enables councils and planning authorities to pass by-laws requiring pre-application consultation**; and allow time to complete the consultation process to enable planning authorities to make complete application decisions, prior to allowing applicants to appeal to the OLT.

In the context of increasing risks due to climate change and the reduced availability of commercial/home insurance products to mitigate financial risks and losses associated with the impacts of natural hazards, we ask the Province to strongly consider the above recommendations. This will **avoid siting development in areas where there is an increased risk to public health and safety and to property damage from natural hazards (e.g., flooding and erosion), and to ensure the ongoing protection of Ontario's sources of drinking water**. The following paragraphs elaborate on the above recommendations.

Enhancing the Framework for Additional Residential Units (ARUs)

This proposal would enhance the Minister's authority to make regulations that could remove elements of municipal zoning by-laws (e.g., maximum lot coverage, limits on bedrooms allowed per lot) for the purpose of facilitating the development of ARUs, such as basement suites.

Conservation Ontario understands the importance of increasing availability of residential units in existing and proposed residential neighbourhoods to achieve the shared goal of building 1.5 million homes in a safe and expedited manner. Equally important to increasing the supply of housing is maintaining the health and safety of people, property and infrastructure, while safeguarding the natural environment. Under the *Planning Act,* the Minister shall have regard to matters of provincial interest, including the protection of public health and safety. Where the Minister considers using the new regulation-making authority, due consideration must be applied to ensure ARUs are not located in areas susceptible to natural hazards and where safe access through the hazard cannot be achieved, in accordance with Provincial standards. Furthermore, the Province should consider the potential cumulative impacts of locating ARUs on existing lots, including increased needs for stormwater management and the potential for localized flooding during storm events, resulting from increased impervious surfaces.

Recommendation

Clarify the proposed Minister's regulation-making authority that would not allow the Minister to remove elements of municipal zoning by-laws that would direct ARUs outside of hazardous lands and hazardous sites and where safe access through the hazard is not achieved. Continue to empower municipalities to regulate lot coverage where there is a higher possibility that stormwater infrastructure could be overwhelmed.

“Use It or Lose It” Tools

Conservation Ontario supports the Province’s proposal to enhance lapsing authority for approvals of draft plans of subdivision/condominiums and site plan control approvals. This proposal would help address outdated approvals that do not meet modern planning standards and would allow for the impacts of natural hazards to be reassessed upon lapsing. Natural hazards are dynamic and variable [especially in a changing climate] and the proposed tool would ensure that approvals reflect the current state of natural hazard features and associated risks; to reduce potential risks to public health and safety, and to property damage.

Municipal Pre-Application Process

The Province proposes to make municipal pre-application consultation voluntary at the discretion of the applicant and to allow an applicant to challenge complete application requirements to the Ontario Land Tribunal (OLT) once a fee has been submitted or pre-consultation has begun. This proposal will revoke the existing time-limited window once a municipality rejects an application as not being “complete”.

The pre-application process provides the applicant and municipality an opportunity to develop a comprehensive understanding of the site-specific application requirements for a project. Integrated pre-consultation with applicable regulatory agencies, such as CAs, is strongly encouraged as an effective process for scoping natural hazard technical studies that establish clear submission requirements. Pre-consultation also enables CAs, acting as Source Protection Authorities, to identify whether the proposal relates to a significant drinking water threat or its potential impact on any drinking water sources protected by a Source Protection Plan. Pre-application consultation frequently streamlines the applicant’s time and resources needed for a complete application and ensures natural hazard and drinking water source protection constraints are appropriately addressed. Furthermore, reasonable time should be allowed to complete the consultation process, before allowing an applicant to appeal to the Tribunal.

Should this proposal be enacted and where CAs are not included in pre-application consultation, the opportunity to address natural hazard impacts or potential impacts on drinking water sources protected by a Source Protection Plan could be missed. This may result in further delays as these impacts will need to be addressed later in the process.

Recommendation

Maintain the ability for councils and planning authorities to pass by-laws requiring pre-application consultation; and allow time to complete the consultation process to enable planning authorities to make a complete application decision, prior to allowing an applicant to appeal to the OLT.

Expedited Approval Process for Community Service Facility Projects and Exempting Universities from the Planning Act

A new section of the *Planning Act* is proposed that will enable regulations to provide for the

non-application of any provision of the Act, or a regulation made under the Act, or for setting out restrictions or limitations, to prescribed classes of community service facilities that meet prescribed requirements. The proposal would apply to community service facilities, including an undertaking of a board defined under the *Education Act*, a long-term care home, and a hospital. Similarly, publicly assisted colleges and universities are proposed to be exempt from the *Planning Act* and planning provisions of the *City of Toronto Act, 2006* for university-led student housing projects on- and off-campus.

The Provincial Policy Statement, 2020 strictly prohibits institutional uses, including long-term care homes, hospitals, and schools, from being located in lands affected by natural hazards and where safe access through the hazard cannot be achieved. Any proposed regulatory exemptions or expedited approval processes must consider the Province's direction regarding natural hazards to ensure vulnerable populations or sensitive uses are not located in areas that pose an increased risk to life and property.

Recommendation
Amend the proposal to ensure any new regulation excludes institutional uses and student housing from hazardous lands and hazardous sites and where safe access through the hazard cannot be achieved, in accordance with provincial standards.

Facilitating Standardized Housing Designs

A new section of the *Planning Act* is proposed that will enable regulations to establish criteria to facilitate planning approvals for standardized housing. The proposed changes would only apply to certain specified lands and would identify elements of the *Planning Act* and/or *City of Toronto Act, 2006* that could be overridden and/or certain planning elements that could be removed if the criteria are met.

Conservation Ontario recognizes the importance of establishing an expedited process for undertaking development of standardized housing; however, it must be provided in legislation that these projects be excluded from hazardous lands and hazardous sites, and in areas where safe access through the hazard cannot be achieved. This would further expedite approvals by only including sites that are safe to develop from a natural hazard perspective.

Recommendation
Amend the proposed legislative change so that any new regulation include criteria that standardized housing shall not be permitted in lands affected by hazardous lands and hazardous sites, and where safe access through the hazard cannot be achieved.

Settlement Area Boundary Expansions

The Province proposes to allow applicants to appeal a municipality's refusal or failure to make a decision on privately requested official plan or zoning by-law amendments that would change the settlement area boundaries, outside of the Greenbelt Area. Conservation Ontario is concerned that proposals for settlement area boundary expansions would disregard or underestimate natural hazards, safe access, and sustainability of municipal

sources of drinking water; resulting in a lengthy appeal process initiated by municipalities or CAs.

Recommendation
That the proposal be amended to require expansion of settlement area boundaries to exclude hazardous lands and hazardous sites, lands where safe access through the hazard cannot be achieved, and where development should be restricted to protect the quality and quantity of drinking water supplies, in particular if impacting sustainability of municipal sources of drinking water.

Thank you for the opportunity to review and provide comments on Bill 185. Should you have any questions regarding the comments and/or recommendations in this letter, please contact Brandi Walter at bwalter@conservationontario.ca.

Sincerely,

Brandi Walter
Brandi Walter
Policy and Planning Liaison

Leslie Rich
Leslie Rich, RPP
Source Water Protection Manager

c.c. Conservation Authority CAOs / GMs

PORT COLBORNE
Legislative Services

Municipal Offices: 66 Charlotte Street
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June 27, 2024

Melanie Davis
Manager, Office of the CAO & Board
Niagara Peninsula Conservation Authority
250 Thorold Rd., 3rd Floor
Welland, ON L3C 3W2

Dear Ms. Davis

Re: Report No. FA-27-24 Re: NPCA Comments on Proposed Regulation Detailing Minister's Permit and Review Powers – ERO Posting 019-8320

Please be advised that, at its meeting of June 25, 2024 the Council of The Corporation of the City of Port Colborne resolved as follows:

> That the correspondence received the Niagara Peninsula Conservation Authority (NPCA) regarding, Report No. FA-27-24 Re: NPCA Comments on Proposed Regulation Detailing Minister's Permit and Review Powers – ERO Posting 019-8320, be supported.

Sincerely,

Scott Luey
CAO/Acting City Clerk

Report To: **Board of Directors**

Subject: **NPCA Planning and Development Semi-Annual Report**

Report No: **FA-37-24**

Date: **July 19, 2024**

Recommendation:

THAT Report No. FA-37-24 RE: Planning and Development Semi-Annual Report **BE RECEIVED** for information.

Purpose:

The purpose of this report is to update the Board of Directors on the Planning and Permitting activities between January and June of 2024. Statistical reporting within the Planning and Development Department is a requirement of the NPCA Client Service Standards Document and Conservation Ontario.

Background:

The Planning and Development department is responsible for providing a variety of services to our municipal clients as well as the public. This includes reviewing *Planning Act* and *Niagara Escarpment Planning and Development Act* applications, and municipal Building Permit applications where there is a feature regulated by the NPCA. Planning and Development staff also respond to general phone/email inquiries, and issue Work Permits under Section 28.1 of the *Conservation Authorities Act*.

New sections of the *Conservation Authorities Act* were proclaimed, and Ontario Regulation 41/24 came into effect as of April 1, 2024. Ontario Regulation 41/24 Conservation authorities are now required to prepare and publish an annual report that provides statistics on permits, including reporting on levels of compliance with Ontario Regulation 41/24 and any associated timelines.

Since 2021, and as part of continuous customer service improvements, the NPCA has been reporting annually to Conservation Ontario on permit review times, in addition to the bi-annual reporting done to the NPCA Board of Directors. Staff will continue to provide summary reports in accordance with relevant Regulations.

Discussion:

During the first half of 2024 the Planning and Development Department reviewed a total of 805 applications, including plan reviews, permit reviews, and infrastructure reviews. This represents a 23 percent increase in review activity compared to the first half of 2023. Application reviews are broken down as follows:

- Environmental Assessments: 3
- Planning Act/Niagara Escarpment Planning and Development Act: 243
- Drainage Act (including DART Protocol): 6
- Municipal Pre-Consultation: 140
- Building Permit Clearance: 194
- Formal Property Inquiries: 46
- NPCA Permits: 173

A breakdown of review activity by municipality can be found in Appendix 1.

An additional timeline for conservation authorities was introduced through Ontario Regulation 41/24 to measure the time it takes to declare a Permit application complete. These reviews are expected to be completed 21 days from the date an application for Permit is received. Staff are working to configure our systems to track this metric.

The review timeframes used for Q1 and Q2 of 2024 are based on Conservation Ontario's current guidelines. With the introduction of Ontario Regulation 41/24, Conservation Ontario has advised it will be updating its guidelines. Staff will be reviewing our metrics in concert with Conservation Ontario and other high-growth conservation authorities to determine what are appropriate performance indicators for our watershed.

Table 1 provides a summary of Permit review timeframes for the first half of the year, with correlating percentages found in Table 2.

Table 1: NPCA Permit Processing Times by Type, January-June 2024.

Permit Type	Permits Issued within CO Guidelines	Permits Issued outside of CO Guidelines	Total Permits Issued
Routine Permit (1-14 Days)	46	47	93
Minor Permit (15-21 Days)	57	14	71
Major Permit (22-28 Days)	7	2	9
Total	110	63	173

Table 2: NPCA Permits Processed by Conservation Ontario Guidelines, January-June 2024.

Permit Type	% Processed within CO Guidelines	% Processed outside of CO Guidelines
Routine Permit (1-14 Days)	49%	51%
Minor Permit (15-21 Days)	80%	20%
Major Permit (22-28 Days)	78%	22%
All Permits	64%	36%

During the first half of 2024, routine Permits have been a challenge to meet our review times. This is likely due to having been short two Watershed Planners from January to May, requiring the shift of priorities to more complex files. With the addition of two Watershed Planners in June 2024, it is anticipated that review times for routine Permits will improve throughout 2024.

Continuous Improvement

Staff are working on several continuous improvement initiatives and projects in the Planning and Development Department:

- Implementation of Ontario Regulation 41/24, including but not limited to updating NPCA templates and documents for alignment with enacted sections of the legislation and regulation;
- Updating NPCA Planning and Permitting Policies for conformity with Ontario Regulation 41/24;
- Hiring of two new Watershed Planners;
- On-going, regular maintenance updates to our regulatory mapping;
- Updating NPCA Client Services Guidelines to align with revised Conservation Ontario guidelines; and
- Configuration of CityView to track newly identified timelines and metrics for annual reporting in accordance with Ontario Regulation 41/24.

Financial Implications:

There are no financial implications from this report.

Links to Policy/Strategic Plan

The daily work of the Planning and Development Department contributes to a healthy and resilient climate and supports sustainable growth by protecting people and properties from natural hazards and climate impacts. The efforts undertaken in Planning and Development empower NPCA to maintain a high standard of client services, tools, and procedures for regulating and issuing permits consistent with NPCA policies.

Related Reports and Appendices:

Appendix 1 – Application Review Activity by Municipality.

Authored by:

Original Signed by:

David Deluce, MCIP, RPP
Senior Manager, Environmental Planning & Policy

Reviewed by:

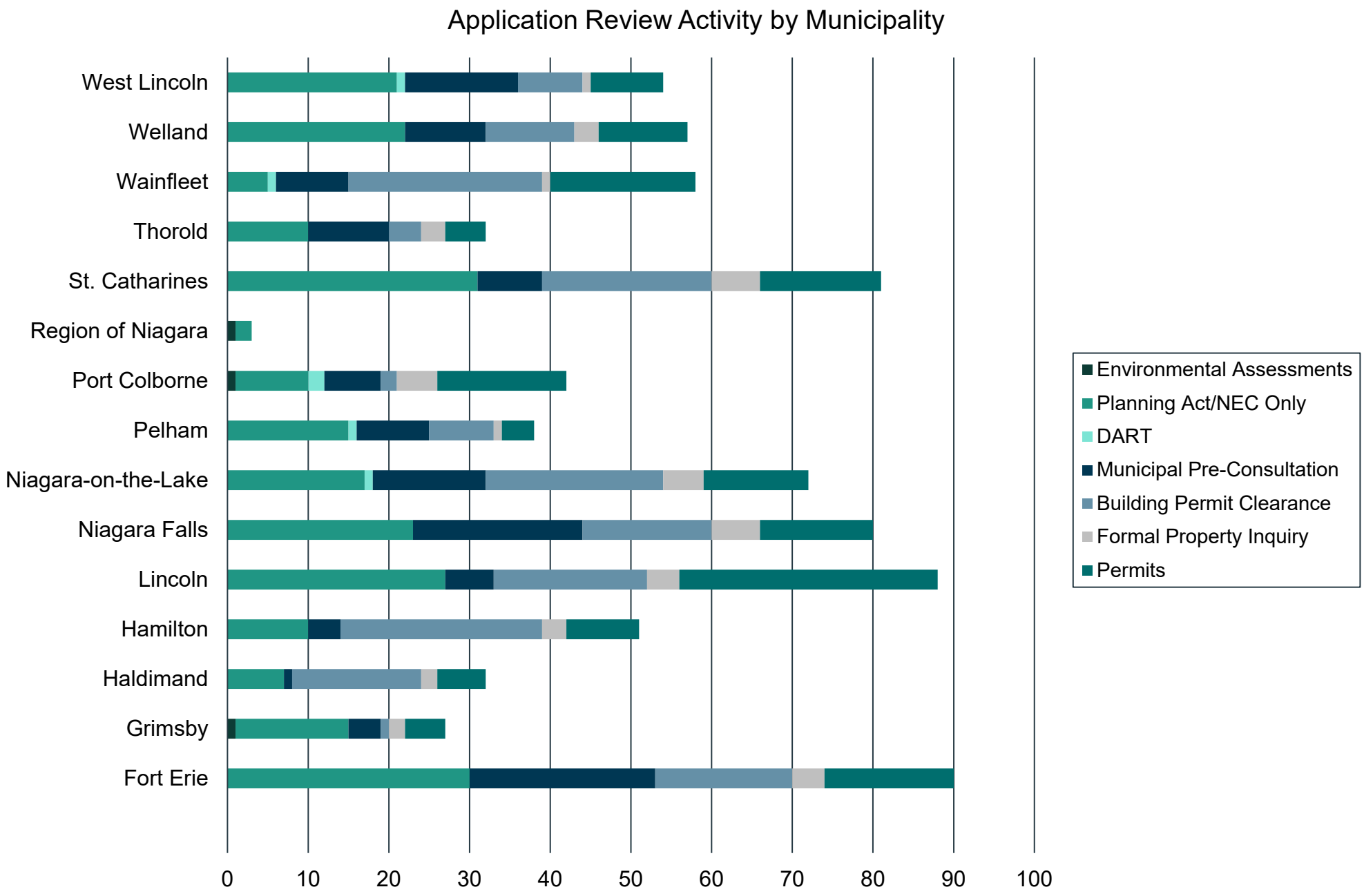
Original Signed by:

Leilani Lee-Yates BES, MSPL.RPD, MCIP, RPP
Director, Watershed Strategies and Climate Change
Interim Director, Planning and Development

Submitted by:

Original Signed by:

Chandra Sharma, MCIP, RPP
Chief Administrative Officer/Secretary-Treasurer


Application Review Activity by Municipality
West Lincoln
Welland
Wainfleet
Thorold
St. Catharines
Region of Niagara
Port Colborne
Pelham
Niagara-on-the-Lake
Niagara Falls
Lincoln
Hamilton
Haldimand
Grimsby
Fort Erie
0
10
20
30
40
50
60
70
80
90
100
Environmental Assessments
Planning Act/NEC Only
DART
Municipal Pre-Consultation
Building Permit Clearance
Formal Property Inquiry
Permits

Report To: **Board of Directors**

Subject: **NPCA Comments on Proposed Amendments to Ontario Regulation 828 – ERO Posting 019-8364**

Report No: **FA-36-24**

Date: **July 19, 2024**

Recommendation:

THAT Report No. FA-36-24 RE: NPCA Comments on Proposed Amendments to Ontario Regulation 828 – ERO Posting 019-8364 **BE RECEIVED** for information.

Purpose:

The purpose of this report is to inform the Board of Directors of proposed amendments to Regulation 828 under the *Niagara Escarpment Planning and Development Act* (NEPDA) and staff's comments submitted to the Environmental Registry of Ontario (ERO).

Background:

On May 3, 2024, the Province posted ERO number 019-8364: **Proposed amendments to development permit exemptions under R.R.O. 1990, Regulation 828 for lands in the Niagara Escarpment Planning Area that is under the area of development control | Environmental Registry of Ontario**. The proposal seeks to amend and expand existing exemptions for development that do not require a development permit under the NEPDA.

Regulation 828 (Development in the Development Control Area) exempts certain developments from the requirement of obtaining a development permit under the NEPDA. The ERO posting was live for 45 days and closed on June 17, 2024. NPCA staff submitted comments on the ERO posting, which are included in Appendix 1.

Discussion:

The Niagara Peninsula Conservation Authority (NPCA) is one of seven Conservation Authorities that have lands within the Niagara Escarpment Plan (NEP) in their watershed jurisdiction. The NEP has a system of parks and open spaces which are connected by the

Bruce Trail. The system is identified as the Niagara Escarpment Parks and Open Space System (NEPOSS) that stives to balance protection, conservation and where appropriate, sustainable recreation. NEPOSS is designed to ensure that the Escarpment will be protected and enhanced as a substantially continuous natural environment for future generations.

Conservation Authorities are defined as Public Bodies in the NEP, and are essential partners to implement the NEPOSS objectives and policies, as described in Part III of the NEP. NPCA must comply with the policies in Part III of the NEP when undertaking works within the Escarpment Conservation Areas (e.g. Ball's Falls, Rockway, Cave Springs, and Beamer Memorial).

R.R.O. 1990, Reg. 828: *Development within the Development Control Area* (Regulation 828) identifies a list of classes of development that may be exempt from the requirement of obtaining a development permit under the NEPDA. This Regulation is frequently referenced by NPCA staff when planning capital projects for lands within the NEP jurisdiction. NPCA staff recognize the benefits to updating Regulation 828 to provide additional clarity on exempted activities that apply to Public Bodies to assist with undertaking low-risk capital projects, while still maintaining an appropriate level of environmental protection.

NPCA's comments on the ERO posting are included in Appendix 1 and are grouped into recommendations for general modifications to the Regulation to help further streamline exemptions of low-risk activities, improvements to definitions that would provide further clarity to enable consistent and reasonable decisions on exemption requests, and suggested exemptions for Public Bodies and Conservation Authorities to achieve mutual mandates and objectives.

Financial Implications:

There are no financial implications from this report.

Links to Policy/Strategic Plan

The NPCA's comments on proposed amendments to Regulation 828 support Goals 3.1 and 3.5 of the *2021-2031 Strategic Plan* by recommending amendments that would better allow the NPCA to improve visitor experiences, through various park improvements, while protecting important environmental features.

Related Reports and Appendices:

Appendix 1 – Niagara Peninsula Conservation Authority's Comments on the "Proposed amendments to development permit exemptions under R.R.O. 1990, Regulation 828 for lands in the Niagara Escarpment Planning Area that is under the area of development control" (ERO #019-8364)

Authored by:

Original Signed by:

David Deluce, MCIP, RPP
Senior Manager, Environmental Planning & Policy

Reviewed by:

Original Signed by:

Leilani Lee-Yates, BES, MSPL.RPD, MCIP, RPP
Director, Watershed Strategies & Climate Change

Original Signed by:

Adam Christie
Director, Conservation Areas

Submitted by:

Original Signed by:

Chandra Sharma, MCIP, RPP
Chief Administrative Officer/Secretary-Treasurer

Niagara Peninsula CONSERVATION nature for all

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June 17, 2024

Public Input Coordinator
MNRF – RPDPB – Natural Heritage Section
300 Water St., 2nd Floor South
Peterborough, ON K9J 3C7

RE: Niagara Peninsula Conservation Authority's Comments on the "Proposed amendments to development permit exemptions under R.R.O. 1990, Regulation 828 for lands in the Niagara Escarpment Planning Area that is under the area of development control" (ERO #019-8364)

Thank you for the opportunity to comment on the proposed amendments to development permit exemptions under R.R.O. 1990, Regulation 828. The Niagara Peninsula Conservation Authority (NPCA) is one of Ontario's 36 Conservation Authorities (CAs) including one of 7 CAs that have the Niagara Escarpment Plan (NEP) area as part of their jurisdiction. The NPCA welcomes the opportunity to create red-tape reduction and help achieve greater certainty for our organization, residents, visitors and member municipalities. This also includes opportunities to streamline development within the NEP area that does not result in significant environmental impacts or risks associated with natural hazards.

Conservation Authorities as Public Bodies and Landowners

Conservation Authorities are Public Bodies as defined in the NEP and are essential partners to implement the Niagara Escarpment Parks and Open Space System (NEPOSS) objectives and policies as described in Part III of the NEP. Ensuring greater certainty and clarity for the largest landowners within NEPOSS is critical for CAs to operate our conservation areas effectively and efficiently while providing access to greenspace, related infrastructure, and amenities that our residents and visitors demand.

Recent legislative and regulatory changes to the Conservation Authorities Act have clarified mandatory programs and services for all CAs. While many Category 1 services identified by CAs in their transition plans already support NEPOSS objectives through land planning and management efforts, CAs are now required to find alternatives to fund Category 2 & 3 services. This includes services like education programs that are such a critical component of NEPOSS and generally create minimal environmental impact. Greater administrative efficiency and exemptions within Regulation 828 will allow CAs to provide services and amenities at NEPOSS parks with fewer barriers related to permitting and policy. Regulation 828 should reflect the current legislative regime and enhance each Escarpment CA's ability to achieve NEPOSS objectives and deliver cost effective programs and services that so many people crave.

General Modifications to the Regulation

The Ministry of Natural Resources (MNR) should develop guidelines for a self-assessment process like how the DFO processes permits under the Federal Fisheries Act. This would put the onus and responsibility on Public Bodies to assess each project and proactively provide the justification for exemption (e.g. formal project registration and related study completion). As a regulatory authority with a natural hazard mandate, NPCA will review internal capital projects on our lands to ensure they satisfy the tests of Ontario Regulation 41/24 and the

NPCA's policies that guide the review and issuance of work permits. This type of self-assessment would also be appropriate for ensuring exemptions meet the NEP and NEPOSS objectives. The NEC would maintain the ability to audit or inspect the exempted works as necessary.

It is also recommended that the revised Regulation or an implementing process streamline how other Public Bodies or planning authorities are notified of exempted projects to save time and resources. For example, exempted projects can be recorded on a registry that is frequently published by the NEC on their website or through the ERO, or as part of a self-assessment process, Public Bodies must also notify other potentially affected Public Bodies.

Improved Definitions

Quite often implementation of Regulation 828 relies on interpretation of Terms that are generally defined in the NEP or Regulation 828 or may not be defined at all, that in some cases have resulted in inconsistent interpretation and application of current exemptions within the Regulation. Where feasible, Terms within the NEP should be created or modified to adequately support Regulation 828. Otherwise, the Terms need to be clarified within the Regulation itself. Terms that would benefit from updates or new definitions include:

Term	Status	Potential Solution
Development	Defined, however, recommend updates to provide additional clarity and consistency	- For consistency with implementation, could consider updating the definition to be similar to the Provincial Planning Statement, which includes, "creation of a new lot, a change in land use or the construction of buildings and structures" and also identifies what is not included. - Clearly define what is and what is not considered development. For example: o Events (which are regulated by municipalities under the Municipal Act) that have no negative impact should not be considered development. o Acquisition of land of any type by a Public Body should not be considered development. o Fencing (chain link, wrought iron, and wood) that have no negative impact should not be considered development. Similar wording to the exemptions included in Regulation 41/24 (under the Conservation Authorities Act) can provide guidance.
Events	Undefined	- It is recommended that the Regulation specifies that events as delivered by Public Bodies that support NEPOSS objectives should not be considered development (this includes events or programs identified within approved NEPOSS management/master plans) - Those types of activities considered events delivered by Public Bodies should include weddings, fund raising events, private events sanctioned and permitted by the Public Body

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Demolition	Undefined	- It is recommended that the Regulation clarifies what is considered demolition and when it should be exempt from a development permit Such as: o Demolition, in part or in whole, of structures on lands owned or managed by Public Bodies o Activity being completed in support of NEPOSS objectives, enhancement of NEPOSS system and completion of the Bruce Trail - Demolition can include Heritage structures as listed or designated by the local planning authority so long as appropriate permits are obtained
Building Size	Defined, however, recommend updates to support NEPOSS objectives	- Size related to Institutional Uses is identified in S.2.2.9 of the NEP but a revision is necessary to help Public Bodies operate NEPOSS lands and achieve NEPOSS objectives o Create a definition within the regulation to enable larger structures in NEPOSS parks that help achieve NEPOSS objectives or mandate of Public Body
Maintenance	Undefined	- Create a consistent definition that applies to Public Bodies managing NEPOSS parks as S.5.17 of the Regulation relies heavily on an undefined term o S. 5.17 should include a definition or clear description of “maintenance” or “improvement of existing infrastructure” that supports NEPOSS objectives. o Should allow for repair of land, infrastructure and facilities to an improved state of repair (i.e. not just to the original condition)
Restoration	Undefined	- A definition of restoration activities in the context of operating NEPOSS should include o Restoration of lands previously not in a natural state o Restoration of lands to improve environmental condition. - Such restoration activities within an operating NEPOSS should be considered exempt from a development permit.
Environmental Management	Undefined	- The ERO posting identifies “environmental management activities” that could be exempt to include “certain projects” carried out by government or non-government conservation organizations. It is recommended that “certain projects” completed by Public Bodies that are exempt be much more specific and exhaustive if included within revised Regulation o See below for more detail on suggested exemption list.
Infrastructure Activities	Undefined	- Should include traditional types of infrastructure such as roads as well as green infrastructure consistent with NEPOSS objectives and parks (e.g. charging stations, innovative water/wastewater servicing).
Commercial Uses	Undefined	- Needs definition specific to Public Bodies and operation of NEPOSS parks or as needed to achieve NEPOSS objectives.

		- S.3.1.6.3 of NEP includes an incomplete definition of such uses that are present or could be present in NEPOSS parks - Consider commercial uses that are ancillary to the primary use of a facility (e.g. education, office space) and are supportive of NEPOSS objectives (e.g. events, food services, weddings, receptions, meeting and community spaces, etc.).
Health and Safety or Emergency Works Project	Undefined	- Work that is for the express purpose of mitigating a health and safety issue should be allowed to proceed without a Development Permit in order to implement measures in a timely manner. - Such works should include: safety railings, safety fencing, work that would otherwise require a Development Permit if the work were needed to immediately secure a structure and prevent further damage.

Suggested Exemptions

NPCA staff see benefits to updating Regulation 828 to provide additional clarity on exempted activities that apply to Public Bodies. Specifically, modifications that would make it easier for CAs and other Public Bodies to undertake works necessary to achieve our mandate and NEPOSS objectives would be highly beneficial. Providing a more robust list of exemptions will also assist NEC staff with prioritizing other projects that require significant attention (e.g. subdivision or aggregate applications). It is also important to note that many of the revised or new exemptions suggested below will allow Conservation Authorities the ability to fund programs while reducing our reliance on levies from member municipalities.

NPCA staff also suggest that through the Management Plan and NEPOSS planning process, specific exemptions consistent with Regulation 828 should be identified for specific classifications and zones. This would allow conservation authorities to proceed with implementing the NEC endorsed management plans with clear certainty on when development permits would and would not be required, while achieving their management priorities and NEPOSS objectives.

Further, it is recommended that the Regulation be reorganized to create a subsection that applies specifically to all Public Bodies as defined in the NEP. Or, at a minimum, a Section within the Regulation that applies solely to conservation authorities, while other Public Bodies (e.g. municipalities and Bruce Trail Conservancy) have their own dedicated sections. The proposed section related to conservation authorities should include the following exemptions:

- Any activities approved within a NEPOSS Master/Management plan are exempt for 10 years with options to renew exemption for further 5 years if completed through periodic review of master/management plan (version of the old S.5.41).
- The maintenance of lands, buildings and structures under the jurisdiction of a conservation authority, the establishment of hiking or cross-country ski trails and the erection of signs for the purposes of property identification or interpretative or recreational information on lands owned by a conservation authority (old S.5.17;). This is subject to improved definitions as suggested above, otherwise this

exemption should be rewritten to be far more inclusive of a variety of activities conducted by Public Bodies within NEPOSS parks.

- All acquisitions completed by Public Bodies, regardless of them being conservation severances or directly adjacent to existing NEPOSS properties and provided they do not create additional, new development (i.e. new development lots that are not already permissible through existing policy). This also includes land acquisition within Prime Agricultural areas (see 'Other Activities' section of the ERO proposal).
- All dispositions within NEPOSS parks related to essential infrastructure projects undertaken by municipalities and provincial or Federal agencies in accordance with an Environmental Assessment or equivalent process (e.g. Planning Act approval).
- Infrastructure projects related to conservation area management and operations (including communication infrastructure, fiber optics, etc.).
- Green infrastructure development and Low Impact Development projects.
- Demolition of structures related to activities that meet the objectives of NEPOSS.
- Parking areas and related amenities (including washroom facilities – temporary or otherwise) that support NEPOSS objectives and provide greater access to greenspace.
- Events that are supported by Master/management plans or NEPOSS objectives (and as may be detailed in a new definition of Events).
- Exemptions for health and safety related projects (e.g. stream bank erosion at St. Johns CA; creating a parking lot for Cheltenham Badlands; trail barriers/fences on slopes; boardwalks and bridges to secure sensitive areas).
- Maintenance to existing infrastructure even if the footprint is expanded to accommodate the maintenance works. Perhaps expansions to existing infrastructure for maintenance purposes could be limited to a certain percentage of the existing footprint.
- Signage and entrance features (e.g. kiosks, wayfinding signage, washrooms) to provide safe access to greenspace.
- Trail development (new development or decommissioning), including supporting health and safety measures (e.g., fencing, accessible boardwalks, etc.) regardless of it being a Bruce Trail route or not.
- Conservation-related education activities that support NEPOSS objectives and CA programming.
- Exemptions should consider setting exemption limits for the size of structures. For example, under Ontario Regulation 41/23, there are exceptions for accessory structure 15 sq. m. or less.
- Forestry and vegetation management activities completed by Public Bodies as outlined in a Master/Management Plan and/or identified within prescribed management documents such as Managed Forest Tax Incentive Program (MFTIP) plans. This includes appropriate prescribed management activities within Areas of Natural and Scientific Interest (ANSI's), and activities that generate ancillary revenues due to sale of forest products.

Over the past few years, NPCA and NEC staff have established monthly agency coordination meetings to discuss NEP development permit files and related NPCA reviews, and conservation area capital projects. These coordination meetings have been very beneficial to identify agency concerns, study requirements and possible NEC exemptions. It is recommended that this type of best practice be offered to other Public Bodies to assist with the streamlined review and approval of NEC development permits in coordination with other agency approvals.

Niagara Peninsula CONSERVATION
nature for all

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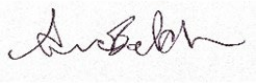
Thank you for the opportunity to provide comments and recommendations for revisions to Regulation 828. We would welcome the opportunity to participate in a working group to develop the new regulation and recommended self-assessment process.

Should you have any questions regarding the comments in this letter please feel free to contact Eric Baldin, Manager, Land Planning at 905-788-3135, ext. 283, or ebaldin@npca.ca.

Sincerely,



Eric Baldin
Manager, Land Planning

cc: Leilani Lee-Yates, Interim Director, Watershed Strategies and Climate Change, NPCA
Adam Christie, Director, Conservation Areas, NPCA
David Deluce, Senior Manager, Environmental Planning and Policy, NPCA

Report To: **Board of Directors**

Subject: **Decarbonization Roadmap and NPCA's Corporate Climate Change Action Plan**

Report No: **FA-39-24**

Date: **July 19, 2024**

Recommendation:

THAT Report No. FA-39-24 RE: Decarbonization Roadmap and NPCA's Corporate Climate Change Action Plan **BE RECEIVED**.

Purpose:

To provide an update on NPCA's climate change action progress and current initiatives, including a decarbonization roadmap to achieve climate change commitments.

Background:

Following the NPCA's declaration of a climate change emergency through Resolution No. 174-2019 in 2019, climate change was identified as a critical priority under the 2021-2031 Strategic Plan. The *2021-2031 Strategic Plan* includes numerous actions related to climate change action and environmental sustainability practices across six strategic priorities.

Specifically, Goal 5.4 of the strategic plan seeks to address climate change and sustainable practices through NPCA operations and lands by developing "a corporate climate change strategy to implement actions that reduce the NPCA's climate impacts and carbon footprint." Goal 5.4, along with other relevant actions identified in the strategic plan, are being integrated into a corporate Climate Change Action Plan (CCAP), which is currently being developed and implemented.

The CCAP aims to achieve the following three objectives:

1. Build climate change resilience within the Niagara Peninsula watershed and NPCA properties;
2. Reduce NPCA's carbon footprint to achieve net-zero greenhouse gas (GHG) emissions by 2050; and
3. Engage with NPCA staff, partners, and stakeholders to accelerate local climate change action.

At the Full Authority Board Meeting on December 16, 2022, the CCAP framework was approved through Resolution No. FA-123-2022. Extensive staff engagements were then conducted to help shape the details/actions of the plan, including updating the six updated key outcomes as follows:

Outcome 1 Targets for corporate GHG reduction established.

Outcome 2 Understand climate change impacts and vulnerabilities to the Niagara Peninsula watershed jurisdiction, including on NPCA properties.

Outcome 3 Increase climate change resiliency throughout the watershed.

Outcome 4 Enhanced climate change resiliency at NPCA properties.

Outcome 5 Improved corporate sustainability practices.

Outcome 6 Collaboration with external partners to advance research and on-the-ground climate action.

Throughout 2023, several actions and initiatives have been implemented as the CCAP is being finalized.

Discussion:

Climate Change Action Plan - Progress Update

Several actions have been implemented throughout 2023 and 2024 that support the development of NPCA's CCAP. These range from program enhancements in restoration and the additions of new properties through land securement, to conducting foundational water quality monitoring and conducting natural asset management planning.

One significant achievement was the completion of the Niagara Peninsula Watershed Natural Asset Analysis and Valuation Project (Report FA-38-24) which examined the inventory and condition of all natural assets in NPCA's watershed jurisdiction including the value of carbon storage and sequestration provided by those assets. In addition, an overarching watershed-based resource management strategy is in development as required by the *Conservation Authorities Act*.

Together with the CCAP, these key strategic documents will provide a climate-resilience lens for the Niagara Peninsula watershed with critical information supporting the business case for nature in the face of climate change, while addressing future watershed challenges pertaining to growth and extreme climate impacts, and guiding efforts to enable climate action within the community.

The CCAP will be finalized after additional key actions related to determining corporate GHG emission baselines and targets are completed, as described in further detail below.

Decarbonization Roadmap Project

To support the development of its CCAP commitments (e.g., outcome 1 and 5) and exemplify leadership in sustainability, NPCA needs to understand its current GHG emissions, set interim and net-zero emission reduction targets, and identify actionable items to meet these targets.

In accordance with corporate procurement policies, NPCA retained the services of Enviro-Stewards Inc. as the top-ranked proponent from a list of four invited proponents. The company boasts over 20 years of experience with helping diverse clients (e.g., municipalities, local wineries, large manufacturers) to reduce their operating costs and impact on the environment. Enviro-Stewards provides cost-effective solutions to reduce water and energy consumption, provide innovative pollution prevention solutions, and yield improvement in the commercial, institutional, and manufacturing sectors. Their sustainability projects have garnered several national awards and honours since 2014.

NPCA's project includes sustainability assessments (i.e., water, energy, waste) at six properties: Administrative Office in Thorold, Ball's Falls Conservation Area, Binbrook Conservation Area, Chippawa Creek Conservation Area, Gainsborough Conservation Area, and Long Beach Conservation Area.

Following the assessment, baseline and target GHG emissions will be determined along with a credible, affordable path and measures to achieve them. This will include opportunities to reduce energy usage, water consumption, and waste with a capital cost plan for future budget considerations. Throughout the project, Enviro-Stewards will involve and train key NPCA staff to ensure they are equipped to implement, track, and report on actions. More information about the results of this project will be provided to the Board of Directors upon completion in the Fall 2024.

Community collaboration toward climate action and resilience

NPCA continues to co-lead the Niagara Climate Change Action Network (NCCAN) with Niagara Region, Brock University, and Niagara College. The Network brings together over 35 organizations from local government, utilities, businesses, industries, educational institutions, environmental organizations, Indigenous communities, and other interested parties working towards world-class climate change action. Together, these organizations collaborate through NCCAN to enhance energy performance and sustainable development while realizing positive economic, environmental, social, and cultural outcomes.

In 2023, the NCCAN finalized its Terms of Reference and launched a new website, which is hosted by the NPCA as an in-kind contribution. In Q4 of 2023, the NCCAN coordinating agencies hosted the second Niagara Climate Change Summit which focused on community energy planning.

In Q2 of 2023, NPCA staff delivered a presentation about local climate projections and the NPCA's climate change initiatives to local Haldimand County residents through a collaboration with the Haldimand County Library.

In Q1 of 2024, the NPCA collaborated with Brock University's Environmental Sustainability Research Centre on an experiential learning opportunity with graduate students completing Master's and Doctoral programs. These projects focused on knowledge mobilization and engagement related to sustainability and community energy planning. The outcomes of the projects will provide valuable insight to support outreach and engagement activities by NPCA staff and the NCCAN Coordinating Committee.

NPCA continues to participate in the Niagara Climate Change Municipal Community of Practice which includes all twelve local area municipalities, coordinated by Niagara Region staff. This group focuses on work concerning climate resilience and adaptation, land development, energy management and local generation, biodiversity, and green infrastructure. NPCA staff attend meetings, provide input and expertise, support information sharing and learning, and delivered a presentation in March 2023 about NPCA's role in climate change action.

Throughout 2023, NPCA staff also participated in the development of the Hamilton Biodiversity Action Plan (BAP), led by the Hamilton Naturalists' Club, in partnership with the City of Hamilton and other local environmental partners. The BAP aims to protect, restore, and enhance biodiversity in Hamilton.

Finally, to create climate resilience communities, staff are currently exploring program enhancements that enable individuals to implement climate actions at home, work, and school.

Financial Implications:

There are no financial implications in receipt of this report. The initiatives detailed herein are supported through the approved operational budgets.

Related Reports:

Report No. FA-85-19 RE: Response to Notice of Motion – Climate Change
Report No. FA-07-22 RE: NPCA Climate Change Update
Report No. FA-50-22 RE: Climate Change Action Plan Framework and Progress Update

Links to Policy/Strategic Plan:

Climate change has been identified as a critical priority throughout the *2021-31 Strategic Plan*. The launch and implementation of the CCAP is a performance indicator to achieve organizational excellence under Goal 5.4. In addition, the CCAP specifically advances

several strategic goals related to Strategic Priority 1, Healthy and Climate Resilient Watersheds.

The CCAP further advances goals across additional strategic priorities, including but not limited to:

Goal 2.3 – Lead the implementation of sustainable technologies and green infrastructure best practices for climate resiliency and sustainability.
Goal 3.2 – Lead nature education, environmental stewardship, and volunteerism.
Goal 4.2 – Fostering relationships with the community, non-governmental organizations, businesses, agriculture, industry, and academic institutions for collective outcomes and impact.
Goal 5.4 – Demonstrating leadership in addressing climate change and sustainable practices through NPCA lands and operations.

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Report To: **Board of Directors**

Subject: **Progress Update on the Management of Drainage in the Wainfleet Bog Conservation Area**

Report No: **FA-40-24**

Date: **July 19, 2024**

Recommendations:

THAT Report No. FA-40-24 RE: Progress Update on the Management of Drainage in the Wainfleet Bog Conservation Area **BE RECEIVED** for information.

Purpose:

The purpose of this report is to inform the Board of Directors on the work of Niagara Peninsula Conservation Authority (NPCA) staff with the Wainfleet Bog Ad-Hoc Committee on implementing the Board-approved approach to the future management of drainage in the Wainfleet Bog Conservation Area that will help inform management decisions related to maintaining optimal water levels in the Bog.

Background:

The Wainfleet Bog is located north of the Lake Erie shoreline within the Township of Wainfleet and the City of Port Colborne. The Bog was historically mined for peat resulting in significant adverse impacts to this rare and unique ecosystem. The two largest landowners of the Wainfleet Bog natural area are the NPCA and the Ministry of Natural Resources (MNR), with NPCA retaining the largest land holding.

The Wainfleet Bog Conservation Area, acquired by the NPCA in 1995, is the largest NPCA land holding, spanning approximately 2,000 acres or 800 hectares. Designated as a Provincially Significant Wetland (PSW), it is the largest, least disturbed bog remaining within the Carolinian region of Ontario. The property is designated as a Key Biodiversity Area and one of 11 NPCA properties identified as a Protected Area as part of the Federal initiative to protect 30% of Canada's lands and waters by 2030. This rare ecosystem provides habitat to a variety of unique plants and animals, as well as a variety of recreational uses.

A Management Plan and site Restoration Plan were developed by NPCA staff in 1997 with input from a variety of interested parties. Identified objectives were to restore a healthier state of the Wainfleet Bog, provide passive recreation and educational opportunities, include

self-sustaining management strategies with little to no human intervention, multi-use site opportunities, and achieving said objectives at minimal cost.

NPCA staff continues to implement management actions aligned with the Management Plan. Monitoring of water levels, vegetation progress and site wildlife continues monthly and annually to assess the progress of the management plan. The plan continues to be relevant with ongoing reviews and updates to the management plan scheduled. A management plan update will be scheduled in future years along with other NPCA lands as required under the *Conservation Authorities Act* and O. Reg 686/21.

In June 2021, the NPCA Board of Directors received a delegation who expressed concerns over drainage impacts on the Wainfleet Bog with a recommendation for the NPCA to request that a section of the Biederman Drain be moved back to its original alignment. Through NPCA Board Resolution No. FA-126-2021, the Board endorsed the staff recommended approach to the future management of drainage in Wainfleet Bog, presented in Report No. FA-39-21:

- Further research of appropriate control structures to use and on which canal outlets to the Drain would have the intended effects of further rehabilitating the NPCA owned portion of the Bog;
- Further analysis to identify targeted inundation areas of water impoundment options associated with the control structures that include avoidance and mitigation measures to reduce negative effects on Species at Risk, and work closely with staff from the provincial Ministry of Natural Resources (MNR), and Ministry of Environment, Conservation and Parks (MECP) to obtain any necessary permits in advance of any required work;
- Create a standing committee of experts and interested parties to advise staff on water heights to be impounded to maintain an optimal hydrology for species at risk, and inform the update to the 1997 Management Plan; and
- Create an ecological monitoring plan that will ensure the targeted hydrology is reasonably attained through the control structures, with response plans for several potential scenarios and management action.

Through NPCA Board Resolutions FA-195-2021, FA-27-2022, and FA-27-2023, the Wainfleet Bog Ad-Hoc Committee Terms of Reference and membership were approved. The purpose of the Committee is to provide collaborative perspective, guidance and expert advice in the review and revision of the Wainfleet Bog Conservation Area Management Plan, and support NPCA in the implementation of the Management Plan and other site strategies of the Wainfleet Bog Conservation Area.

Committee membership includes representatives from the Township of Wainfleet, City of Port Colborne, science and academia, indigenous communities, Environmental Non-Governmental Organizations and other interested parties.

Discussion:

Members of the Wainfleet Bog Ad-Hoc Committee serve in a non-governance capacity with a focus on providing advice and recommendations for consideration by NPCA staff. The Committee met in May and October of 2022 and February of 2024.

At the inaugural Committee meeting on May 4, 2022, staff presented a draft design for a wooden control structure with an adjustable sluice gate, which the committee supported in principle. Challenges with accessing locations for installation and the need for a robust monitoring plan to monitor water levels were discussed. Staff consulted with MECP staff regarding possible permit requirements for the installation of the structures and was informed that permits may be required, and additional information related to the installation should be provided to confirm any requirements.

At the following Committee meeting on October 5, 2022, NPCA staff and 8 Trees Inc. presented summaries of available groundwater and ecological data that have been collected within the Bog since the mid-1990s. Committee members noted that to inform the need, location and design of the control structures, further data analysis is required, and further data gaps need to be identified and filled.

Throughout 2023 and 2024, NPCA staff in consultation with the Committee, have compiled the existing groundwater level data for the Bog and developed a scope of work for a peer review of the existing collective groundwater level data for the Wainfleet Bog Conservation Area to determine groundwater level trends, its hydrological regime, identify inconsistencies or sources of error within the dataset, and outline specific methods to improve data collection and interpretation.

In consideration of the advice received from the Wainfleet Bog Ad-Hoc Committee, NPCA will proceed with these additional actions that continue to support the Board-approved approach to the future management of drainage in Wainfleet Bog:

1. Staff will defer implementation of installing control structures on two canals feeding the Biederman Drain until further analysis of the groundwater levels within the Wainfleet Bog Conservation Area is complete;
2. Staff will initiate a procurement process to retain consultants to review and assess existing collective groundwater level data, make recommendations to fill data gaps that may exist, and recommend monitoring activities related to the potential control structures, including pre- and post-installation monitoring activities;
3. Staff will continue consultation with MNR and MECP staff to determine any permit requirements and data needs to support a potential permit application for the installation of the control structures;
4. Staff will continue to seek advice from the Wainfleet Bog Ad-Hoc Committee to assist with refining or enhancing groundwater and ecological monitoring efforts within the conservation area in response to the data assessment recommendations and permit requirements; and,

5. Staff will begin working with the Committee on scoping a full Management Plan update for the conservation area that will include a detailed monitoring program and restoration options.

These efforts will inform a more definitive course of action while minimizing impact on the sensitive Bog environment and local landowners. It is also important to note that these actions may take substantial time to complete. If permits from provincial ministries are required and data gaps exist, it may take several years to gather the necessary data given the seasonality of the species and specific data requirements. The groundwater level data peer review will commence in 2024, with the potential for additional monitoring and permit submissions following in 2025. Further updates on progress and timelines will be brought forward for the Board's information when appropriate.

Financial Implications:

Consulting fees to assess existing groundwater level data and provide monitoring recommendations have been accounted for within existing NPCA operating budget.

Links to Policy/Strategic Plan:

Goal 1.1. – Support evidence-based decision-making for climate-resilient watersheds and shorelines.
Goal 1.4. – Manage NPCA lands to increase biodiversity, habitat connectivity, and natural cover.
Goal 4.2 – Foster relationships with the community, non-government organizations, businesses, agriculture, industry, and academic institutions for collective outcomes and impact.

Related Reports and Appendices:

Report No. FA-39-21 – Wainfleet Bog Biederman Drain Realignment Proposal

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Submitted by:

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Chandra Sharma, MCIP RPP
Chief Administrative Officer/Secretary-Treasurer

Report To: **Board of Directors**

Subject: **2025 Conservation Area Fees**

Report No: **FA-32-24**

Date: **July 19, 2024**

Recommendation:

THAT Report No. FA-32-24 regarding the 2025 Conservation Area Fees **BE RECEIVED**;

AND THAT the 2025 Conservation Area Fees outlined in Appendix 1 of Report No. FA-32-24 **BE APPROVED**.

Purpose:

The purpose of this report is for the NPCA Board to consider and approve the proposed 2025 Conservation Area Fees.

Background:

The Niagara Peninsula Conservation Authority (NPCA) administers a fee schedule for a wide variety of services offered at its conservation areas. The fee schedule is reviewed and analyzed annually considering three central factors: balancing inflationary pressures, user demand for services, and comparable services and facilities at other Conservation Authorities and the local private sector.

The *Conservation Authorities Act,* O. Reg. 686/21 and O. Reg. 687/21 define the mandatory programs and services that conservation authorities are required to provide and the funding structures that conservation authorities may utilize to deliver on these mandatory services. O. Reg. 686/21 states that Conservation and Management of Lands is a mandatory service that can be funded through the municipal levy and further that passive recreation (those programs and services undertaken to maintain facilities, trails and amenities that can be provided to the public without staff supervision) is a mandatory service. These activities on conservation area lands are considered Category 1 programs and services.

Conversely, active recreation programs and services delivered within conservation areas, or those services requiring direct staff support or supervision to be provided, would not be included within the required components of the mandatory program or service. As such, these programs and services would be classified as Category 3 programs, where conservation authorities may determine that these programs and services support the CA's mandate and are advisable to deliver to the community. Category 3 programs must be

funded either through self-generated revenue, grants, or other agreements including cost apportionment agreements (levy) with municipalities. Based on these changes, the NPCA will need to ensure that costs for active conservation area programs and services are fully recovered.

In 2021, the NPCA commissioned a comprehensive, phased fee review for services offered within NPCA conservation areas. This review was necessary to proactively address service level gaps and associated costs, prepare for regulatory changes resulting from *Conservation Authorities Act* updates, and to ensure NPCA was positioned to provide the best standard of service to the growing number of visitors to conservation areas.

The 2021 Conservation Area Rate Review was undertaken by Watson and Associates Economists Ltd, a highly respected, arms-length third party firm with experience in the review of public-sector operations. This comprehensive review included an initial review of the direct operating and capital costs of active recreation conservation area operations, and the maintenance costs of passive recreation areas, and land care activities. The study recommendations and associated fee structure (2022-2024) was approved by the NPCA Board and is being implemented until the end of 2024.

Discussion:

In preparation of revising the 2025 Fee Schedule, staff completed a comprehensive review that included an analysis of the current and anticipated costs to operate NPCA's programs and services. Staff also analyzed user demand for conservation area programs and services and studied comparable services at nearby Conservation Authorities, including Hamilton Conservation Authority, Conservation Halton, and Grand River Conservation Authority. Several local private-sector operators that deliver comparable programs and services were included as well. This comparator analysis resulted in the proposed 2025 Conservation Areas fees as attached in Appendix 1.

The proposed Fee Schedule for 2025 includes modest increase to some program areas based on service levels and inflationary pressures and no increase to some selected programs. A concerted effort has been made to keep the fees lower than comparable programs, facilities and services in other jurisdictions.

Notably, fee changes proposed for wedding facility rentals are to take effect in 2026. Staff seek fee approvals for wedding facilities two years in advance to align with industry and market standards, as such events are booked two years in advance on average. The 2025 fee structure remains unchanged.

In addition to NPCA programs, facilities and services, staff propose a minimal increase to day-use admissions into active (or gated) conservation areas. Day-use admission and parking fees are proposed to increase no more than $0.25 per admission in 2025.

To promote accessibility, equity and ongoing support for the community to connect to nature, NPCA staff propose no increase to the cost of the NaturePlus Pass. Further, a renewal discount has been proposed in 2025 for current passholders to receive $10.00 in savings

upon the renewal of an existing valid Pass. The NaturePlus Pass is valid at Ball's Falls, Binbrook, Chippawa Creek, Long Beach and Rockway Conservation Areas during operating seasons and hours annually. The remaining conservation areas, among NPCA's 41 areas, remain accessible at no cost, year-round.

To support the watershed community in accessing greenspace and outdoor recreation, the NPCA continues to partner with municipal libraries, educational institutions, and community-based organizations to provide NaturePlus Passes to community members through a shared lending program.

As part of the NPCA's initiative to provide accessible, simple and convenient access to information and services to the community and visitors, staff have continued to explore innovative software and online service platforms to enable visitors to book experiences and reservations in advance. A dramatic increase in online sales and advanced reservations has taken place over the past four years, largely in response to the global pandemic.

With this ongoing trend, the NPCA continues to offer several programs, services, sales and permits through online platforms. With the administrative and banking cost of conducting business online, some fees for services that are available for purchase or reservation online in advance, such as event tickets, camping reservations and day camp registrations, will incorporate these associated charges. These charges may be displayed upon online checkout as a "Reservation Fee," "Administration Fee," or may be included in the listed price of the item.

Financial Implications:

NPCA fees and self-generated revenues result in a reduced reliance on municipal levies and support critical programs and services connecting people to nature. Consolidated, the recommended conservation area fee changes result in an average increase of 3.57%. This projected revenue in active conservation area programs and services will be factored into the 2025 operating budgets.

Links to Policy/Strategic Plan:

The recommended conservation area fees proposed for 2025 support strategic goals pertaining to Financial Sustainability:

Goal 6.1. – Ensure responsible, sustainable, and sound fiscal practices
Goal 6.2. – Optimize self-generating revenue using innovative approaches

Related Reports and Appendices:

Appendix 1: Proposed 2025 Conservation Area Fees

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Niagara Peninsula Conservation Authority	Appendix 1 - FA-32-24	
FEE SCHEDULE *(EXCLUDING HST)*	***Effective 01-JAN-2025 - Pending Approval***	
Description	**Fee - 2024**	**Fee - 2025**
CONSERVATION AREA FEES		
Day Use		
Ball's Falls, Binbrook, Chippawa Creek, Long Beach (unless specified)		
- Children 5 and Under	FREE	FREE
- Vehicle and driver	$ 12.83	$ 13.05
- Vehicle and Senior/Accessible/Student Driver	$ 9.71	$ 9.96
- Additional Passenger - Adult	$ 4.42	$ 4.42
- Additional Passenger - Senior/Accessible/Student	$ 3.54	$ 3.54
- Maximum Vehicle	$ 26.33	$ 26.55
- Bus - greater than 20 passengers per vehicle	$ 142.48	$ 146.02
- Shoulder Season Admission (Fall/Winter) - No attendant **(Ball's Falls & Binbrook Only)**	$ 7.96	$ 7.96
- Auto Gate Peak Season (No attendant)	$ 12.83	$ 13.05
- Passive Conservation Area Parking **(Rockway CA)**	$ 7.96	$ 7.96
Ball's Falls Thanksgiving Festival *(Note: $1.00 of General Admission ticket goes to NPCF)*		
- Children 5 and Under	FREE	FREE
- General Admission	$ 8.41	$ 10.40
- Senior (65+)	$ 6.64	$ 7.74
- Children (6 to 11 years of age)	$ 6.64	$ 7.74
Camping		
Chippawa Creek & Long Beach		
- Non Serviced One Night	$ 50.71	$ 52.23
- 15 Amp One Night	$ 55.48	$ 57.14
- 15 Amp Seasonal	$ 2,798.31	$ 2,938.23
- 15 Amp One Night Premium	$ 60.26	$ 62.06
- 15 Amp Seasonal Premium	$ 3,064.20	$ 3,217.41
- 30 Amp One Night	$ 62.64	$ 64.52
- 30 Amp Seasonal	$ 3,197.27	$ 3,357.14
- 30 Amp One Night Premium	$ 65.03	$ 66.98
- 30 Amp Seasonal Premium	$ 3,456.75	$ 3,629.59
- 30 Amp Seasonal Premium / Ridge **(Long Beach Only)**	$ 3,821.86	$ 4,012.95
- Reservation Fee	$ 10.62	$ 11.50
- Change / Cancellation Fee	$ 7.08	$ 7.96

Niagara Peninsula Conservation Authority	Appendix 1 - FA-32-24	
FEE SCHEDULE *(EXCLUDING HST)*	***Effective 01-JAN-2025 - Pending Approval***	
Description	**Fee - 2024**	**Fee - 2025**
- Deck Storage	$ 84.41	$ 88.50
- Trailer Storage **(Long Beach Only)**	$ 197.00	$ 221.24
Passes and Permits		
- NPCA NaturePlus Membership Pass	$ 119.32	$ 119.32
- NPCA NaturePlus Membership Pass Replacement Fee	$ 25.00	$ 25.00
- NPCA NaturePlus Membership Pass Renewal Fee	NA	$ 109.32
- Annual Tour Guide Operator Permit	$ 59.71	NA
- Photography Permit (per day)	$ 119.36	$ 122.94
- Filming Permit (per hour)	$ 149.43	$152 - $500
- Hunting Permit	$ 42.24	$ 43.50
Educational Programming *(HST exempt)*		
- Half-Day School Visit (per student)	$ 8.50	$ 9.00
- Full-Day School Visit (per student)	$ 14.25	$ 15.00
- School Visit Lunch Venue	$ 59.50	$ 100.00
- Full Day Nature School (per student)	$ 61.00	$ 65.00
- Extended Day Care (per family)	$ 12.00	$ 13.00
- Single Day Camp (PD/PA Days) (per child)	$ 47.50	$ 50.00
- Full Week Day Camp (March Break, Summer) (per child)	$ 180.00	$ 185.00
- Additional Child Full Week Day Camp	$ 155.00	$ 160.00
EVENT FACILITIES		
NPCA Facility Rentals		
Pavilion Rental		
- Picnic Pavilion Rental **(Ball's Falls)**	$ 134.36	$ 151.83
- Picnic Pavilion Rental **(Binbrook, Chippawa Creek, Long Beach)**	$ 142.56	$ 151.83
Corporate Facilities Rental		
- Corporate Day Rate	$ 636.00	$ 675.00
- Educational Day Rate	$ 318.00	$ 335.00
Special Program and Event Facilities Rental		
- Special Large-Scale Event Site Use Permit	$ 10,610.00	$ 11,257.21
- Craft and Artisan Vendor Space (10x10 outdoor)	$ 348.34	$ 360.53
- Craft and Artisan Vendor Space (10x10 indoor)	$ 547.40	$ 566.56
- Craft and Artisan Vendor Space (10x20 outdoor)	$ 696.70	$ 721.08
- Craft and Artisan Vendor Space (10x20 indoor)	$ 1,094.79	$ 1,133.11

Niagara Peninsula Conservation Authority	Appendix 1 - FA-32-24	
FEE SCHEDULE *(EXCLUDING HST)*	***Effective 01-JAN-2025 - Pending Approval***	
Description	**Fee - 2024**	**Fee - 2025**
- Craft Beverage / Concession Vendor Space (10x10)	$ 746.54	$ 772.67
- Craft Beverage / Concession Vendor Space (10x20)	NA	$ 1,123.60
- Farmers' Market Vendor Space (10x10)	$ 149.29	$ 154.52
- Vendor Hydro Fee (10x10) (per day)	$ 25.00	$ 25.00
- Vendor Hydro Fee (10x20) (per day)	$ 30.00	$ 30.00
- Concession Vendor Commission Fees	15%	15%
WEDDINGS		
NPCA Facility Rentals - Weddings	**Fee - 2025**	**Fee - 2026**
Barn Rental - Ball's Falls		
- Barn Reception [1]	$ 3,579.52	$ 3,704.80
- Venue Setup Rental [2]	$ 328.12	$ 339.60
Pavilion Wedding - Binbrook, Chippawa Creek, Long Beach		
- Pavillion Reception	$ 1,125.72	$ 1,165.12
Centre for Conservation - Glen Elgin Room - Ball's Falls		
- Glen Elgin Room Reception	$ 3,579.52	$ 3,704.80
- Venue Setup Rental [2]	$ 328.12	$ 339.60
Church Rental - Ball's Falls		
- Two-Hour Ceremony [3]	$ 1,014.20	$ 1,049.70
Natural Setting Rental		
- Outdoor Ceremony - Ball's Falls	$ 1,014.20	$ 1,049.70
- Outdoor Ceremony - Binbrook, Chippawa Creek, Long Beach	$ 394.00	$ 407.79
Bridal Suite Rental - Ball's Falls		
- Daily Rate	$ 447.44	$ 463.10

Schedule E(1) - CONSERVATION AREA SERVICES - WEDDING FACILITIES
[1] Alcohol is not permitted outside of the barn
[2] Rates only apply if the venue remains available within 2 weeks of event date.
[3] Rental times: 9:30 am to 11:30 am; 12:00 pm to 2:00 pm; 2:30 pm to 4:30 pm; 5:00 pm to 7:00 pm

Report To: **Board of Directors**

Subject: **Watershed Natural Assets Analysis and Valuation**

Report No: **FA-38-24**

Date: **July 19, 2024**

Recommendation:

THAT Report No. FA-38-24 RE: Watershed Natural Assets Analysis and Valuation **BE RECEIVED**;

AND THAT a copy of Report No. FA-38-24 RE: Watershed Natural Assets Analysis and Valuation **BE CIRCULATED** to NPCA watershed municipalities.

Purpose:

To inform the Board of Directors about the results of the NPCA's watershed natural asset analysis, assessment and valuation project, including the Town of Fort Erie case study.

Background:

Nature is a valuable infrastructure asset critical for mitigating and adapting to the effects of climate change. With its role in watershed-based natural resource management, the NPCA is a key leader in implementing local climate change adaptation and mitigation initiatives such as water monitoring, flood forecasting and warning, floodplain mapping and flood infrastructure risk management, ecosystem restoration and stewardship, land securement, and natural asset management.

In 2019, the NPCA Board of Directors declared a climate change emergency through approval of Resolution No. 174-2019 recognizing the critical need to act on the impacts and effects of climate change across the NPCA watershed. More recently, climate change was identified as a critical priority under the NPCA's 2021-2031 strategic plan which includes numerous climate-related actions across six strategic priorities. The relevant strategic plan's goals and actions have been integrated within the NPCA's Climate Change Action Plan (CCAP) which is currently being implemented and finalized by staff (refer to FA-39-24 for more information).

The CCAP aims to achieve the following three objectives:

1. Build climate change resilience within the Niagara Peninsula watershed and NPCA properties
2. Reduce NPCA's carbon footprint to achieve net-zero greenhouse gas (GHG) emissions by 2050
3. Engage with NPCA staff, partners, and stakeholders to accelerate local climate change action

Following the December 2022 approval of the CCAP framework (Report FA-50-22), extensive staff engagements were conducted to help shape the details/actions of the plan, including updating the six updated key outcomes as follows:

Outcome 1	Targets for corporate GHG reduction established
Outcome 2	Understand climate change impacts and vulnerabilities to the Niagara Peninsula watershed jurisdiction, including on NPCA properties.
Outcome 3	Increase climate change resiliency throughout the watershed.
Outcome 4	Enhanced climate change resiliency at NPCA properties.
Outcome 5	Improved corporate sustainability practices
Outcome 6	Collaboration with external partners to advance research and on-the-ground climate action.

As part of the NPCA's climate change initiatives (related to CCAP outcomes 2, 3, 4, and 6), NPCA initiated a project to undertake a natural asset inventory, analysis and valuation project for the Niagara Peninsula watershed. The project also included a case study application of natural asset management approaches for the Town of Fort Erie and help them meet regulatory requirements for incorporating green infrastructure into asset management plans.

In September 2023, staff provided an update on the NPCA's asset management initiatives including tangible capital asset management planning, the watershed natural heritage asset project, and overview of a pilot project with the Town of Fort Erie (Report FA-38-23).

Discussion:

Natural or green infrastructure, also called nature-based solutions, are those natural or human-made elements that provide essential services to people and the environment, such as carbon uptake (i.e., sequestration) and storage, protecting against flood and erosion, supporting biodiversity, providing shade/cooling effects, improving water quality, and many human health and recreational benefits.

In Q3 of 2023, in accordance with corporate procurement policies, NPCA retained Green Analytics to support the completion of a watershed-wide natural asset management project using NPCA's recently updated natural areas inventory and ecological land classification data. The purpose of the project was to: create an inventory of natural assets across three levels ranging from general natural areas to specific ecosystem types, better understand the

state of the assets through an ecosystem-based condition assessment, and estimate the value of natural assets using replacement cost and provision of ecosystem services.

The information from this project is critical for watershed management, land acquisition, conservation area land planning, natural asset management, financial planning, and targeted habitat restoration.

Natural Asset Inventory

The final report, attached as Appendix 1, shows that altogether agricultural, natural, and pervious area assets cover 83.5% of the NPCA's watershed. Agricultural land dominates the natural asset composition within the NPCA watershed, covering 52.6% of the watershed while natural assets comprise 28.1% of the NPCA watershed.

Condition Assessment

A condition assessment was conducted using a desktop approach to produce a high-level evaluation of an asset's ability to provide ecosystem services, such as nature-based recreation, air pollution filtration, and storm water attenuation.

To assess natural asset condition, a set of nine indicators were used following the approach outlined in the Canadian Standards Association (CSA) for natural asset inventories. The indicator criteria were categorized into either landscape context (e.g., percent of forest cover, percent wetland cover, extent of adjacent permeable land uses) or physical context (e.g., interior habitat, natural area patch shape, road density, proximity to watercourses, forest proximity to other natural assets, and wetland proximity to other natural assets).

The underlying assumption for natural asset condition assessments is that an asset in "good" condition (from an ecological perspective) is anticipated to be able to provide a "good" level of ecological services. The condition assessment found that 59% of the watershed's natural assets are in 'good' condition and 40% in 'fair' condition. Notably, 89% of wetland assets rated as good and other natural assets generally rated fair.

Replacement Costs

In the context of tangible capital asset management processes, a replacement cost includes the comprehensive costs for replacing and maintaining as asset through its lifecycle; however, estimating replacement costs for natural assets can be challenging because natural assets are irreplaceable in an ecological sense, may not have a historical or capital construction cost, and gain more value as they age (unlike capital assets that depreciate over time).

Using the established natural asset guidance and scientific literature, the estimated replacement costs for the natural assets within the Niagara Peninsula watershed was estimated to exceed $10 billion, based on per unit restoration costs. Overall, forest assets account for 46% and wetlands account for 44% of the total replacement cost. It is important

to note that the estimate accounts for the complexity and extended time required to restore natural assets.

Ecosystem Service Valuation

Natural assets support climate change mitigation efforts through carbon sequestration, where carbon is removed from the atmosphere and stored within the asset. They also support climate adaptation efforts through the provision of other ecosystem services, such as stormwater attenuation, supporting biodiversity, and more.

The amount of carbon sequestration and storage was evaluated for forest and non-forest assets in the NPCA watersheds. The study found that forest assets, including forested wetlands, within the NPCA jurisdiction exhibit carbon sequestration rates ranging from 0.25 to over 2.5 tonnes of carbon per ha annually. Carbon storage for forest assets within the NPCA watershed surpasses 1.3 tonnes, with a weighted average of approximately 261 tonnes per ha. Sequestration rates for non-forest assets were derived from literature and vary by asset type ranging from 0.3 to 2.16 tonnes carbon per ha.

Natural assets also provide numerous additional ecosystem services such as nature-based recreation, air quality regulation, stormwater regulation, habitat preservation, and contribution to crop productivity. The report assessed these select ecosystem services delivered by natural assets within NPCA's watershed. Using established methods and scientific literature, the value of the ecosystem services was estimated at $331 million to $463 million, annually. Nature-based recreation and stormwater regulation were identified as the most valuable services. It is important to note that the study only examined a subset of ecosystem services as noted and that the value is considered an underestimate of the true value of natural asset service provision.

Supporting our Municipal Partners: Fort Erie Natural Asset Inventory Pilot Project

As part of this watershed analysis project and through a collaborative approach with the Town of Fort Erie, NPCA staff led a Fort Erie natural assets inventory and assessment project to help the municipality fulfill the requirements of *O. Reg. 588/17*. Given the NPCA's role in watershed-based natural resource management, most of the natural asset data was readily available and up to date. NPCA staff filled critical data gaps relating to urban street trees while other green infrastructure data were provided by the Town of Fort Erie.

The Fort Erie natural asset project provides an evaluation of the municipality's natural assets and their capacity to deliver services. The report showcases the inventory, condition, risks, level of services, ecosystem service valuations, and replacement costs associated with Fort Erie's natural assets, which include various land covers such as forests, wetlands, and waterbodies. This information will help the Town of Fort Erie meet its asset management planning requirements for green infrastructure under *O. Reg. 588/17.*

The final report was provided to municipal staff for incorporation into the Town's asset management plan and approval by Council at their July 8, 2024 meeting.

Next steps

With the completion of the watershed natural assets analysis and valuation project, NPCA staff will continue to advance our work in this emerging field and will develop a workplan to:

- Integrate natural asset information into NPCA asset management planning process and policies, as applicable.
- Complete data collection at NPCA conservation areas to fill remaining data gaps related to enhanced assets, such as park, trees, and trails.
- Determine best practices for data management and sharing.
- Continue to collaborate with Conservation Ontario and other conservation authorities engaged in natural asset initiatives (i.e., Toronto & Region, Credit Valley, Halton Region, Lake Simcoe Region, and Ausable Bayfield) to support knowledge sharing and build a community of practice amongst Ontario's Conservation Authorities and municipal partners in natural asset management.
- Explore additional opportunities to support watershed municipalities, as appropriate, by providing natural asset inventory and valuation information.
- Develop a program to update the watershed natural asset inventory as new data becomes available and conduct field-based condition assessment and risk assessments to detect changes over time, enabling proactive management and early identification of threats for timely intervention.

Financial Implications:

The Watershed Natural Assets Analysis and Valuation project was supported through the approved operational budgets. The NPCA entered a partnership with the Town of Fort Erie to complete the Fort Erie Natural Asset Inventory Pilot Project with cash and in-kind contributions from both partners.

Links to Policy/Strategic Plan:

Goal 2.3 – Lead the implementation of sustainable technologies and green infrastructure best practices for climate resiliency and sustainability.
Goal 4.1 – strengthen government relations toward collective outcomes and impact
Goal 6.3 – Improve asset management and close the state of good repair

Related Reports and Appendices:

Appendix 1: Final Report Niagara Peninsula Watershed Natural Asset Analysis & Valuation
Appendix 2: Presentation by Amy Taylor, Green Analytics, Niagara Peninsula Watershed Natural Asset Analysis and Valuation

Report No. FA-38-23 RE: Natural Assets Inventory and Management Initiative

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Niagara Peninsula Watershed Natural Asset Analysis and Valuation

June 20, 2024

green ANALYTICS

Executive Summary

This report presents an assessment of natural assets within the Niagara Peninsula Conservation Authority (NPCA) watershed.

The assessment involved creating a detailed inventory of natural assets, assessing carbon storage and sequestration, evaluating condition, and quantifying economic values. It also included a case study application of natural asset management approaches to the town of Fort Erie.

Key findings:

- **Natural Asset Inventory**: A detailed inventory categorized natural assets across three levels, from general natural areas to specific ecosystem types. Agricultural land dominates the natural asset composition within the NPCA, covering 52.6% of its area. Natural assets comprise 28.1% of the NPCA area. Taken together the agriculture, natural and pervious area assets cover 83.5% of the NPCA's jurisdiction.

- **Condition Assessment:** The condition assessment found 98% of the natural assets to be in fair or good condition with wetland assets rating good and other natural assets generally rating fair.

- **Asset Replacement:** The estimated replacement costs for natural assets take into account the complexity and extended time required to restore natural assets. Utilizing the per unit restoration costs provided by Beacon Environmental (2020), the total replacement cost for the designated assets was projected to exceed $10 billion.

- **Carbon Storage and Sequestration**: Carbon sequestration was evaluated for forest and non-forest assets in the NPCA. Forest assets (including forested wetlands) within the NPCA boundary exhibit carbon sequestration rates ranging from 0.25 to over 2.5 tonnes of carbon per ha per year. Carbon storage for forest assets and found to surpass 1.3 million tonnes, with a weighted average carbon density of approximately 261 tonnes per ha. Sequestration rates for non-forest assets were derived from literature and vary by asset type.

- **Ecosystem Service Valuation**: The report assessed various ecosystem services delivered by natural assets in the NPCA region. The value of the ecosystem services was estimated to be between $331 million and $463 million annually.

- **Town of Fort Erie Case Study**: The Fort Erie case study illustrates how a municipality can assess its natural assets and their ability to provide services. It offers insights into the asset registry, condition and risk assessments, ecosystem service valuation, and replacement cost valuation for Fort Erie’s natural assets.

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1 Introduction

Operating at the watershed scale, Ontario's Conservation Authorities (CAs) are uniquely positioned to address challenges and undertake initiatives that support the natural environment. Conservation authorities work closely with local municipal partners to deliver programs and services related to local land-use planning, natural hazard management, ecosystem restoration, monitoring, recreation, and drinking source protection under the *Clean Water Act*. The Niagara Peninsula Conservation Authority (NPCA) is one of 36 CAs in Ontario, created through the *Conservation Authorities Act* to guide watershed-based natural resource management activities within the geographic area of Niagara, plus portions of Haldimand County and the City of Hamilton.

Municipalities across Canada provide services to local citizens through use of built infrastructure. For example, stormwater management dikes, erosion control structures and drinking water infrastructure. The 2019 Canadian Infrastructure Report Card found the country's infrastructure at risk with a considerable amount of infrastructure in poor or very poor condition. The state of Canada's infrastructure poses a financial challenge to municipalities; however, natural assets such as wetlands, forests, and meadows provide a cost-effective, resilient, alternative to some built infrastructure. Indeed, when managed properly, natural assets provide several valuable services, including numerous services of relevance to CAs mandate such as stormwater management, erosion control, water quality improvements, and recreation. Taking a watershed-based approach and working with municipal governments, CAs can help ease the infrastructure burden on local governments and ensure maximum service provision from nature for citizens. Natural asset management provides a platform for understanding the natural assets present within a watershed along with the services those assets are providing. By conceptualizing nature as an asset, we can codify, measure, and track the ways in which we depend on it. If natural assets are not managed properly their value can depreciate and their ability to provide services diminishes.

Recent developments in analytical approaches for assessing and valuing natural assets allow for more ecosystem- and location-specific, rigorous, and defensible value estimates. Such estimates can be replicated and incorporated into traditional asset management frameworks and compared across jurisdictions and regions. The outcomes of doing so include reduced risks (e.g., lower flood risk through wetland restoration), enhanced services (e.g., enhanced recreational experience by improving natural asset conditions, improved water filtration by maintaining forest cover), increased climate resilience (e.g., greater drought resistance by preserving meadow and other natural assets) and climate change mitigation (e.g., enhanced carbon sequestration through reforestation).

This report contains the results of an assessment of the natural assets within the NPCA's 2,424 km^2 watershed jurisdiction (Figure 1-1) which provide many valuable services to approximately 520,000 residents. It is situated between Lake Ontario and Lake Erie. The Niagara River forms a shared boundary with the United States of America. There are numerous notable natural features within the NPCA jurisdiction including the Niagara Escarpment Biosphere Reserve, Niagara Falls, Wainfleet Bog, Ball's Falls, and Willoughby Marsh. The watershed is one of Ontario's most productive agriculture areas.

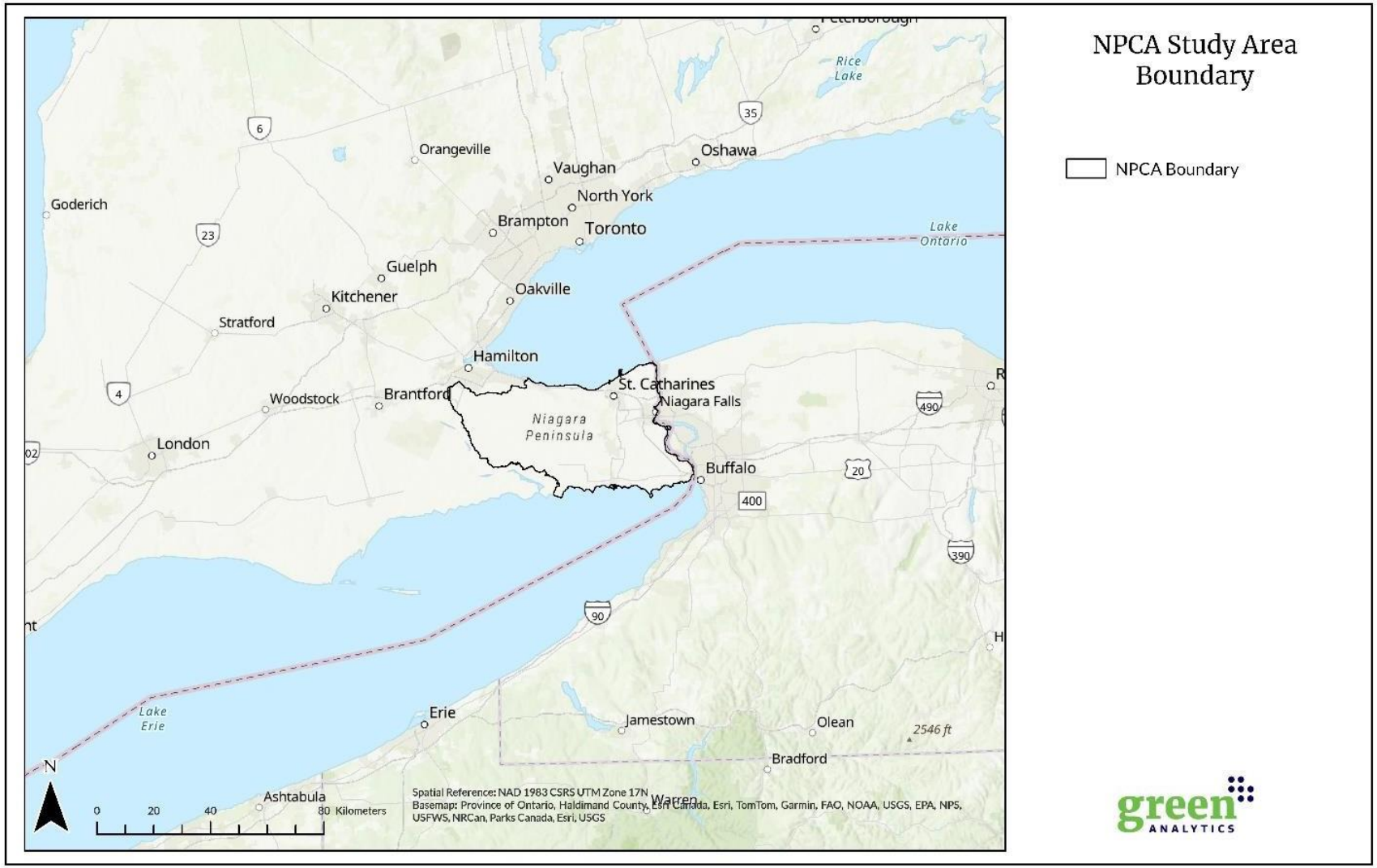

Figure 1-1. Niagara Peninsula Conservation Authority study area boundary.

The purpose of this project was to apply a natural asset management approach to the assets within the NPCA boundary. To that end, this report is organized as follows:

- Section 2 provides the **state of the natural assets in the NPCA** describing the range of assets located within the NPCA jurisdiction, their condition and replacement values.
- Section 3 contains the approach and results of a **carbon sequestration** assessment of forest and non-forest assets.
- Section 4 describes the approach and results of a **valuation of some of the ecosystem services** provided by the natural assets within the NPCA.
- Section 5 is a summary from a **case study application** of natural asset management to the Town of For Erie.
- Section 6 **concludes the report** with a summary of findings and recommendations for next steps.
- A series of **Appendices** provide additional details on the analysis and findings of this study.

2 The State of Natural Assets in the NPCA

This section provides a detailed account of the asset inventory, an assessment of the condition and estimated asset replacement costs. For the purpose of this report, the term "asset inventory" refers to the broader inventory that includes natural and enhanced assets as well as agricultural lands while the term "natural asset inventory" refers to the specific subset of natural assets, as they are defined in this section.

2.1 Asset Inventory

Employing the data identified in Appendix A, an asset inventory was developed for the NPCA. The asset inventory forms the foundation upon which all other asset management tasks (e.g., condition assessment, and replacement costs) are based. To create an asset inventory, the location, type and extent of natural assets are delineated and quantified. The first step is to define the assets to be included in the inventory. Figure 2-1 defines various categories of assets.

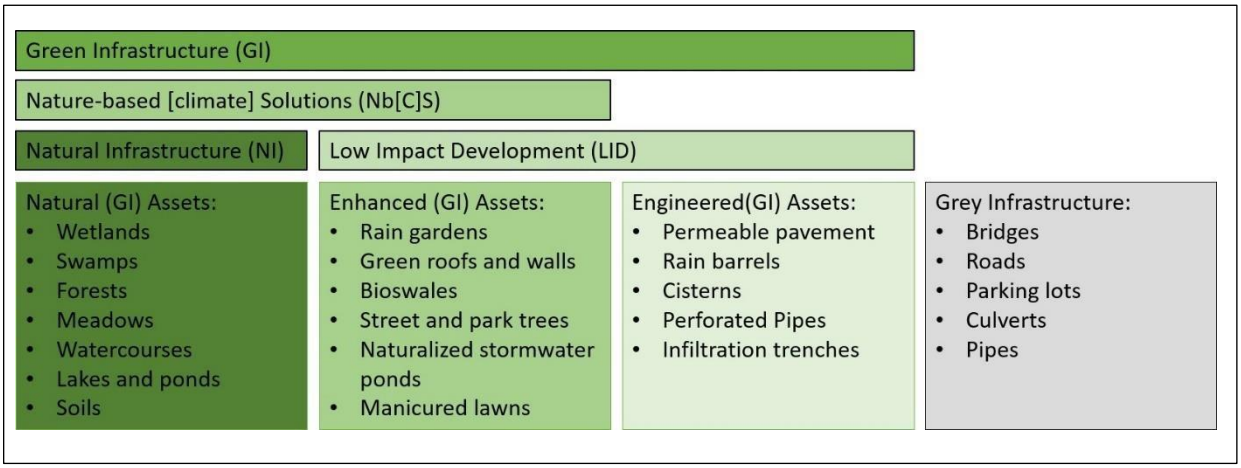

Figure 2-1. Categories of green infrastructure.

For this project, the inventory included all natural assets as well as some enhanced assets within the NPCA. Specifically, enhanced assets (e.g. parks and mown fields) are included along with agriculture assets. Note that not all assets included in the inventory are owned and managed by the NPCA. In the inventory, a distinction is made between those under the control of the CA and those that are not. The rationale for including assets that are not owned or managed by the NPCA is twofold. First, privately owned and managed assets provide services that the CA and local residents (and visitors) may benefit from (e.g., stormwater management, aesthetic/nature appreciation and urban heat reduction). Second, because of the services provided by privately owned assets, there is a role for CAs to play in influencing how they are managed. Often referred to as "non-infrastructure solutions" options for influencing the management of assets not owned by the CA include subsidies for tree planting, wetland creation and/or enhancement and riparian restoration, as well as stewardship and outreach programming.

The inventory was created using Geographic Information Systems (GIS) where all relevant data was organized to get a complete picture of the type, location, and extent of natural assets within the NPCA. For natural assets, the inventory is described at three levels as per Table 2-1. At Level 1, a natural asset is defined as a continuous area of natural landcover regardless of the land cover type. At Level 2, a natural asset is defined as a continuous area of the same land cover type. At this level, for example, forest assets are differentiated from water assets, which are differentiated from wetland assets. At Level 3, differentiation is made between types of assets at Level 2. At Level 3, for example, forest assets, are defined as coniferous, deciduous, and mixed forests.

Table 2-1. Asset hierarchy for natural area assets.

Asset Class (Level 1)	Asset Type (Level 2)	ELC (Level 3)
Natural Area Assets	Forest	Coniferous Forest
		Coniferous Savanna
		Coniferous Thicket
		Coniferous Woodland
		Deciduous Forest
		Deciduous Savanna
		Deciduous Thicket
		Deciduous Woodland
		Mixed Forest
		Mixed Savanna
		Mixed Thicket
		Mixed Woodland
		Treed Agriculture
	Hedgerow	Coniferous Hedgerow
		Deciduous Hedgerow
		Mixed Hedgerow
	Meadow	Forb Meadow
		Graminoid Meadow
		Mixed Meadow
	Natural Bare	Open Bluff
		Open Cliff
		Open Rock Barren
		Open Talus
		Shrub Bluff
		Shrub Cliff
		Shrub Rock Barren
		Shrub Talus
		Treed Cliff
		Treed Rock Barren
		Treed Sand Barren and Dune
		Treed Talus
	Aquatic	Open Aquatic
		Open Water
		Open Water (Varied Type)
		Water (ESRI)
		Mixed Ponds
	Shoreline	Open Shoreline
		Shrub Shoreline
		Treed Shoreline

Asset Class (Level 1)	Asset Type (Level 2)	ELC (Level 3)
	Wetland	Coniferous Swamp
		Deciduous Swamp
		Floating-leaved Shallow Aquatic
		Marsh (Unknown Type)
		Meadow Marsh
		Mixed Shallow Aquatic
		Mixed Swamp
		Shallow Marsh
		Shrub Bog
		Submerged Shallow Aquatic
		Thicket Bog
		Thicket Swamp
	Watercourse	

Table 2-2 demonstrates the various levels of the inventory for other land assets. This includes agriculture and enhanced assets at Level 1 with additional differentiation taking place within these asset classes at Levels 2 and 3 of the inventory (where applicable).

Table 2-2. Other land assets hierarchy.

Asset Class (Level 1)	Asset Type (Level 2)	ELC (Level 3)
Agriculture	Agriculture	Agricultural Infrastructure
		Open Agriculture
		Shrub Agriculture
	Agriculture and Undifferentiated Rural Land Use	Agriculture and Undifferentiated Rural Land Use
	Agriculture Crop Defined	Agriculture Crop Defined
Enhanced	Built-up Pervious	Cemetery
		Green Lands
		Mixed Grasses
		Mixed Pervious
		Mixed Pervious Surface (UAB)
		Parks
	SWM Pond	
	Golf	Golf
	Water Constructs	Canal
		Reservoir

The remainder of this section provides outputs derived from the NPCA's asset inventory. Table 2-3 presents area of NPCA's assets at Level 1 for all assets within the NPCA boundary. At this level, the distinction is between natural assets (28% of the assets), agriculture assets (52% of the assets) and enhanced assets (3% of the assets).

Table 2-3. Area of natural assets within the NPCA jurisdiction according to Level classification

Asset Type (Level 1)	Natural Assets within the NPCA (ha)	Portion of NPCA Jurisdiction
Agriculture	125,317	51.6%
Natural	67,211	27.6%
Enhanced	7,734.08	3.2%
Total	**200,262**	**82.4%**

Table 2-4 demonstrates the distribution of assets by type at Level 2. While the agriculture assets hold the majority of the total area of assets, the significant contribution of wetland and forest assets is notable at this level of analysis. In addition, 4,973 km of watercourses assets are captured as a component of the inventory (Table 2-5).[1] The location and extent of the assets within the NPCA at Level 1 and 2 are depicted in Figure 2-2 and Figure 2-3, respectively. Appendix B provides a list of Level 3 assets and their associated areas.

Table 2-4. Area of assets within the NPCA according to Level 2 classification.

Asset Type (Level 2)	Natural Assets within the NPCA (ha)	Portion of NPCA Jurisdiction
Agriculture	10,242	4.2%
Agriculture and Undifferentiated Rural Land Use	9,533	3.9%
Agriculture Crop Defined	105,542	43.4%
Aquatic	3,657	1.5%
Built-up Pervious	4,779	2.0%
Forest	22,740	9.4%
Golf	1,939	0.8%
Hedgerow	1,409	0.6%
Meadow	5,137	2.1%
Natural Bare	127	0.1%
Shoreline	182	0.1%
SWM Pond	4.39	0.0%
Water Construct	1,011.13	0.4%
Wetland	33,960	14.0%
Total	**200,262**	**82.4%**

Table 2-5. Length of watercourse assets within the NPCA.

Asset Type	Length within the NPCA (km)
Watercourse	4,973

[1] Watercourse assets are measured by length rather than area so are presented separately here.

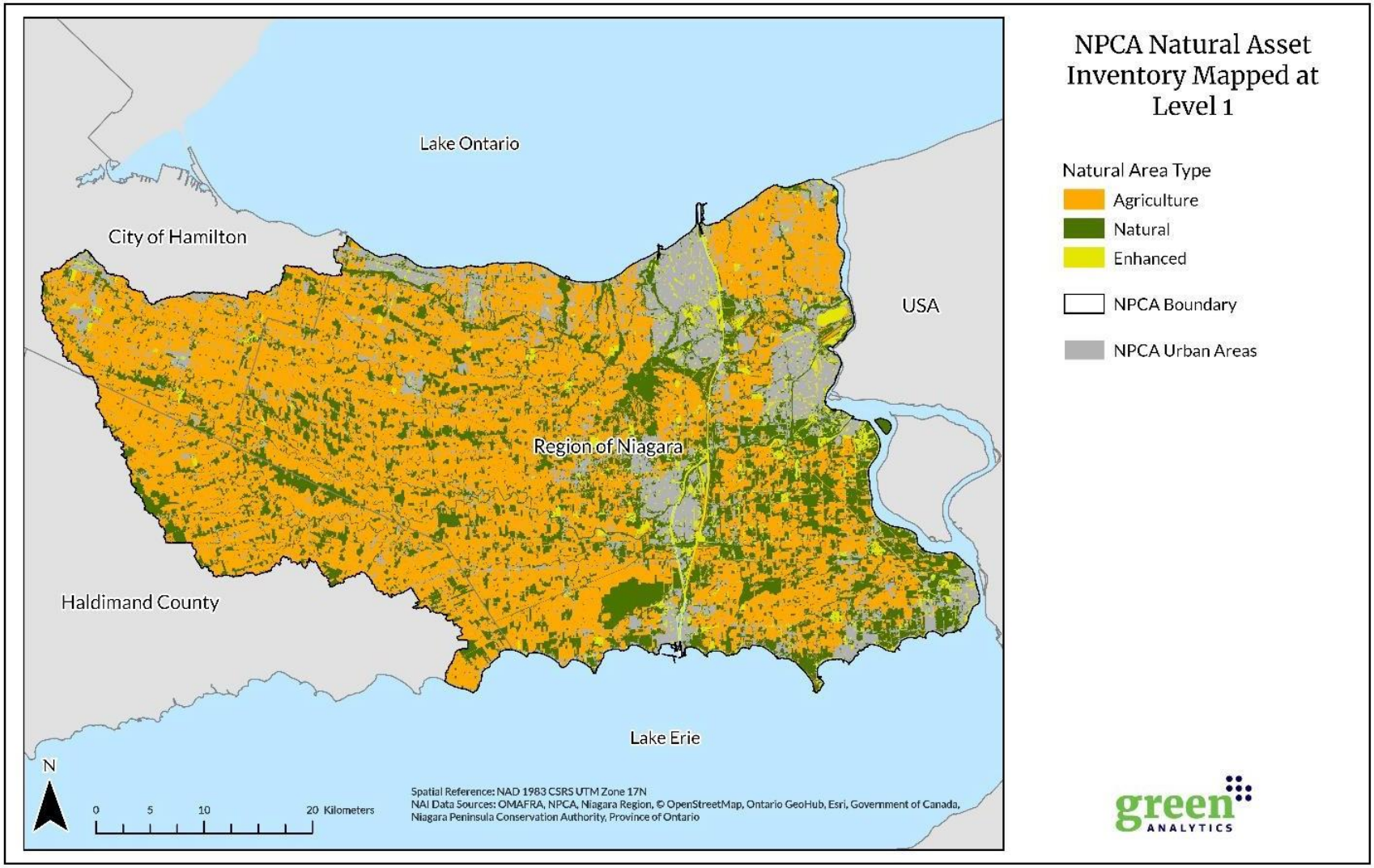

Figure 2-2. Assets within the NPCA (Level 1).

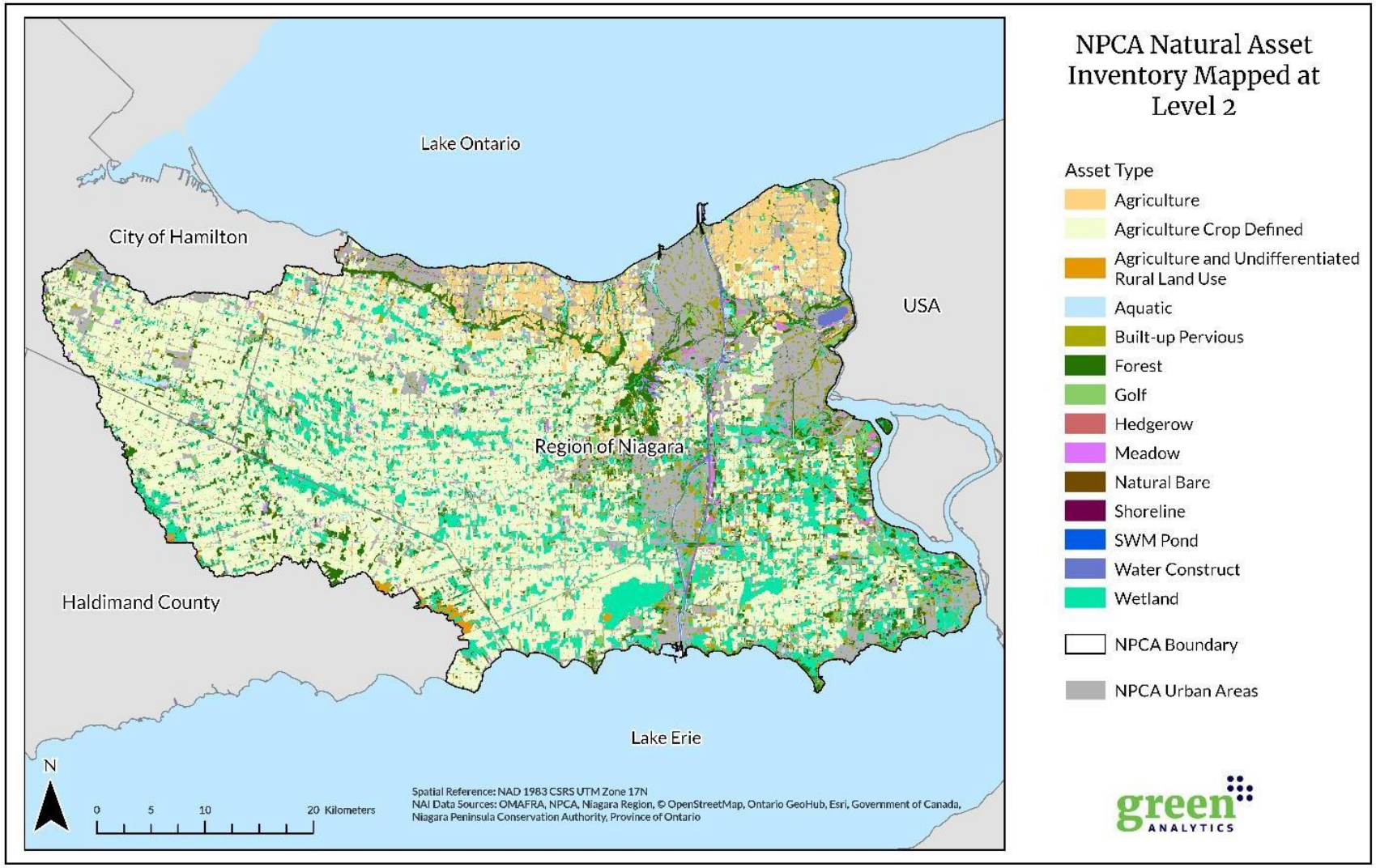

Figure 2-3. Natural assets within the NPCA (Level 2).

2.2 Condition Assessment

The objective of a natural asset condition assessment is to determine a high-level evaluation of an asset's ability to provide ecological services, which are valued by people (e.g., air pollution filtration, storm water attenuation, carbon sequestration, nature-based recreation). The underlying assumption for natural asset condition assessments is that an asset that is assessed as being in a "good" condition from an ecological perspective, is anticipated to be able to provide a "good" level of ecological services.

This section of the report describes the results of a desktop condition assessment that was applied to the NPCA's natural assets. While the desktop analysis completed for this study is grounded in landscape ecology metrics, it is recommended that field-based verification of the condition of natural assets be completed overtime to support and improve condition monitoring.

Note that the condition indicators were applied to natural assets as defined in Table 2-1. The other land assets (enhanced and agricultural assets) were included in the inventory to provide a complete picture of the land-based assets within the NPCA watershed and to recognize their important contribution to community services such as stormwater management and recreation. However, the condition indicators employed in this assessment were not well suited to agricultural lands, since the condition of these lands are heavily influenced by agricultural management practices and the extent of best management practices employed. Because of this, alternative condition indicators specifically focused on agriculture lands would need to be developed and more detailed data collected to assess the condition of agriculture lands. For built-up pervious assets, condition ratings can be useful from a management perspective. However, such ratings require input from field staff on each individual property. Such data was not readily available and thus, assessing the condition of enhanced assets was deemed beyond the scope of the current project.

The process used for the condition assessment in this project aligns with the process outlined in the Canada-wide standards and specifications for natural asset inventories (Figure 2-4) (CSA 2022).

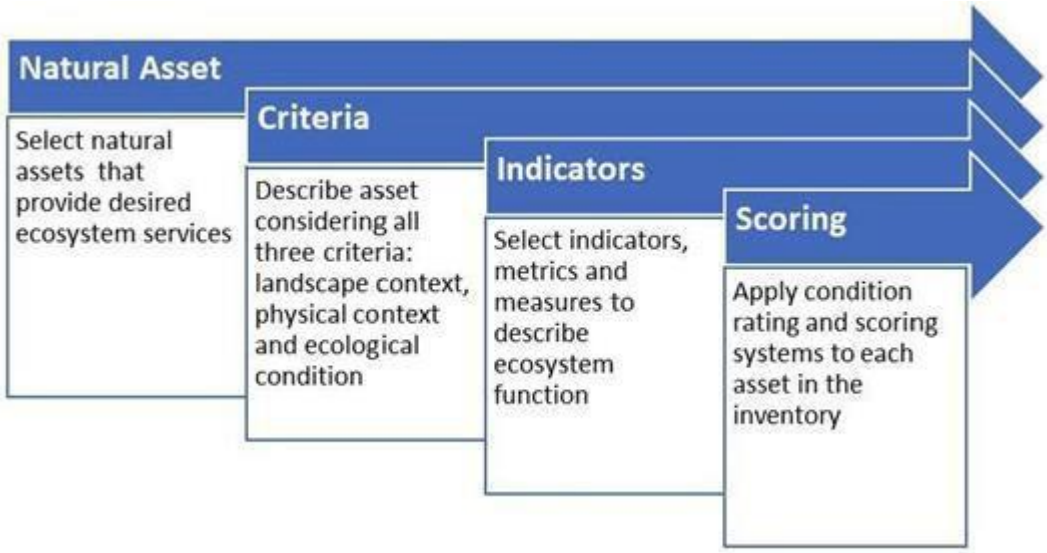

Figure 2-4. The natural asset condition assessment process (Source: CSA 2022).

The condition indicators employed are noted below and categorized into two criteria (i.e., landscape context, physical context) to align with the CSA standard for natural asset inventories:

CRITERIA FOR PHYSICAL CONTEXT:

- Interior Habitat
- Natural Area Patch Shape
- Road Density
- Natural Asset Proximity to Watercourses
- Forest Proximity to other Natural Assets
- Wetland Proximity to other Natural Assets

CRITERIA FOR LANDSCAPE CONTEXT:

- Extent of Adjacent Permeable Land Uses
- Percent of Forest Cover within Watersheds
- Percent of Wetland Cover within Watersheds

Each of these indicators are described below. Note that as is often the case with natural asset desktop condition assessments, suitable indicators for evaluating Ecological Condition were not found for the NPCA. Assessing ecological condition requires site-specific, largely field-based data that is frequently lacking. Future data collection focused on species diversity, invasive species or habitat quality would help respond to this gap.

To give an overall picture of the condition of the natural assets within the NPCA jurisdiction according to the condition indicators employed in this assessment, Figure 2-5 demonstrates the combined results of all indicators assuming an equal weighting between indicators. Appendix C contains detailed results for each condition rating. As is evident in the figure below, most of the natural assets within the NPCA jurisdiction are in good condition (59%, as noted in Table 2-6). A large proportion of natural assets are also rated as fair (40%). Incorporating an indicator related to ecological condition may result in a reduction in the overall condition rating for NPCA's natural assets.[2] In addition to considering results by condition rating, it is useful to examine condition results by assets type. Figure 2-6 shows the condition results by asset type at Level 2.

Table 2-6. Area of natural assets by overall condition rating.

Overall Condition Rating	Natural Assets within the NPCA (ha)	Portion of Total Inventory
Very Good	937	1.4%
Good	39,779	59.2%
Fair	26,614	39.6%
Poor	892	1.3%
Very Poor	5	0.0%
Total	67,211	100.0%

[2] Including ecological condition indicators may result in increased alignment with the results of the Niagara Peninsula Watershed Report Card 2023, that found surface water condition to be poor and forest condition to be fair within the NPCA. Note, however, that the watershed report card and the current study are not directly comparable due to differences in indicators and approaches. The watershed report card is available here: Watershed Report Card (npca.ca)

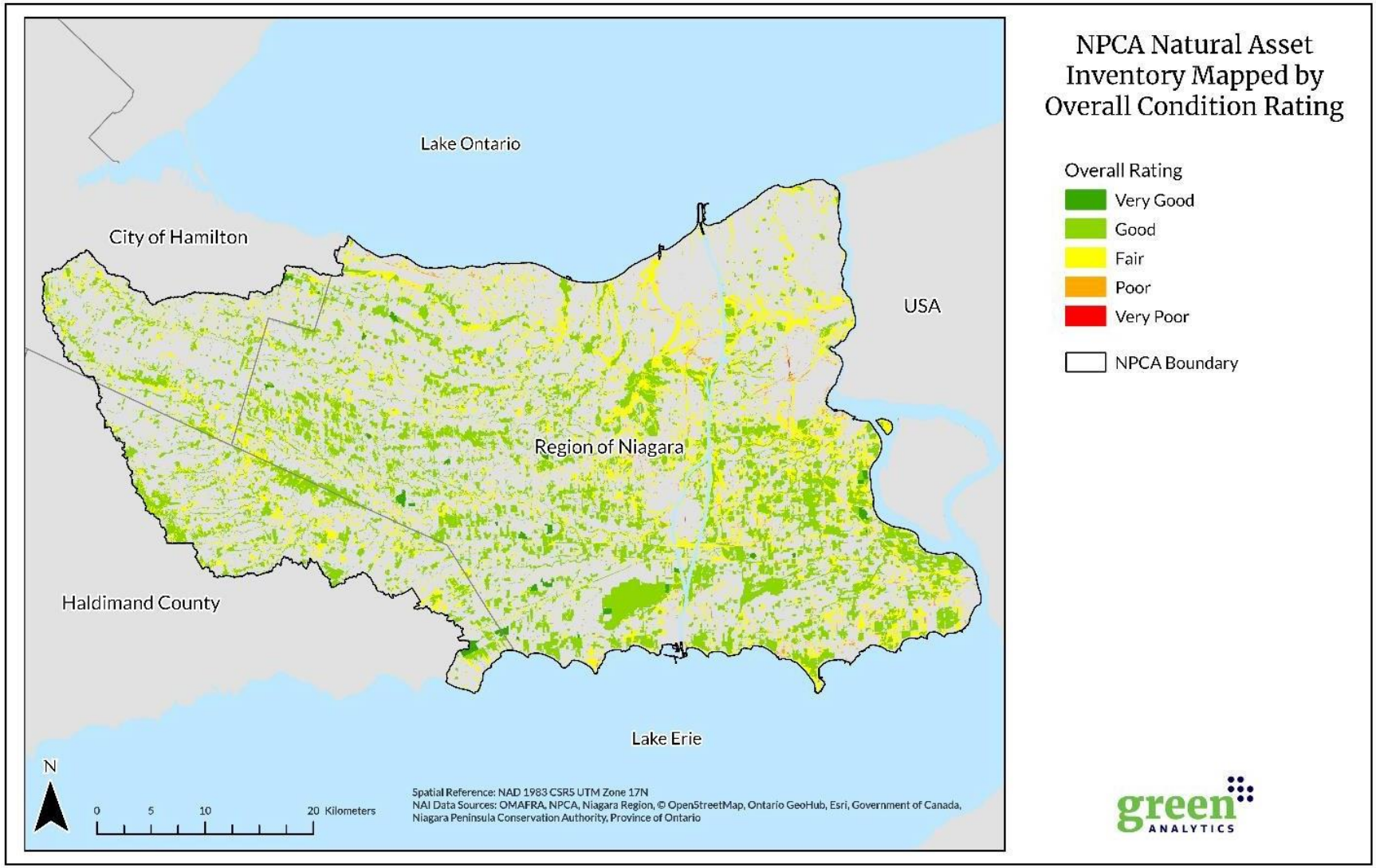

Figure 2-5. Natural assets categorized by overall condition rating.

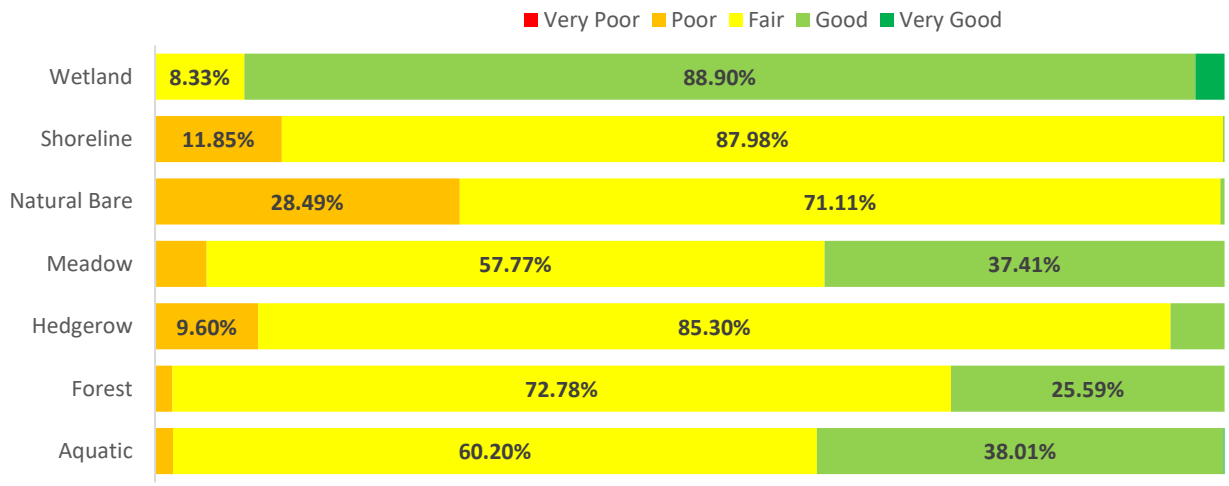

Figure 2-6. Condition Breakdown by asset type.

2.3 Asset Replacement Costs

Assigning replacement costs to assets is a widely recognized practice in asset management. Replacement costs reflect the comprehensive costs associated with replacing an existing asset with a new one of equivalent functionality and capacity (TRCA 2022). Such costs encompass not only the purchase price of the asset but also a range of additional costs including site preparation, initial delivery and assembly, as well as the costs incurred in initial maintenance and monitoring activities. When it comes to natural assets, the replacement process is notably different from that for grey infrastructure (e.g., restoring wetland or reforesting areas, as opposed to replacing pipelines or roads). A key difference arises from the time it takes to establish natural assets, which can span several decades (TRCA 2022). Unlike grey infrastructure, green assets such as wetlands, or urban forests require a significant period to reach full maturity and functionality, making their replacement a long-term and dynamic process.

Replacement cost values for natural assets in the NPCA watershed were assigned using ecosystem restoration costs from Beacon Environmental (2020). The Beacon study compiled restoration costs for various asset types, categorized across 5 life-cycle phases of planning, creation, inspection and maintenance, monitoring and managing, and removal. For the current report, costs from phases 1 and 2 were combined to reflect the per unit replacement costs for specific asset types. The creation cost of 1 ha of deciduous or mixed forest, $214,959, was used to estimate the forest replacement costs for all forest categories (coniferous forest, coniferous woodland, deciduous forest, deciduous thicket, and mixed forest) within the NPCA area. This value was also applied to treed shoreline assets. The creation of 1 ha of cultural meadow, $184,635, was utilized to determine the replacement costs for all meadow assets (graminoid, mixed, and forb meadows). The creation cost of 1 ha of meadow marsh, valued at $385,113, was assigned as the replacement cost for all marsh assets (marsh, meadow marsh, and shallow marsh). Likewise, the cost of 1 ha of thicket swamp was used to approximate the replacement costs for all swamp assets (deciduous swamp, thicket swamps, and coniferous swamps).

Total replacement costs for natural assets within NPCA are presented in Figure 2-7. With replacement costs assumptions detailed by ELC Class in Table 2-7. Overall, the replacement value of the natural assets was estimated to total $10.1 billion. Forest assets account for 46% of the total replacement cost and wetlands (swamps and mashes combined) account for 44%.

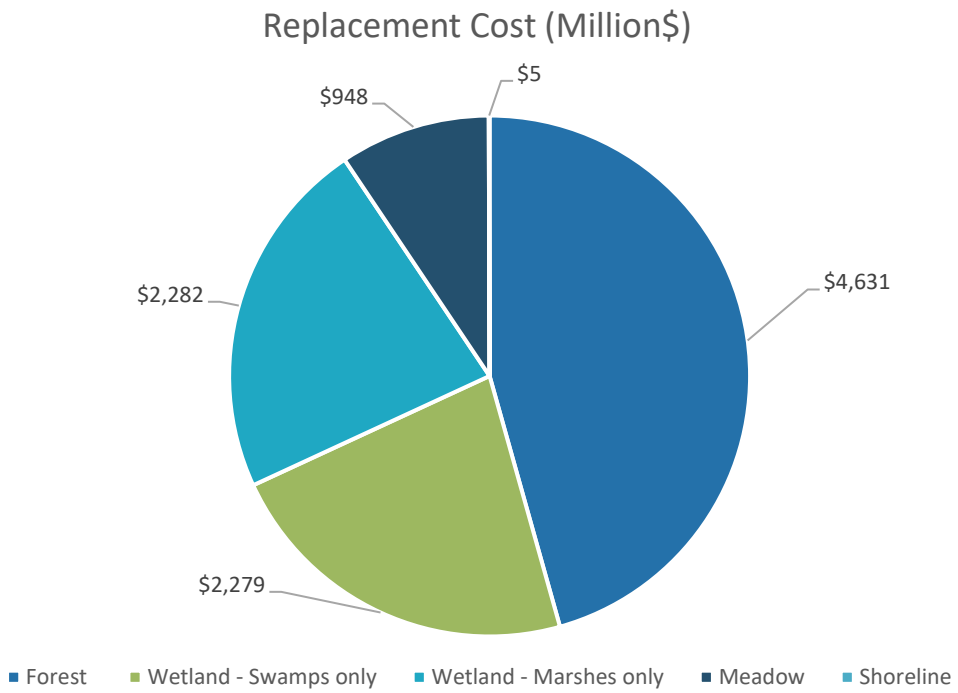

Figure 2-7. Replacement cost (millions $) by asset type.

Table 2-7. Replacement Cost and Per Unit Replacement Cost for natural assets in the NPCA (Level 3).

ELC Class	Unit Replacement Cost ($/ha)	Asset Area (ha)	Replacement Cost ($ millions)
Coniferous Forest	214,959	538	115.5
Coniferous Swamp	82,775	38	3.2
Coniferous Thicket	214,959	37	7.9
Coniferous Woodland	214,959	146	31.3
Deciduous Forest	214,959	14,351	3,085.0
Deciduous Swamp	82,775	23,402	1,937.1
Deciduous Thicket	214,959	3,854	828.4
Deciduous Woodland	214,959	1,082	232.5
Forb Meadow	184,635	4	0.8
Graminoid Meadow	184,635	69	12.7
Marsh (Unknown Type)	385,113	1,522	586.1
Meadow Marsh	385,113	3,277	1,262.1
Mixed Forest	214,959	1,218	261.9
Mixed Meadow	184,635	5,064	935.0
Mixed Swamp	82,775	458	37.9
Mixed Thicket	214,959	95	20.4
Mixed Woodland	214,959	224	48.2
Shallow Marsh	385,113	1,126	433.7
Thicket Swamp	82,775	3,639	301.2
Treed Shoreline	214,959	25	5.4
Total		**60,168**	**10,146.2**

3 Carbon Storage and Sequestration Assessment

One of the deliverables for this project was a baseline assessment of carbon storage and sequestration from natural assets within the NPCA. This section summarizes the approach and results of that assessment.

3.1 Carbon Assessment Approach Overview

Two approaches were used to assess carbon storage and sequestration from assets within the NPCA jurisdiction:

1. **Forest assets -** This includes all forested land cover types as well as forested wetlands as articulated in Table 3-1.
2. **Non-forest assets** - This includes a range of other natural and enhanced assets as articulated in Table 3-1.

Table 3-1. Summary of methods, results and land covers for forest and non-forest assets.

Asset Types	Asset and Land Cover Types Included	Carbon Assessment Method Used	Carbon Results Captured
Forest assets	Forest, forested wetlands (i.e. swamps), hedgerows, savannahs, thickets, woodlands	Carbon modelling using the CBM-CFS3	Storage and sequestration
Non-forest assets	Agriculture, built-up pervious, meadows, golf courses, shorelines, non-forested wetlands (i.e. marsh, bogs, shallow aquatic)	Carbon sequestration multipliers	Sequestration only

Assessing forest assets separate from non-forest assets allowed Green Analytics to leverage more robust and sophisticated approaches available for these particular assets. Specifically, the Carbon Budget Model of the Canadian Forest Service, v3 (CBM-CFS3) was used for forest assets.[3] The CBM-CFS3 model allowed the estimation of carbon storage and sequestration values over time for forest assets.

Generally, forests have the capacity to act as both sources (emissions) and sinks (sequestration) of carbon dioxide in any given year, depending on the overall condition of the forests and geographic extent of the analysis. For example, a fire within a forested area results in that area being a source of carbon dioxide. This is due to the immediate release of the stored carbon from the burnt organic matter through combustion. The same area, a few years later, will create new tree foliage and tree stems and become a carbon sink by absorbing more carbon dioxide than it emits.

The CBM-CFS3 was specifically designed to estimate the carbon sources and sinks of forests and forested assets in Canada. As such, the CBM-CFS3 was the model of choice to estimate the carbon stocks and sequestration rates for the forest assets within the NPCA watershed. The model requires inputs for forest growth rates (changes over time of forest volume), forest ages, and forest species compositions. These parameters were input using the data embedded in the NPCA's asset inventory. The CBM-CFS3 model operates at a per hectare resolution and its primary unit of measurement is tonnes of carbon per hectare. Sequestration rates are reported in tonnes of carbon per hectare per year. Using the CBM-CFS3 model, carbon storage and sequestration rates were established for forest assets including forested wetlands (i.e. swamps), hedgerows, savannahs, thickets and woodlands.

For non-forested assets, Green Analytics was able to establish carbon sequestration rates only; carbon

[3] https://natural-resources.canada.ca/climate-change/climate-change-impacts-forests/carbon-accounting/carbon-budget-model/13107

storage estimates could not be estimated. To estimate carbon sequestration, the project team drew from a review of carbon sequestration literature. Specifically, non-forest asset types were cross-referenced with a database of average sequestration rates by land cover type. More than 30 peer-reviewed papers informed the employed carbon sequestration rates. Using this approach, each non-forest natural asset class was assigned a carbon sequestration rate. Non-forested asset types, and their sequestration rates, are shown in Table 3-2. As noted above, for these assets, it was not possible to quantify carbon storage. The CBM-CFS3 model is applicable to forest assets only and given the data inputs required to establish such estimates (e.g. forest age and growth rates) establishing storage estimates for non-forest assets was not feasible. Further, for agriculture assets, management actions influence carbon storage as does the large proportions of agricultural lands that produce a yearly, or multi-year crop that is removed from the land. An assessment of carbon storage from agriculture lands would need to thus consider the specific management actions undertaken as well as the particular crop or crops harvested from the lands. Such an analysis was beyond the scope of current study.

Table 3-2. Sequestration rates for non-forest asset types.

ELC Class	Crop Type	tC / ha / year	Area (ha)
Agriculture Crop Defined	General Agriculture	0.31	103,069
Agriculture Crop Defined	Vineyards	1.49	1,919
Agriculture Crop Defined	Orchards	0.84	553
Cemetery	-	0.3	264
Floating-leaved Shallow Aquatic	-	2.16	17
Forb Meadow	-	0.48	4
Golf	-	1.73	1,939
Graminoid Meadow	-	0.48	69
Green Lands	-	1.73	1
Marsh (Unknown Type)	-	1.59	1,522
Meadow Marsh	-	1.59	3,277
Mixed Grasses	-	0.48	196
Mixed Meadow	-	0.48	5,064
Mixed Pervious	-	0.48	2,368
Mixed Pervious Surfaces (UAB)	-	0.31	839
Mixed Ponds	-	-	120
Mixed Shallow Aquatic	-	1.62	8
Open Agriculture	-	0.31	107
Open Aquatic	-	-	411
Open Bluff	-	-	6
Open Rock Barren	-	-	11
Open Shoreline	-	-	148
Open Talus	-	-	1
Open Water	-	-	2

ELC Class	Crop Type	tC / ha / year	Area (ha)
Open Water (Varied Type)	-	-	4,128
Park	-	0.48	1,112
Shallow Marsh	-	1.58	1,126
Shrub Agriculture	-	1.49	6,952
Shrub Agriculture	-	0.84	3,180
Shrub Bluff	-	-	7
Shrub Bog	-	2.02	101
Shrub Rock Barren	-	0.31	5
Shrub Shoreline	-	1.08	10
Shrub Talus	-	-	6
Submerged Shallow Aquatic	-	1.58	8
SWM Pond	-	-	4
Thicket Bog	-	1.59	364
Treed Bluff	-	1.08	24
Treed Cliff	-	-	57
Treed Rock Barren	-	-	4
Treed Sand Barren and Dune	-	-	3
Treed Shoreline	-	1.08	25
Treed Talus	-	-	2
Water (ESRI)	-	-	8
Subtotal:			**166,577**

3.2 Carbon Storage Results

Forest carbon stocks represent the estimated carbon accumulated (stored) in each of the forested assets. The amount of carbon stored in forest assets depends on the carbon sequestration rate, the amount of time they have been alive, and the presence or absence of large-scale disturbances such as fire, insects, or harvest activities. Growing forests accumulate carbon in trees, trunks, and root systems. Carbon is also stored in dead trees and woody debris. As forests age, standing dead trees and foliage fall to the ground and add to the stock of carbon held in dead organic matter. Over time the dead organic matter decomposes transferring carbon into the forest soils.

Figure 3-1 displays the carbon stored in the forest assets across the NPCA watershed. In general, the older and more productive forests are, the more carbon is stored within them. Less productive and more open forested areas store comparatively less carbon per unit area than a fully closed canopy forest.

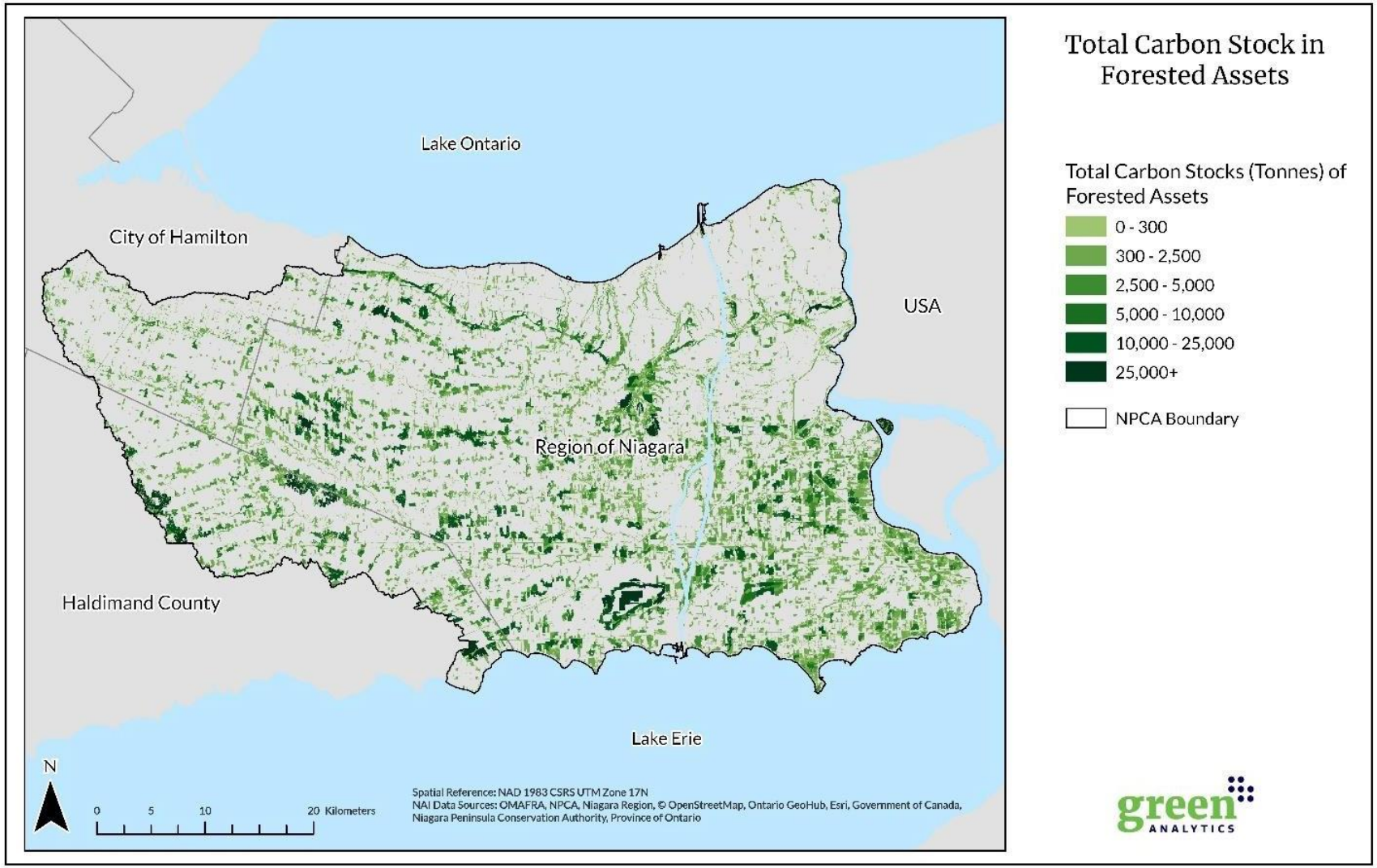

Figure 3-1. Total carbon stocks of forested assets (including forested wetlands) in tonnes of carbon.

Table 3-3 shows carbon storage, carbon density and area for forest assets (including treed wetlands) at Level 3. Per hectare carbon storage rates vary by growth rates and average age. Deciduous forests were estimated to be the most carbon dense. Tolerant hardwoods grow very well in the NPCA watershed and consequently were estimated, in general, to store the most carbon per hectare. Actual storage rates vary from forest stand to forest stand depending on productivity, age, and other factors. Overall, the forested assets within the NPCA were estimated to store over 13 million tonnes of carbon, with an average carbon density of 261 tonnes of carbon per hectare.

Table 3-3. Total carbon storage in tonnes by ELC Class.

ELC Class	Forested Area (hectares)	Total Carbon Storage (tonnes)	Carbon Density (tonnes carbon per hectare)
Deciduous Swamp	23,402	6,966,401	297
Deciduous Forest	14,351	4,255,965	292
Deciduous Thicket	3,854	562,565	142
Thicket Swamp	3,639	514,743	141
Deciduous Hedgerows	1,329	410,581	299
Mixed Forest	1,218	244,784	197
Deciduous Woodland	1,082	227,393	205
Treed Agriculture	1,048	153,020	142
Coniferous Forest	538	112,002	203
Mixed Swamp	458	62,384	136
Mixed Woodland	224	32,431	141
Coniferous Woodland	146	33,740	225
Coniferous Savanna	106	22,797	208
Mixed Thicket	95	13,841	142
Coniferous Hedgerows	65	14,021	208
Coniferous Swamp	38	9,340	244
Coniferous Thicket	37	7,937	208
Deciduous Savanna	30	7,112	230
Mixed Hedgerows	15	2,210	142
Mixed Savanna	10	2,030	188
Total	**51,685**	**13,539,320**	**261 (weighted average)**

3.3 Carbon Sequestration Results

Carbon sequestration rates are determined by the difference in the sum of the carbon stocks from the prior year to the most recent year. The rate at which assets grow in relation to decomposition determines the quantity of carbon accumulated each year. In the case of forests for example, young forests tend to accumulate carbon quickly in vigorously growing trees whereas older forests tend to store more carbon per hectare but accumulate very little carbon year over year as the accumulation rate more or less equals the decomposition rate in such forests.[4]

[4] For a more detailed description of the nuances of forest carbon sequestration see https://natural-resources.canada.ca/climate-change/climate-change-impacts-forests/forest-carbon/13085

Figure 3-2 displays forest carbon sequestration rates, per hectare per year, within the NPCA boundary. The darker the green, the higher the sequestration rate. Carbon sequestration rates of non-forested assets are displayed in Figure 3-3. Due to the significant role wetlands play in the carbon cycle within NPCA's jurisdiction a separate wetlands specific map is also provided (Figure 3-4). Wetlands accumulate significant amounts of carbon within their soil and vegetation. Note the carbon sequestration rates shown in this map were estimated using a combination of data from the literature review and outputs of the CBM-CFS3 model (for treed wetlands).

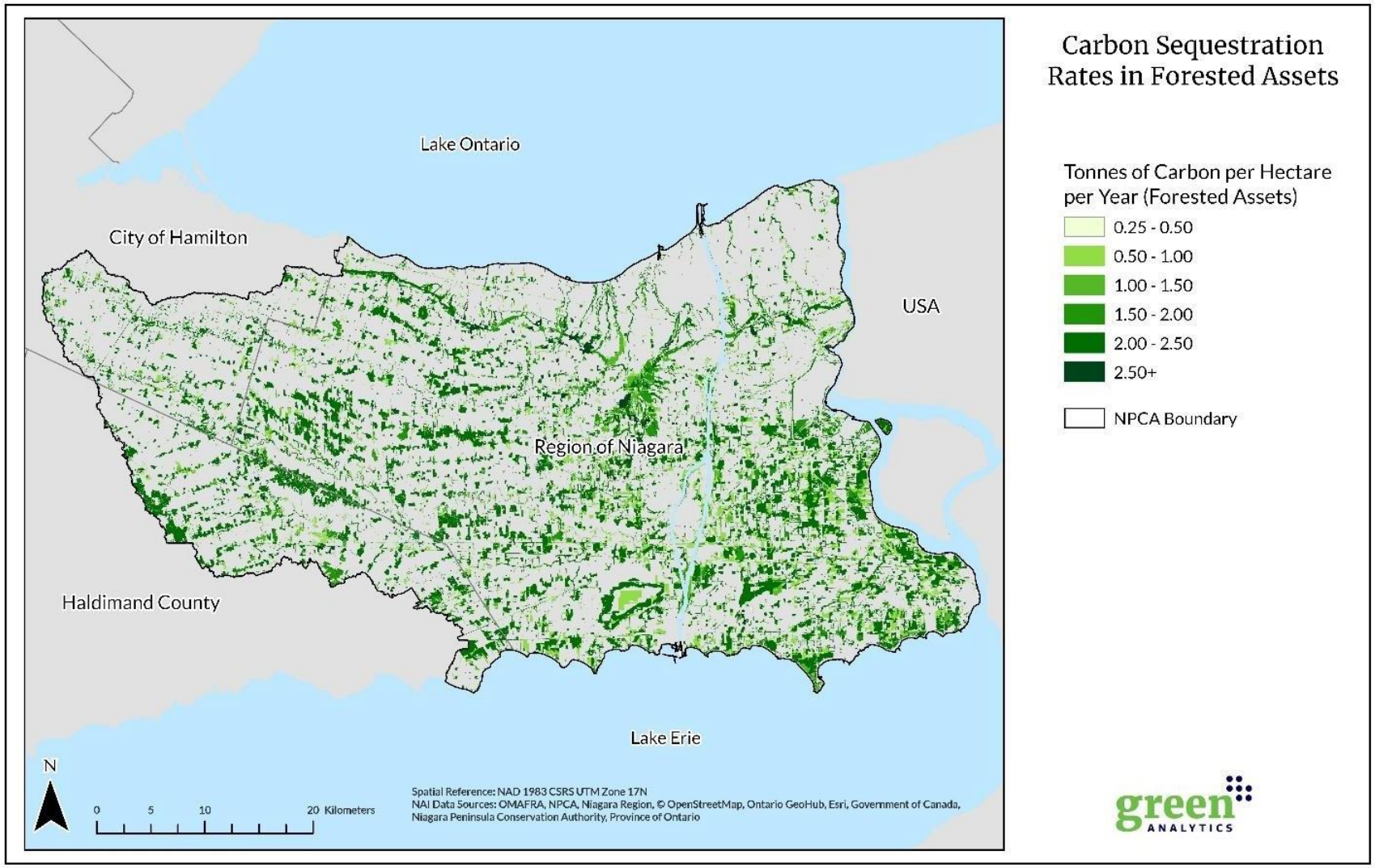

Figure 3-2. Carbon sequestration forested assets (including forested wetlands) classified by tonnes C / hectare / year.

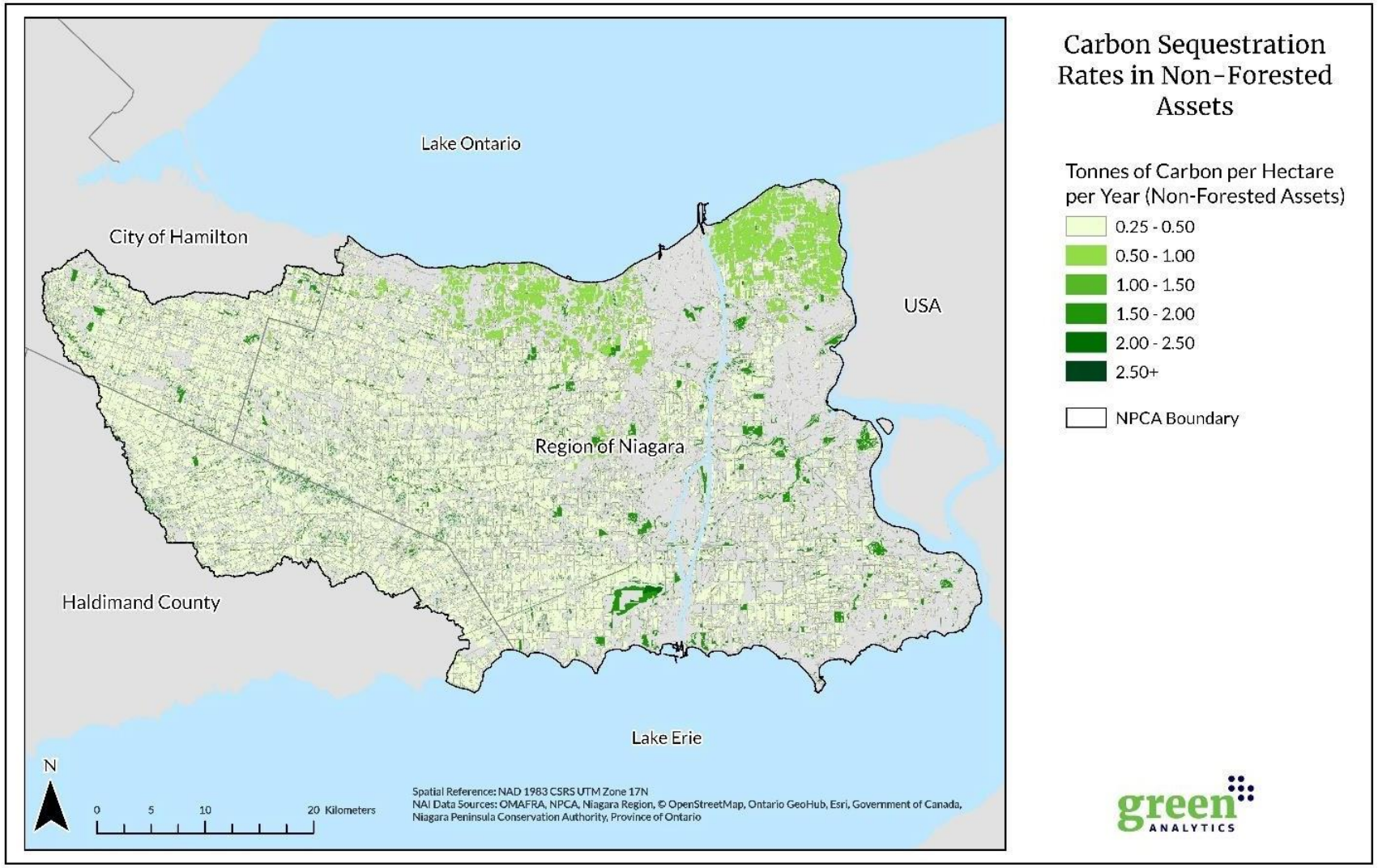

Figure 3-3. Carbon sequestration of non-forested assets.

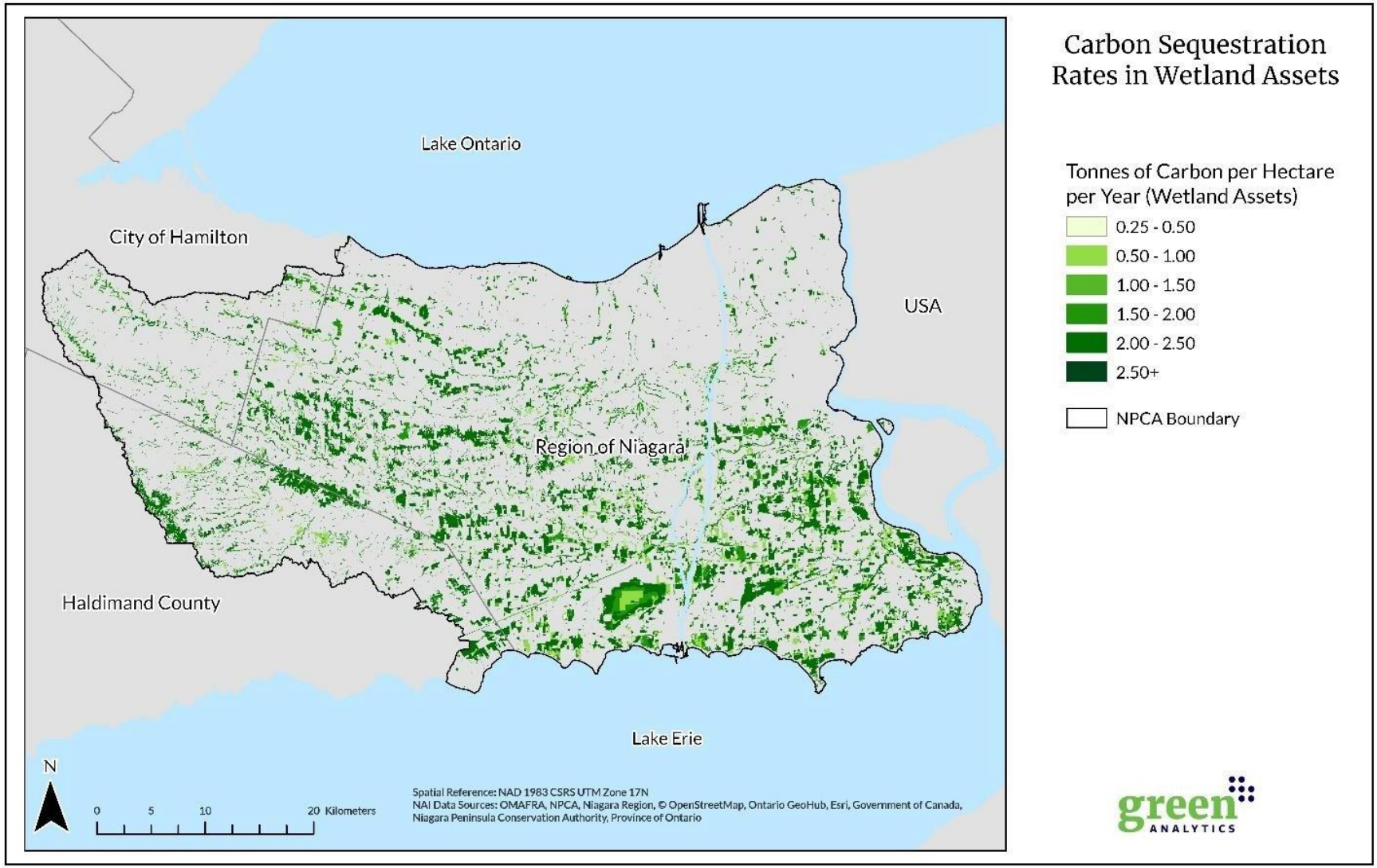

Figure 3-4. Carbon sequestration of wetland assets (both forest and non-forested wetlands).

4 Ecosystem Service Valuation

Ecosystem services are the benefits that nature provides to humans. Ecosystem services contribute to our well-being and economic health by providing clean air and water, food, materials for shelter and clothing, and natural resources for economic development. Additionally, these services play a crucial role in reducing environmental risks and regulating natural cycles in ways that sustain life (WWF Living Planet Report, 2016). Figure 4-1 depicts numerous ecosystem services categorized by the common service types: provisioning, regulating, supporting and cultural. Provisioning services are direct products derived from ecosystem such as food and water; regulating services result from natural processes like climate control and water regulation; supporting services are foundational services that are necessary for the provision of all other services such as soil formation and nutrient cycling; and cultural services capture things like recreational and spiritual benefits. The ecosystem services summarized in Figure 4-1 align closely with the classification used by The Economics of Ecosystem and Biodiversity (TEEB) which is aligned with the Millennium Ecosystem Assessment Framework that helped standardize the way we understand and assess ecosystem services.

Figure 4-1. Ecosystem services diagram (Source: WWF Living Planet Report 2016).

To understand the value of ecosystem services, it is important to conceptualize the link between an ecosystem's biophysical structure and function and the value humans derive from them. This is demonstrated through what is commonly referred to as the cascade model (Figure 4-2). Natural assets have biophysical structures and natural processes (e.g. wetland habitat and net primary productivity) that create ecosystem functions (e.g. slowing the passage of water). These functions generate the ecosystem services humans rely on (e.g. flood control) resulting in a benefit to humans (e.g. reduced flood risk). It is this benefit that a dollar value can be placed on (e.g. the value of avoided flood damages).

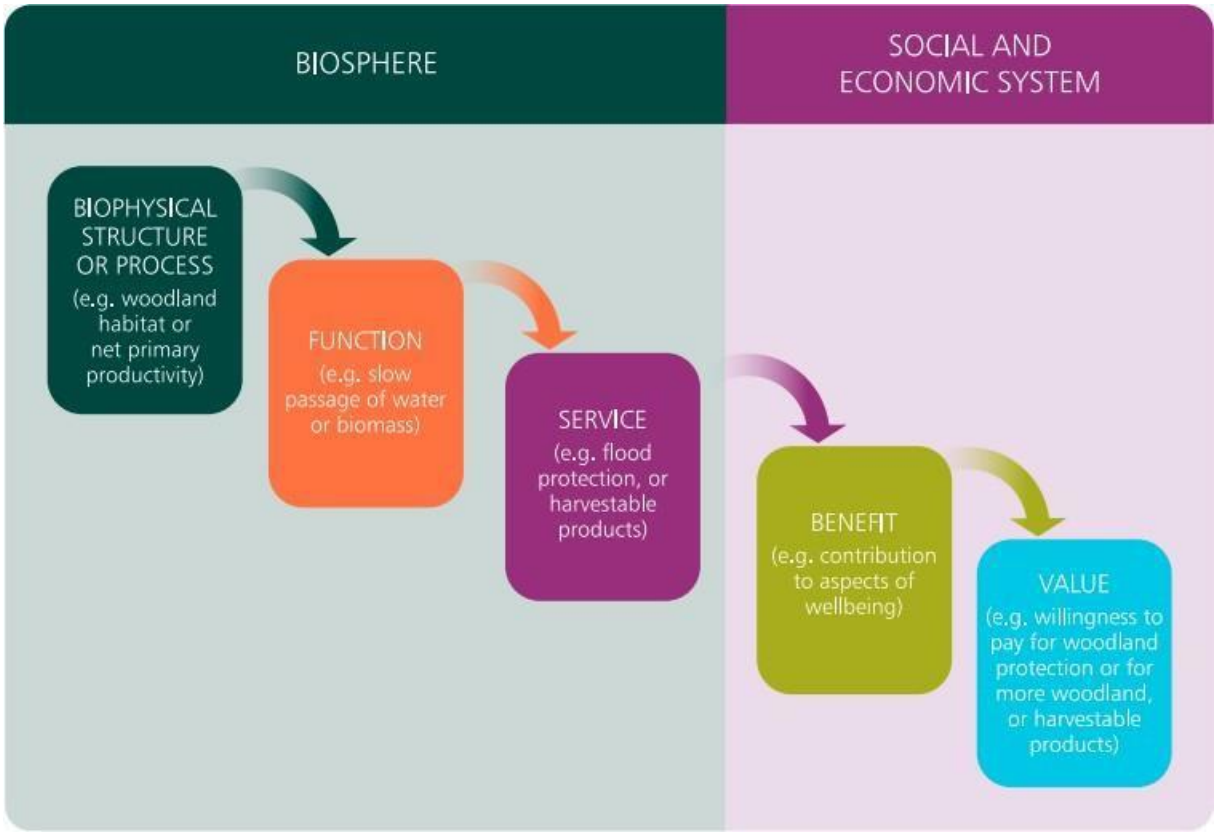

Figure 4-2. The cascade model depicts the framework used to value services from natural assets.

From the range of services identified in Figure 4-1, a number of priority ecosystem services were identified for valuation in the NPCA context. The services estimated for NPCA are summarized in Table 4-1. Valued services include the provision of recreational opportunities, natural asset contribution to carbon sequestration, air quality regulation, stormwater regulation, habitat preservation and wild pollinator habitat contribution to crop productivity.

Table 4-1. Ecosystem services valued as well as the focus of the valuation exercise.

Ecosystem Service	Focus of the Valuation
Provision of recreation opportunities	Enjoyment of recreation activities
Carbon sequestration	Value of carbon dioxide removed from the atmosphere.
Air quality regulation	Avoided costs associated with health issues derived from air pollution
Regulation of stormwater	Avoided stormwater management infrastructure costs
Preservation values	Value people place on knowing habitat (and associated biodiversity) is preserved
Contribution to crop productivity	Improved crop productivity generated from wild pollinators

The approaches employed to value the services varied by service type but, at a high-level, were based on existing norms and standards. In this regard, the valuation of the ecosystem services focused on the value of the final services provided to those who benefit from the services. Willingness to pay (WTP) is the common convention used to establish values for ecosystem services. To establish WTP, economists employ stated preference, revealed preference, or benefits transfer approaches. For this analysis, the benefits transfer approach that was applied varied depending on the service provided. The simplest approach is to apply a dollar per hectare transfer from one location to another. In the case of valuing recreation, a dollar per unit approach was more appropriate. For example, the value of recreation was estimated by applying a dollar per recreation user to the number of recreation users for a given set or sub-set of natural assets such as trails. Benefits functions were used for services like the value of air quality regulation where the distance between natural assets and population were considered.

4.1 Provision of Recreational Opportunities

Natural assets such as parks and woodlands contribute to human health and happiness. They provide unique settings for recreational activities like hiking, birdwatching, and picnicking as well as places for social and cultural interactions, which contribute to personal fulfillment and life satisfaction. Natural assets within the NPCA provide ample recreational opportunities.

To estimate the value of recreational opportunities within the NPCA, a value transfer approach was employed drawing on values published by the Spatial Informatics Group, LLC available on the Ontario government website (Voigt et al. 2013).[5] Voigt et al (2013) contains dollar per hectare estimates by land cover type. Per hectare values were updated to 2023 dollars[6] (from 2011) and applied to the number of hectares of each land cover type within the NPCA watershed.

The total value of recreational opportunities was estimated as $114 million per year in 2023 dollars. See Appendix D for a breakdown of values per hectare and the number of hectares by ELC land category.

4.2 Carbon Sequestration

Forests, wetlands, and various natural landscapes have the ability to sequester and store carbon, removing CO_2 from the atmosphere and lowering greenhouse gas levels. Natural assets within the NPCA, including greenspaces, forests, wetlands, and hedgerows actively sequester carbon.[7] Considering the natural assets as they existed in the NPCA as of 2023, the value of carbon sequestration from natural assets was estimated.

Drawing on the rates of carbon sequestration as estimated in the carbon storage and sequestration assessment (detailed in Section 3), the value of carbon sequestration was determined by applying a carbon price per unit of carbon sequestered. For this analysis, tonnes of carbon per hectare were converted to tonnes of carbon dioxide equivalent as carbon prices are reported in dollars per tCO_2e. 'Carbon dioxide equivalent', or 'CO_2e', describes the global warming potential of various other greenhouse gases relative to carbon dioxide as well as carbon dioxide itself.

[5] https://www.ontario.ca/page/ecosystem-service-values

[6] All dollar normalization in this report was based off the Statistics Canada Consumer Price Index tables, specifically the table 18- 10-0004-01, Geography of Ontario, yearly averages for 2011 and 2023, 2002 = 100 base year.

[7] The term "sequestration" of carbon dioxide in this context means capturing and storing atmospheric carbon dioxide through the process of photosynthesis which results in the fixation of carbon in organic matter (trees, shrubs, grasses, soils and other vegetation).

To convert to tCO_2e, each tonne of carbon was multiplied by the stoichiometric ratio of carbon to carbon dioxide (44/12).[8] In other words, every tonne of carbon sequestered by a natural asset means 3.67 tonnes of CO_2 have been removed from the atmosphere.[9]

To assign a monetary value to the carbon sequestration from the natural assets in the NPCA two prices of carbon were used. The first carbon price is the "National social cost of carbon" (SCC) for Canada. The second price is the "Minimum National Carbon Pollution Price." The SCC is defined as:

> "The SCC … estimates include damages from a variety of climate change impacts, including, but not limited to, changes in net agricultural productivity, human health effects, property damage from increased flood risk, disruption of energy systems, and the value of ecosystem services. Given that climate change damages are a function of the cumulative stock of GHG emissions, the SCC estimates increase over time as GHG emissions accumulate in the atmosphere. The SCC price increases over time because: a) there are larger incremental damages from future emissions as physical and economic systems become more stressed from greater climatic change, and b) income grows over time, meaning future impacts affect more wealth, and as income grows there is a higher willingness to pay to avoid economic damages."[10]

The value of the SCC used in this analysis was \$291/tCO_2e in 2023 Canadian dollars. The second carbon price corresponds to the Minimum National Carbon Pollution Price of \$65/tCO_2e (in 2023 dollars).[11] The Minimum National Carbon Pollution Price is defined as:

> "The Government of Canada published the Pan-Canadian Approach to Pricing Carbon Pollution (the federal 'benchmark') on October 3, 2016, which established Canada's approach to carbon pricing for the 2018-2022 period. It set out the principles on which the pan-Canadian approach to pricing carbon pollution is based, and established minimum national stringency criteria that all systems must meet to ensure they are comparable and effective.
>
> It also indicated that the federal carbon pollution pricing system (the 'backstop') would be applied in provinces and territories that request it or that do not implement a system that meets the benchmark. The federal backstop is an explicit price-based system composed of two parts, a fuel charge and an output-based pricing system for large industry. Where the federal backstop system is applied, all carbon pricing proceeds are returned to the jurisdiction of origin."

Figure 4-3 shows the spatial distribution of the value of carbon sequestration by the natural assets within the NPCA. **The total value of carbon sequestration in the NPCA was between \$38 million and \$171 million in 2023 dollars as per the minimum cost and social cost of carbon, respectively**.

[8] Carbon dioxide equivalent (CO_2e) is a measure of normalization of several different greenhouse gasses, such as nitrous oxide and methane, in which these different types of gasses are reported in one unit, CO_2e. In this analysis, there were no significant sources of nitrous oxide or methane and as such only the carbon sequestration rates were converted to CO_2e which makes the calculation simply tonnes of carbon multiplied by 44/12.

[9] Only carbon dioxide was considered in this analysis as there were no significant sources of methane or nitrous oxide produced by the natural assets.

[10] https://www.canada.ca/en/environment-climate-change/services/climate-change/science-research-data/social-cost-ghg.html#toc0

[11] https://www.gazette.gc.ca/rp-pr/p2/2023/2023-07-05/html/sor-dors129-eng.html

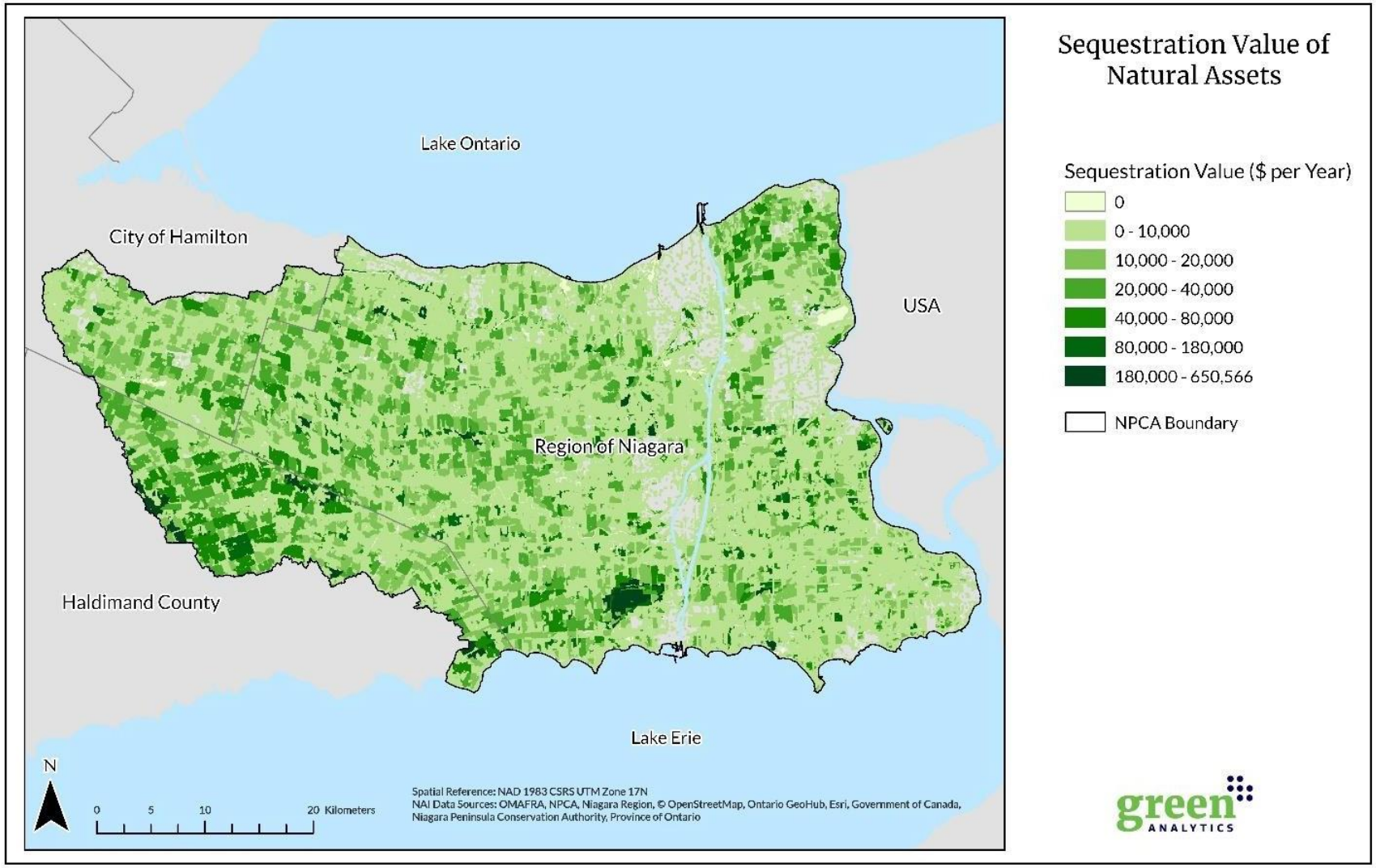

Figure 4-3. Natural assets mapped by value of carbon sequestration as valued by the SCC ($237M /year total).

4.3 Air Quality Regulation

Nature and natural assets have the potential to play a significant role in regulating air quality. Trees and plants in urban and rural areas act as natural air filters, absorbing pollutants, and particulates, contributing to cleaner, healthier air (Nowak et al., 2014). This improvement in air quality can reduce respiratory and cardiovascular health issues, increasing overall public health (Pataki et al., 2011).

The value of air quality regulation provided by the natural assets within the NPCA is based on an estimate of the avoided health care costs associated with exposure to air pollutants. The specific air pollutants considered in this analysis were nitrogen dioxide, ozone, sulfur dioxide and fine particulate matter smaller than 2.5 microns in size. Nitrogen dioxide, abbreviated NO_2, at elevated levels in the atmosphere can cause damage to peoples' respiratory tract and increase vulnerability to respiratory infections.[12] Ozone, abbreviated O_3, has similar effects on people as NO_2. People with asthma, or other respiratory conditions, suffer when exposed to areas with higher-than-normal concentrations of O_3. Fine particulate matter smaller than 2.5 microns in size, abbreviated PM2.5, has a similar effect on people as ozone and nitrogen dioxide, though it appears more severe than NO_2 and O_3. Exposure to elevated levels of PM2.5 has been linked to premature death in people with prior heart or lung diseases.[13] Sulfur dioxide, abbreviated SO_2, in high concentrations can cause multiple significant impacts on both people and plants. At sufficiently high concentrations, SO_2 can contribute to acid rain. Taken together, these emissions can significantly impact healthcare costs.

To establish an estimate of the value of air quality provided by the natural assets within the NPCA, regression equations developed by Nowak et al. (2014) were used. These equations account for the population densities of the municipalities within the NPCA watershed to estimate the avoided health care costs according to the number of people exposed to surrounding air quality. Nowak et al. (2014) built upon previous studies and produced well referenced estimates of the value of air pollutant removal by forest assets for each of the noted pollutants (NO_2, O_3, PM2.5, and SO_2). The focus of their study was on the leaf area index (the overall extent of tree foliage) of the forested assets and their ability to regulate pollutants. This resulted in specific regression equations which were used to estimate the value of air quality regulation based on population density and forest area (forest area and population density being the independent variables within the regression equations). While other types of natural assets (beyond forest assets) can play a role in regulating air quality, this analysis, given the approach employed, examined only forest assets. Consideration of additional assets would increase the value of air quality regulation provided by natural assets within the NPCA.

Table 4-2 summarizes the assumptions and regression equations from Nowak et al. (2014). Using NO_2 as an example, each hectare of forest is associated with 5.5 kg of NO_2 removal annually (Nowak et al. 2014). Thus, the volume of pollutant removal was established by multiplying the removal rate (per unit area) by the area of forest assets within the NPCA. The value per tonne (in 2023 dollars) of this removal was then determined by the equation $y=0.7208 + 0.6264(x)$ where x equaled the population density of the municipality in which the assets were present with population density measured as people per square kilometer. Using census subdivisions allowed for the spatial variation in population densities to be accounted for. The population density information for each of the municipalities within the NPCA boundary was dated 2021 and acquired from Statistics Canada's census datasets. The value per tonne was then applied to the overall tonnes of pollutants removed.

[12] https://www.qld.gov.au/environment/management/monitoring/air/air-pollution/pollutants/nitrogen-oxides

[13] https://ww2.arb.ca.gov/resources/inhalable-particulate-matter-and-health

Table 4-2. Nowak et al. (2014) equations and assumptions used in the current analysis.

Pollutant	Kg removed per ha of tree cover	Value function y = dollars per tonne x = people per km^2
Nitrogen Dioxide (NO_2)	5.5	y = 0.7298 + 0.6264x (r^2 = 0.91)
Ozone (O_3)	54.9	y = 9.4667 + 3.5089x (r^2 = 0.86)
Fine Particular Matter < 2.5µ (PM25)	2.7	y = 428.0011 + 121.7864x (r^2 = 0.83)
Sulphur Dioxide (SO_2)	3.5	y = 0.1442 + 0.1493x (r^2 = 0.86)

The geographic distribution of the assets providing air quality value is displayed in Figure 4-4. See Appendix D for a detailed breakdown of air quality values by Census areas within the NPCA jurisdiction. **The total yearly value of air quality regulation by the 51,684 hectares of forested assets in the NPCA watershed in 2023 dollars was $8.5 million (Figure 4-4).**

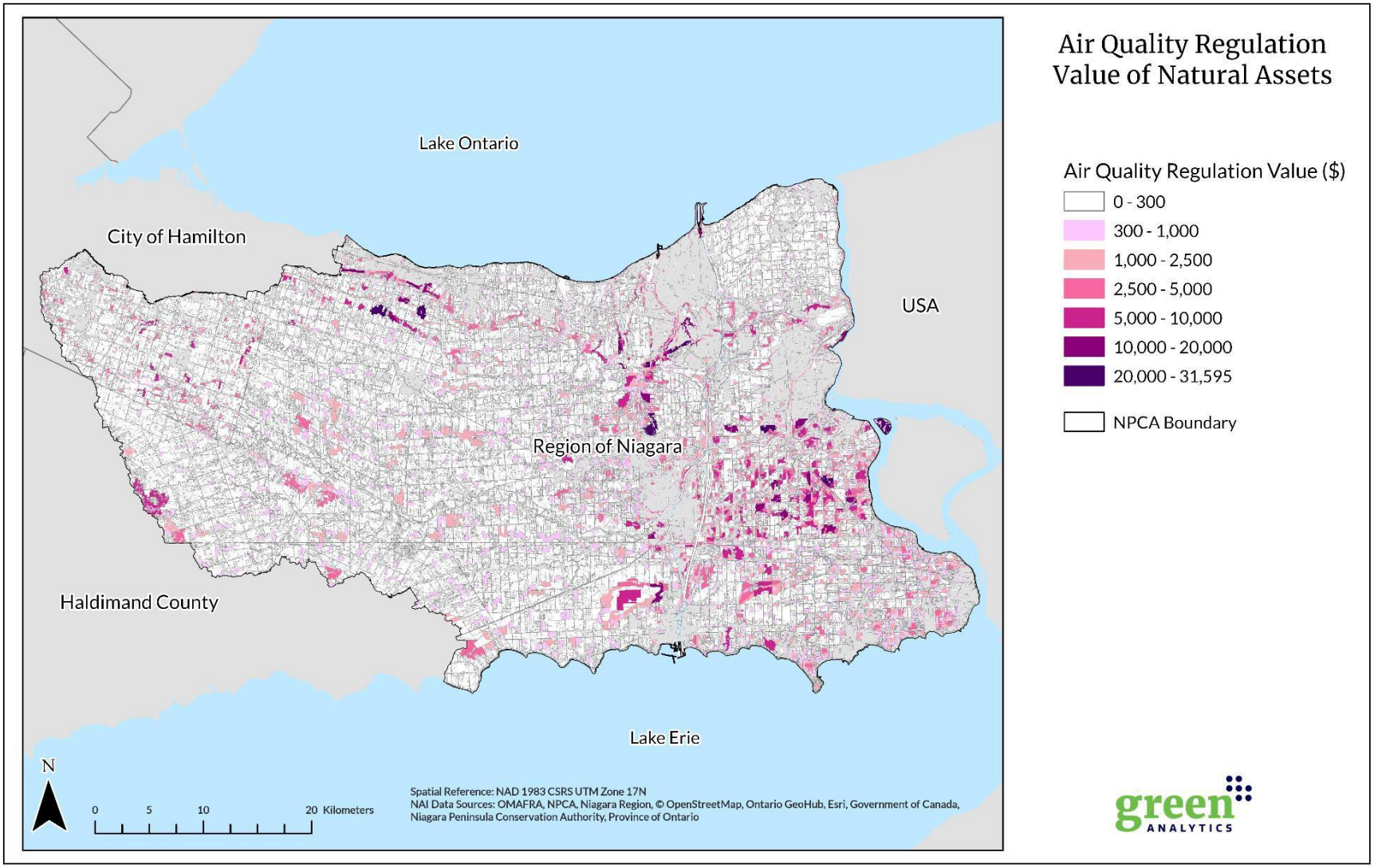

Figure 4-4. Natural assets categorized by air quality regulation value.

4.4 Stormwater Regulation

Natural assets play a crucial role in stormwater regulation contributing to the management of water runoff, flood prevention, and water quality improvements. Trees and forests reduce stormwater runoff by capturing and storing rainfall in the canopy and releasing water into the atmosphere through evapotranspiration. Additionally, tree roots and leaf litter create soil conditions that promote the infiltration of rainwater into the soil. This helps to replenish the groundwater supply and maintain stream flow during dry periods. The presence of trees also helps to slow down and temporarily store runoff, which further promotes infiltration, and decreases flooding and erosion downstream (Saini et al. 2018). Wetlands receive stormwater from upland sources and hold large volumes of water in situ before slowly releasing it to streams, lakes, and rivers. They act as an important buffer system to stormwater regulation.

The value of stormwater regulation was based on the ability of natural assets to control and absorb water during low frequency heavy rain events. Following work done by Saini et al. (2018) from the Peel Pilot Study, forests, meadows and wetlands in the NPCA were assigned a value per hectare based on their ability to abate stormwater. This analysis assumed that site characteristics in the Peel pilot site were suitably scalable to NPCA natural assets, and that stormwater services monetized in the Peel/Credit Valley subwatersheds were similar to services provided in NCPA subwatersheds. This analysis also assumed that the bulk of the wetlands within the NPCA region are similar to palustrine wetlands and meadows are similar to open space features as reported by Saini et al. (2018). It is recognized that the hydrologic conditions and context of these two regions of southern Ontario are likely to differ and thus the service values are likely to be different as well. That said, the Peel estimates provide a reasonable order of magnitude estimate for NPCAs assets that can be used to demonstrate the potential value of stormwater regulation services for the NPCA. Hydrological modelling of the NPCA watershed would be needed to get a more refined and locally-explicit valuation.

Table 4-3 shows the value of stormwater regulation by the natural assets within the NPCA boundary depending on the area of the three types of asset classes providing value. **The value was estimated at nearly $103 million per year in 2023 dollars.** Figure 4-5 demonstrates the spatial distribution of the stormwater regulation service value for the natural assets within the NPCA watershed.

Table 4-3. Total value of stormwater prevention due to natural asset presence within the NPCA watershed.

Asset Type	Hectares	$/ Hectare	$ / Year
Forests and Hedgerows	24,149	$2,064	$ 49,830,367
Meadow	5,137	$741	$3,805,068
Wetlands	33,960	$1,446	$49,112,792
Totals	**63,246**	**N/A**	**$102,748,227**

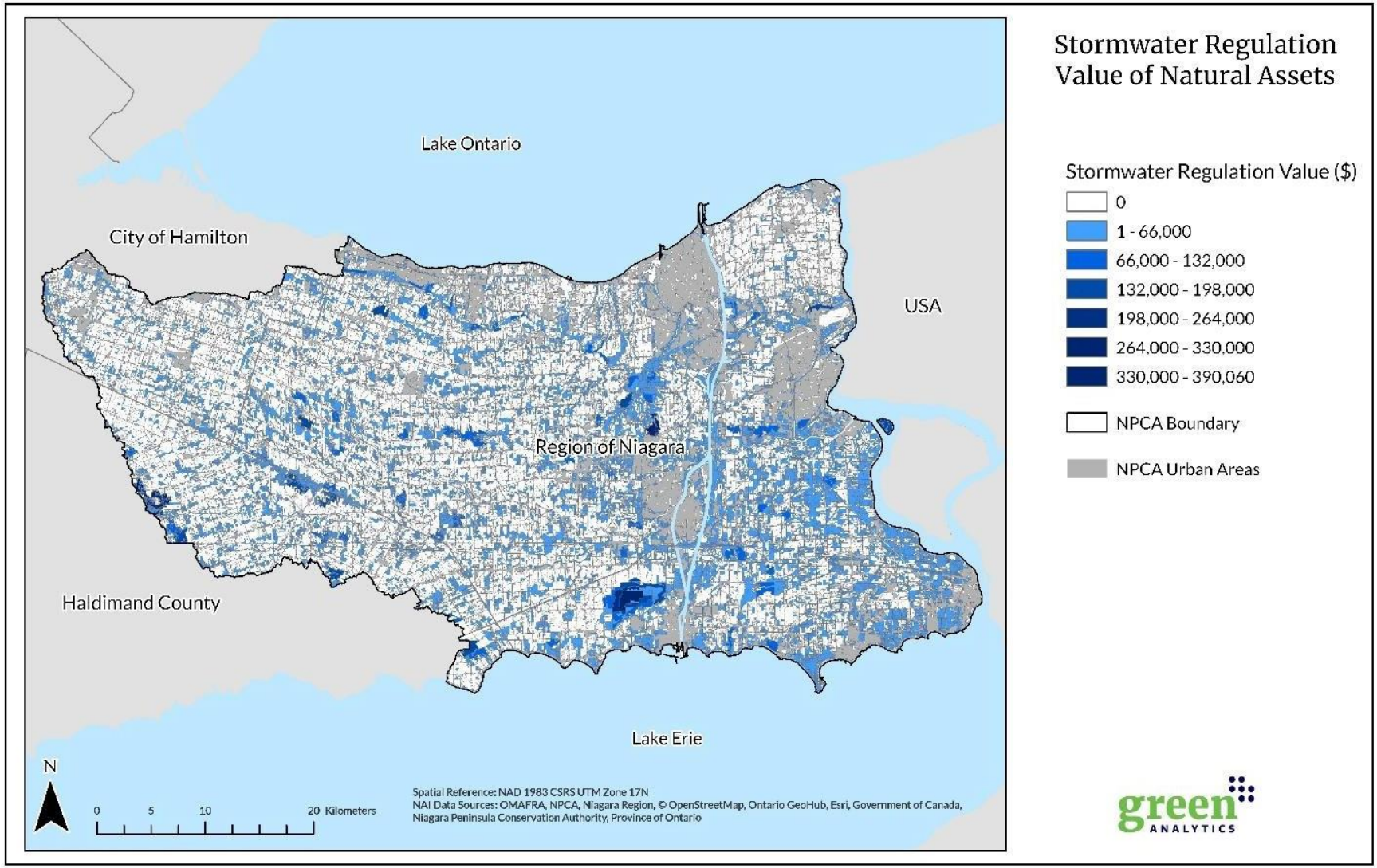

Figure 4-5. Natural assets categorized by stormwater regulation value.

4.5 Habitat Preservation

Habitat preservation supports biodiversity and maintains ecosystem balance. Conserved areas protect various species and their habitats, ensuring ecological stability and resilience (Cardinale et al., 2012). Habitat preservation enhances human well-being through the provision of clean air and water, and recreational and educational opportunities (Keniger et al., 2013). Habitat preservation is also fundamental to sustaining the flow of other ecosystem services. While biodiversity itself is difficult to value, environmental economics acknowledges the value people place on preserving nature and habitats using WTP for conservation efforts.

The value of habitat preservation for NPCA relied on the work done by Brander and Koetse (2011) who determined the preservation value of urban and peri-urban greenspaces. Brander and Koetse defined open spaces as urban parks, forests, green spaces, undeveloped lands, and agriculture lands. They noted that the results of their analyses would be transferable to other locations by substituting information on the parameter values for specific sites. It was within this context that their regression equation was applied to the natural assets within the NPCA region. The areas within the NPCA which were assumed to contribute to the value of habitat preservation are shown in Table 4-4.[14]

Table 4-4. Assets which provide Habitat Preservation Values.

Asset Types	Area (hectares)
Forest	22,740
Meadow	5,137
Shoreline	182
Wetland	33,960
Subtotal	**62,018**

Brander and Koetse (2011) use regression analysis to articulate a mathematical function that can be used to estimate the value of open spaces in other jurisdictions. Their regression function is based on a meta-analysis of several studies exploring the WTP to preserve these areas for recreation, preservation, and aesthetic values. Their mathematical function can be used to estimate the value of habitat preservation by substituting regression parameters with NPCA-specific data. The function was parameterized to focus only on preservation values (ignoring recreation and aesthetic values).

To apply the regression equation to the natural assets within the NPCA's watershed, data for area of natural assets, gross domestic product per capita and population density were populated with NPCA-specific data. The result was an estimate of the value of natural assets measured in dollars per hectare, which was applied to the hectares of natural assets (noted in Table 4-4) within the NPCA watershed. **Specifically, a value of $443 per hectare was applied to the area of assets (62,018 ha) and a total value of habitat preservation was estimated at $27 million per year in 2023 dollars.**

4.6 Contribution to Crop Productivity (Wild Pollination)

Pollination plays an essential role in enhancing agricultural productivity. Wild pollinators, such as honeybees, stingless bees, bumble bees, solitary bees, wasps, hover flies, beetles, thrips, and some bird species (Klein et al. 2006) contribute to the success of agricultural production by pollinating agricultural crops. Natural pollination not only boosts crop yields but also supports the economic stability of the

[14] Note that not all asset types are presumed to provide habitat preservation hence the total area presented here does not align with the total area of assets captured in the inventory.

agricultural sector, benefiting human livelihoods and health (Aizen et al., 2009).

To estimate the contribution of wild pollinators to crop productivity within the NPCA jurisdiction, the agricultural assets within the NPCA watershed were buffered by an assumed pollinator foraging range of 1,500 m (AAFC 2014) to identify crops within the range of wild pollinators. The crop types were reviewed to determine those that are dependent on wild pollination and allocated a pollination crop dependency based on research by Aizen et al. (2009, 2019) and Klein et al. (2006, 2007). Crop dependency indicates how dependent crop yields are on wild pollination. Table 4-5 describes the 5 broad classes of pollinator dependency. As an example, apple crops have a high dependency (between 40% and 90%) on wild pollinators (Aizen et al. 2019, Klein et al., 2007), meaning that in the absence of wild pollinators, between 40% and 90% of the apple crop yield would be lost (Aizen et al. 2009). To infer the value of the influence of wild pollinators on pollinator-dependent crops, the midpoint impact percentage was applied to the yearly harvest values for each crop type. For example, if apple crops were estimated at $100,000 per year, then a 65% (mid-point between 40% and 90%) impact would reduce the value of the apple yield to $35,000, and thus the value of the wild pollinators would equal the value of the lost yield or $65,000 in this example.

Table 4-5. Assumptions on the impact of wild pollinators on crop production.

Crop Dependency				
Level	**Dependence**	**Upper**	**Midpoint**	**Lower**
0	None	0%	0%	0%
1	Little	10%	5%	0%
2	Modest	40%	25%	10%
3	High	90%	65%	40%
4	Essential	100%	95%	90%

Not all crops found within the NPCA region require wild pollination, some crops such as corn and winter wheat are wind pollinated. Table 4-6 displays the assumptions used to value wild pollinators' impact on crops in the NPCA watershed based on the research of Aizen et al. (2019) and Klein et al. (2007). Note that Table 4-6 summarizes the most detailed crop distinction that could be achieved with the available data. The NPCA region is well known for its fruit production (orchards and berries). Additional assumptions were needed to capture their importance; these are summarized in the footnotes to Table 4-6.

Agriculture statistics were used to establish average Ontario crop production values per hectare for the crops noted in the table below. Average production values ($/ha) for each crop type were established based on a 5-year average from 2019-2023 (the most recent years for which data is available). The 5-year average was used to smooth out annual fluctuations in crop values. The 5-year range also aligned well with the spatial crop data which was based on 2022 crop conditions. Total crop values were approximated by multiplying the average production value by the area of each crop. To determine the value of wild pollinators, the total crop value was multiplied by the assumed yield impact. This provided an estimate of the contribution to crop productivity provided by wild pollinators. Table 4-7 summarizes the final crop types included in the assessment with their dependency on wild pollinators, the price per bushel, the average bushels per hectare, their area in hectares and the estimated value of wild pollination. **The total value of wild pollination to crop productivity was estimated to be approximately $42 million per year.** The spatial distribution of the value provided by wild pollinators is shown in Figure 4-6.

Table 4-6. Wild pollinator impact assumptions.

Crop Type	Area (hectares)	Dependence	Description
Soybeans	66,596	2	Modest
Pasture/forage	16,543	N/A	Unknown
Corn	14,977	0	None
Winter wheat	3,369	0	None
Vineyards	1,919	0	None
Sod	555	0	None
Orchards[15]	553	2 / 3	High / Modest
Oats	275	0	none
Canola/rapeseed	136	2	Modest
Nursery	118	N/A	Unknown
Rye	116	0	None
Barley	95	0	None
Fallow	88	0	None
Other vegetables[16]	70	1 / 4	Little / Essential
Sunflower[17]	39	2	Modest
Beans	23	1	Little
Spring wheat	20	0	None
Other berries[18]	20	2	Modest to High
Greenhouse	17	0	None
Blueberry	9	3	High
Ginseng	2	0	None
Sorghum	1	0	None
Subtotal:	**105,542**		

[15] Orchards were assumed to include peaches, apples, cherries, pears, and plums. Pears and peaches have a modest dependance and apples, cherries and plums have a high dependence. An average dependence factor was used for this category.
[16] Other vegetables were assumed to be pumpkins and tomatoes. Pumpkins have an Essential dependence on wild pollinators while tomatoes have a Low dependence. An average of these two categories was used.
[17] Note that due to data limitation, the role of natural assets in supporting sunflower production is not included in the table below.
[18] Other berries were assumed to be strawberries (modest dependance) and blueberries (high dependence). An average dependence factor based on each crop was used for this category.

Table 4-7. Wild pollinator values by crop types.

Crop Type	Dependency	Pollinator influence percentage	Yield (bushels /hectare)	Price ($/bushel)	Area (hectares)	Pollinator Value ($ thousands)
Soybeans	Modest	25%	121.3	$15	66,596	$31,954
Orchards	High / Modest	45%	12.7	$3,140	553	$ 9,936
Other vegetables	Essential / Little	50%	54.9	$376	70	$725
Canola/rapeseed	Modest	25%	2.9	$2,282	136	$221
Other berries	Modest	25%	8.0	$5,335	20	$208
Blueberry	High	65%	2.9	$5,844	9	$102
Beans	Little	5%	8.0	$714	23	$7
Subtotal					**67,407**	**$42,153**

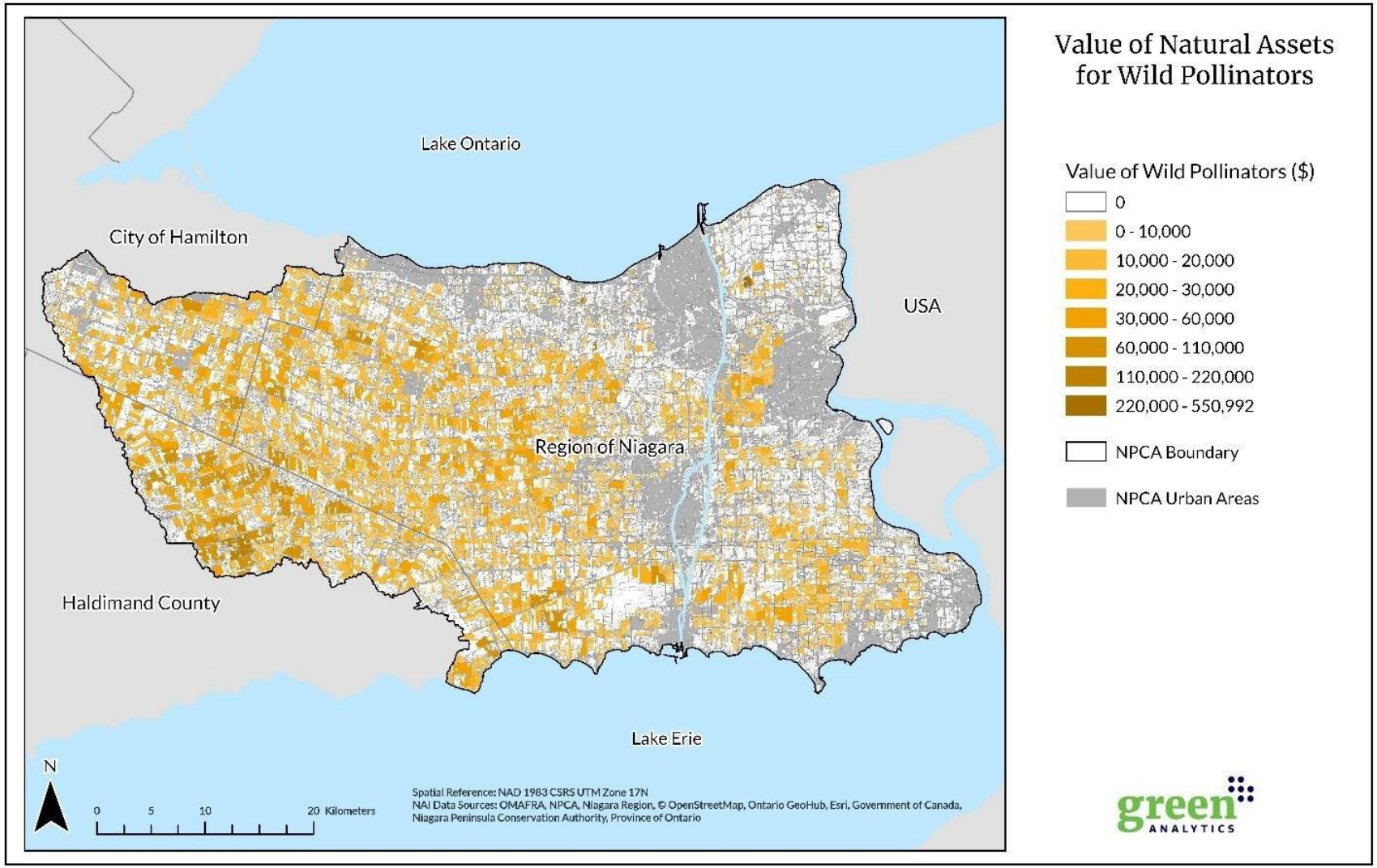

Figure 4-6. Natural assets categorized by value of wild pollinators

4.7 Ecosystem Service Valuation Summary

Ecosystem services, though often overlooked, contribute to the well-being of residents throughout the NPCA jurisdiction. Wetlands, meadows, hedgerows, and forests reduce flood risks, improve air quality, and sequester and store carbon emissions. Wild pollinator habitat contribute to crop production, which is particularly relevant in the NPCA where fruit production is a significant economic driver. Natural assets provide habitat for biodiversity preservation and places for people to recreate.

The ecosystem services valued through this assessment are estimated at between $331 million and $463 million per year (Table 4-8). It should be noted that this is only a subset of the services being provided by natural assets (as noted in Figure 4-1). As such, this value should be considered an underestimate of the true value of services provided by natural assets.

Table 4-8. Summary of ecosystem service values for the natural assets within the NPCA watershed.

	Value (2023 $ million CDN)	
Ecosystem Service	**Low Estimate**	**High Estimate**
Recreation Opportunities	114	114
Carbon Sequestration	38	170
Air Quality Regulation	9	9
Stormwater Regulation	103	103
Habitat / Biodiversity	27	27
Crop Production/Wild Pollinators	40	40
Total	**331**	**463**

Recreation and stormwater management were the most valuable of these services. Agriculture, recreation, and tourism are major economic drivers for this region, highlighting the dependence of the economy on natural features and assets. This, in addition to other benefits such as carbon sequestration and stormwater regulation, highlights the importance of protecting, monitoring, and maintaining natural assets to ensure the region can continue to benefit from the services over the long term.

5 Fort Erie Case Study Summary

A key deliverable for this project was the completion of a natural asset assessment for the Town of Fort Erie. The resulting "State of Infrastructure" report provides an evaluation of the municipality's natural assets and their capacity to deliver services. This report offers insights into the registry, condition, risks, levels of service, ecosystem service valuations, and replacement costs associated with Fort Erie's natural assets, which include various land covers such as forests, wetlands, and water bodies. This information will help the Town of Fort Erie meet its asset management planning requirements for green infrastructure under Ontario Regulation 588/17.

Key findings:

- **Natural Asset Inventory**: The assets in Fort Erie owned and managed lands are comprised of three asset classes: agriculture assets, which span 171.19 ha or 26.16% of the total area of assets; natural assets, which cover 373.18 ha or 57.41% of the asset area; and enhanced assets, which cover 110.05 ha or 16.82% of the total area of assets. The natural asset category includes various asset types such as aquatic areas, forests, hedgerows, meadows, shorelines, and wetlands, with wetlands being the largest component at 33.51% of the 373.18 ha of natural assets.
- **Condition Assessment:** The condition assessment revealed that the Town of Fort Erie's natural assets are predominantly in good or fair condition, with 94% classified within these categories. Wetlands are generally in good condition, while forest and aquatic assets are often in fair condition. Additionally, 77.62% of urban trees are in good condition.
- **Risk Assessment**: The risk assessment identified several threats to the integrity and functionality of the natural assets**.** Key risks include invasive species, erosion, and climate-induced changes such as increased flooding and extreme weather events. The majority of the Town of Fort Erie's natural assets face a moderate risk (91.8%) from potential hazards, with a small percent facing high (6.4%) or very high risks (1.0%). Shorelines mostly exhibit very high risk levels. Wetlands, meadows, and aquatic assets have a significant portion under moderate risks.
- **Levels of Service**: The levels of service analysis identified key performance metrics for service delivery from natural assets including metrics for stormwater management, air quality improvements, and recreational spaces.
- **Asset Replacement**: The replacement cost analysis underscores the financial investment required to restore natural assets speaking to the need for conservation and effective management to ensure continued service delivery from assets over time. The overall and per unit replacement costs for assets owned and managed by the town were estimated to exceed $115 million.
- **Ecosystem Services Values**: A valuation of some of the ecosystem services provided by Fort Erie's natural assets illustrates their contribution to the wellbeing of local citizens. The analysis quantified benefits such as carbon sequestration, water regulation, and habitat provision. The estimated annual value of services provided by natural assets owned by the Town of Fort Erie ranges from $5.6 million to $6.5 million.

6 Conclusion

This report summarizes the findings of an assessment of the natural assets within the NPCA watershed. The assessment focused on foundational components of natural asset management, including the delineation and quantification of assets, a condition assessment, an assessment of carbon storage and sequestration and an asset and ecosystem service valuation. The key findings from the assessment include:

- **Asset Inventory**: The assets within the NPCA boundary were categorized into natural, enhanced, and agricultural assets.
  - Agriculture assets encompass 125,317 ha, accounting for 51.6% of the total asset area.
  - Natural assets cover 67,211 ha, making up 27.6% of the asset area.
  - Enhanced assets extend over 7,734 ha, representing 3.2% of the total asset area.
- **Condition Assessment**: The condition assessment indicated that the NPCA's natural assets, including forests, wetlands, and waterbodies, are largely in fair or good condition.
  - The majority of NPCA's natural assets are classified as good or fair, with over 98% falling into these categories.
  - Detailed findings show that wetlands are generally rated as good, while other natural assets tend to be rated as fair.
- **Asset Replacement:** The replacement cost assessment highlights the financial investment needed to restore natural assets if they are lost.
  - According to per unit restoration cost provided by Beacon Environmental 2020, the total replacement cost for the major natural assets in the NPCA exceeds $10.1 billion , with forest replacement costs accounting for the highest portion of this cost.
- **Carbon Sequestration Assessment**: Carbon sequestration and storage were assessed for both forested and non-forested asset classes in the NPCA.
  - The carbon sequestration rates for forested assets within the NPCA boundary ranged from 0.25 to over 2.5 tonnes of carbon per hectare per year. Sequestration rates for non-forested asset classes were determined from literature review and vary by asset type.
  - The total carbon storage for forested assets exceeds 13 million tonnes, and the weighted average carbon density is about 261 tonnes per hectare. Storage values were not derived for non-forest assets.
- **Ecosystem Service Values:** A valuation of a subset of ecosystem services provided by NPCA's natural assets was carried out for benefits such as recreational opportunities, carbon sequestration, and air quality regulation.
  - The estimated annual value of these services provided by the natural assets in the NPCA ranges from $330.5 million to $462.5 million.
  - This estimate is considered conservative as it does not reflect the full range of services provided by the natural assets within the NPCA.
- **Fort Erie Case Study:** The Fort Erie case study demonstrates how a municipality can evaluate the state of their natural assets and their capacity to deliver services. It provides insights into the asset registry, condition assessment, risk assessment, ecosystem service valuation, and replacement cost valuation for Fort Erie's natural assets.

To ensure the continued delivery of the significant services provided by the natural assets within the NPCA jurisdiction, these assets will need to be monitored and maintained over time. This will require collaboration with municipal partners, private landowners, other stakeholders and rightsholders. While the NPCA does not have direct control over all the natural assets within the NPCA watershed, the natural asset inventory combined with an increased understanding of the services those assets provide will position the NPCA to support the plans, programs, policies and coordination needed to ensure natural assets

are monitored and maintained over the long term.

To further enhance the management and preservation of natural assets within the NPCA watershed, several approaches could be considered:

- Build a robust and frequent monitoring strategy with regular updates to the natural asset inventory and condition and risk assessments to detect changes over time, enabling proactive management and early identification of threats for timely intervention.
- Establish an integrated database management strategy to ensure key data inputs are regularly updated and linked. This should include supporting datasets like watercourse data, making future updates more efficient.
- Expand the desktop condition assessment to include an ecological condition indicator. This may require data collection on species composition, habitat quality, and/or invasive species.
- Establish a field-based condition assessment checklist or form to directly evaluate the condition of NPCA's natural assets efficiently and effectively at regular intervals. The desktop assessment can continue to be used between field assessments and adjusted based on field findings.
- Undertake educational programs on the role and benefits of natural assets to engage local communities in natural asset management.

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7 Appendix A: Datasets

Table 7-1. Dataset descriptions.

File Name	Source	Purpose
NPCA_ELC_20221121	NPCA	The series description was used as the main landcover sourcefor identifying natural areas
2K_Hydropoly_NPCA.shp	NPCA	Used to capture open water and wetlands not represented inthe ELC or other datasets, given priority over ELC for water features.
Vineyards_Orchards_2023.shp	Niagara Region	Used to identify and classify areas as ELC agricultural areas, primarily vineyards and orchards.
Built_up_Area	Ontario GeoHub	Used to fill in landcover where ELC was not present (imperviousand pervious areas).
gis_osm_landuse_a_free_1.shp	Open Street Map (© OpenStreetMap, Available with OpenDatabase license) (http://download.geofabrik.de/north-america/canada.html)	Used to help classify areas as Built-up Pervious in the study area.
gis_osm_pois_a_free_1.shp	Open Street Map (© OpenStreetMap, Available with OpenDatabase license) (http://download.geofabrik.de/north-america/canada.html)	Used to help classify golf courses in the study area.
gis_osm_traffic_a_free_1.shp	Open Street Map (© OpenStreetMap, Available with OpenDatabase license) (http://download.geofabrik.de/north-america/canada.html)	Used to help classify parking lots in the study area.
SOLRIS_Version_3_0_LAMBERT	Ontario GeoHub	Used to help identify the location of excavation sites to remove from the asset inventory.
Annual_Crop_Inv_2022.tif	OMAFRA	Used to divide areas by crop type and assign crop type toAgricultural assets. Crops included Soybeans, Corn, Winter Wheat, Grapes, Cherries, Apples, Pears, Plums, Blueberries, Canola/Rapeseed, Oats, Rye, Barley, Beans, Cabbages, Pumpkins, Strawberries, Ginseng, Sorghum, Spring Wheat, Sunflowers, etc.
UAB.shp	NPCA	Used to help reclassify areas as Built-up Pervious in the urbancentres.

File Name	Source	Purpose
17T_20220101-20230101.tif	ESRI	Used as base file for land cover classification.
NRN_ON_15_0_ROADSEG.shp	National RoadNetwork - NRN - GeoBase Series - Open Government Portal (canada.ca)	Used to delineate roads from natural areas in the study area.
NRWN_ON_2_0_TRACK.shp	National RailwayNetwork - NRWN -GeoBase Series - Open Government Portal (canada.ca)	Used to delineate railways from natural areas in the study area.
OLCC_V2	Ontario GeoHub	Used to fill in landcover where ELC not present (as an input forBuilt-up Pervious areas).
Municipal_Boundaries	NPCA	Used to split assets by municipality boundaries. Extent ofPelham polygon in this file was used for the study area boundary.
Subwatershed_Areas_2K_NPCA.shp	NPCA	Used to divide asset by subwatershed boundaries.
Watershed_Planning_Areas_NPCA.shp	NPCA	Used to split natural assets by watersheds and map/summarizenatural assets by watershed in the inventory dashboard
Conservation_Areas	Niagara Peninsula Conservation Authority	Used to subdivide assets by conservation area boundaries.
ARCGIS_zoning	NPCA	Used to subdivide assets in Fort Erie by zoning type.
ARCGIS_ministerZoning	NPCA	Used to subdivide assets in Fort Erie by zoning type.
ARCGIS_ecOverlayZone	NPCA	Used to subdivide assets in Fort Erie by zoning type.
Hydrography_10K_HydroEdge_NPCA.shp	NPCA	Used for assessment of watercourse connectivity.
Contemporary_Mapping_of_Watercourses_Flowline_Direction_NPCA.shp	NPCA	Used to define water areas and as a separate inventory forshorelines.

8 Appendix B: NPCA Asset Inventory at Level 3

Table 8-1. NPCA asset inventory at Level 3.

ELC Class (Level 3)	Assets within the NPCA (ha)
Agricultural Infrastructure	2.73
Agriculture and Undifferentiated Rural Land Use	9,533.32
Agriculture Crop Defined	105,541.66
Canal	720.88
Cemetery	263.53
Coniferous Forest	537.51
Coniferous Hedgerows	65.21
Coniferous Savanna	106.03
Coniferous Swamp	38.27
Coniferous Thicket	36.91
Coniferous Woodland	145.55
Deciduous Forest	14,351.45
Deciduous Hedgerows	1,328.61
Deciduous Savanna	30.05
Deciduous Swamp	23,401.53
Deciduous Thicket	3,853.96
Deciduous Woodland	1,081.83
Floating-leaved Shallow Aquatic	17.44
Forb Meadow	4.10
Golf	1,939.29
Graminoid Meadow	68.74
Green Lands	0.55
Marsh (Unknown Type)	1,521.97
Meadow Marsh	3,277.11
Mixed Forest	1,218.28
Mixed Grasses	195.79
Mixed Hedgerows	15.15
Mixed Meadow	5,063.97
Mixed Pervious	2,368.23
Mixed Pervious Surfaces (UAB)	838.87
Mixed Ponds	119.74
Mixed Savanna	10.47
Mixed Shallow Aquatic	7.67
Mixed Swamp	457.68
Mixed Thicket	94.87
Mixed Woodland	224.23
Open Agriculture	106.94

ELC Class (Level 3)	Assets within the NPCA (ha)
Open Aquatic	411.45
Open Bluff	5.53
Open Cliff	0.23
Open Rock Barren	10.67
Open Shoreline	147.62
Open Talus	1.40
Open Water	1.71
Open Water (Varied Type)	4,128.47
Park	1,111.81
Reservoir	290.25
Shallow Marsh	1,126.04
Shrub Agriculture	10,131.89
Shrub Bluff	7.00
Shrub Bog	100.85
Shrub Cliff	0.14
Shrub Rock Barren	4.71
Shrub Shoreline	9.60
Shrub Talus	5.86
Submerged Shallow Aquatic	7.90
SWM Pond	4.39
Thicket Bog	363.98
Thicket Swamp	3,639.21
Treed Agriculture	1,048.43
Treed Bluff	24.31
Treed Cliff	57.26
Treed Rock Barren	4.30
Treed Sand Barren and Dune	3.22
Treed Shoreline	25.19
Treed Talus	2.10
Water (ESRI)	7.58

9 Appendix C: Condition Methods

This appendix contains details on the condition assessment approach. The condition indicators were applied to natural assets identified in Table 2-1.

9.1 Interior Habitat

INDICATOR: The relative size of contiguous natural asset areas with larger patches that have more interior area considered higher quality than smaller patches.

RATIONALE: The objective of this indicator is to create a proxy for condition, based on the relative size of contiguous patches of natural assets. In general, larger blocks of habitat (whether they be meadow, forest, and/or wetland) tend to support a greater diversity of plants and wildlife, including habitat specialists that require, or benefit from, conditions only found somewhat removed from a non-natural land cover type (e.g., roads, residential, institutional, or commercial development). In an urbanized context, as the distance from the edge of a natural area to the interior of that area decreases, the penetration of noise and other human-related disturbances and encroachments that can negatively impact certain species associated with those habitats increases (Environment Canada 2013). Given this context, and recognizing the landscape ecology principle, large "blocks" of habitat generally provide a greater range of better-quality habitats, a scoring system was developed as described below.

APPROACH: "Interior" habitat – at least in woodlands - is typically measured starting at 100 m inwards from the feature or "patch" edge (e.g., Environment Canada 2013). The first step is thus to establish the "patch" edge, which can be defined at level 1 (no distinction between asset types) or Level 2 (distinguishing between asset types). In urban settings, Level 1 is generally used because the distribution of natural land cover in segmented environments results in smaller natural assets. At the same time, due to the NPCA jurisdiction being much larger than individual cities or towns, and the notable prevalence of large forests and wetlands in the study area, using Level 2 as the basis for the patches is also reasonable. For this study, Level 2 (Asset Type) boundaries were used.

SCORING: Ratings were allocated as follows:

- Very Good: An asset within a habitat patch with an interior area measured >200 m from the feature edge
- Good: An asset within a habitat patch with an interior area measured 150-200 m from the feature edge and not already captured as "very good"
- Fair: An asset within a habitat patch with an interior area measured 100-149 m from the feature edge and not already captured as "very good" or "good"
- Poor: An asset within a habitat patch with an interior area measured 50-99 m from the feature edge and not already captured as "very good", "good", or "fair"
- Very Poor: Any asset with no interior area measured at <50 m from the feature edge

RESULTS: Table 9-1 and Figure 9-1 summarize the interior habitat condition rating. The large green areas demonstrate the significant portion of natural assets that ranked very good according to this indicator. These assets have interior areas located 200 m or greater from the edge of the asset. However, due to how narrow much of the landscape is due to segmentation of natural cover by agriculture, roads, and other features, a greater proportion of the areas rank poor or very poor.

Table 9-1. Area of natural assets by natural area patch size rating.

Condition Rating	Natural Assets within the NPCA (ha)	Portion of Total Natural Asset Inventory
Very Good	14,163	21%
Good	6,877	10%
Fair	10,903	16%
Poor	16,406	24%
Very Poor	18,861	28%
Total	**67,211**	**100%**

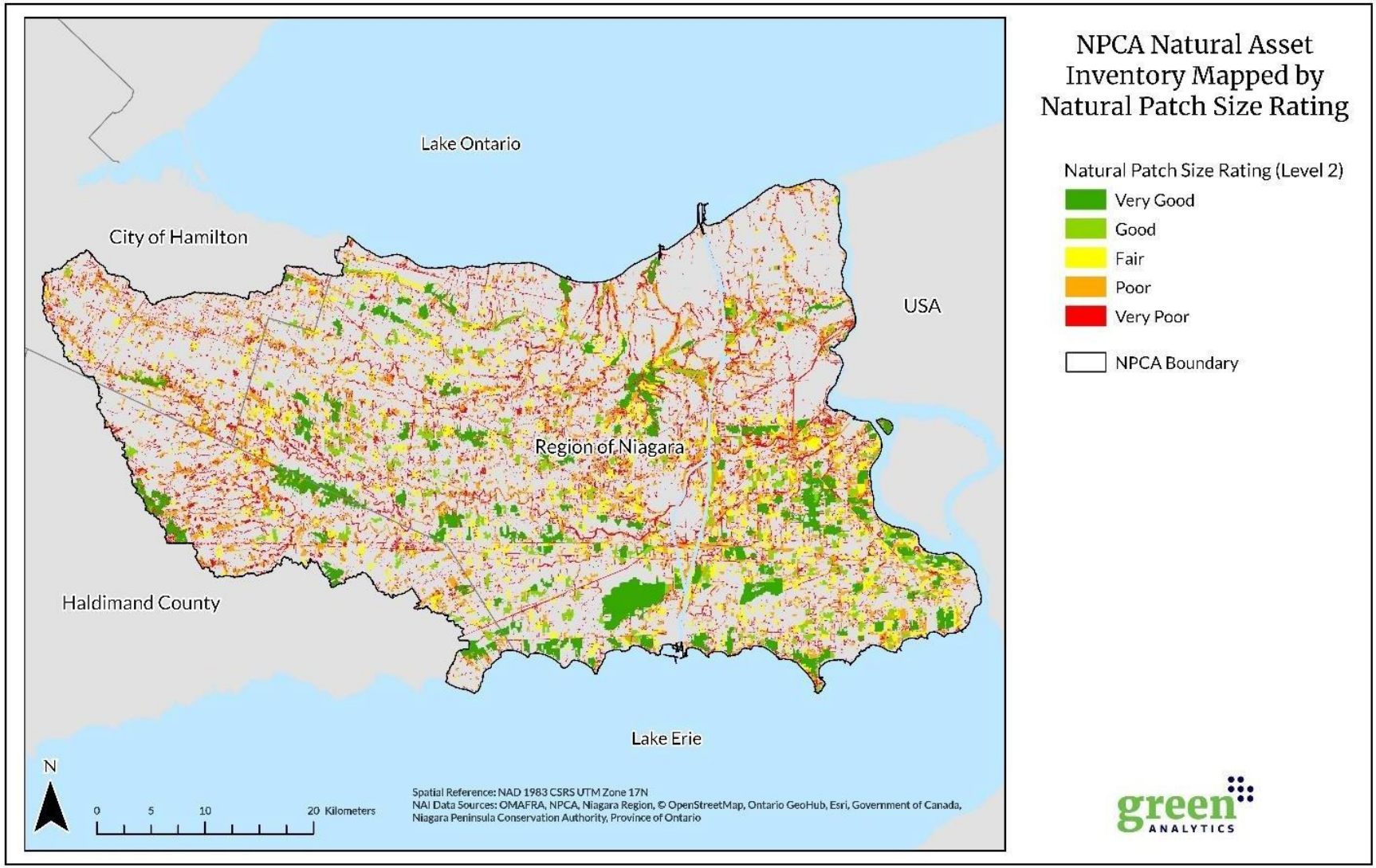

Figure 9-1. Natural asset inventory categorized by natural patch size rating.

9.2 Natural Area Patch Shape

INDICATOR: The shape of natural asset areas, with patches that are more round considered higher quality than smaller patches that are more linear.

RATIONALE: Many negative effects from human land uses occur at feature edges. Impacts at edges can include light and noise, access for invasive species, dumping, domestic animals and encroachment. Features with shapes that reduce the amount of edge are expected to have lower levels of potential edge effects. Given a certain size threshold, compact patch shapes should protect interior habitat against detrimental edge effects because these forms have low edge-to-interior ratios. Conversely, convoluted and elongated patches have high edge-to-interior ratios.

APPROACH: This analysis is performed at Level 2. To determine the compactness ratio on an asset, the following formula is utilized:

sqrt (Area of patch / area of a circle with the same circumference (perimeter))

The resulting values are calculated as a value between or equal to 0 and 1, where 1 has the lowest possible edge to interior (a circle) and scores decrease as edge increases.

SCORING: Condition Scores based on Compactness Ratio:

- Very Good: >0.8 and ≤1.0
- Good: > 0.6 and ≤ 0.8
- Fair: > 0.4 and ≤ 0.6
- Poor: > 0.2 and ≤ 0.4
- Very Poor: ≤ 0.2

RESULTS: Table 9-2 shows the condition rating breakdown by area. The rating for this metric is dominantly fair and poor. The results of the natural area patch shape assessment are also demonstrated in Figure 9-2.

Table 9-2. Condition breakdown of patch shape result.

Condition Rating	Natural Assets within the NPCA (ha)	Portion of Total Natural Asset Inventory
Very Good	2,096	3%
Good	7,231	11%
Fair	16,983	25%
Poor	30,930	46%
Very Poor	9,971	15%
Total	**67,211**	**100%**

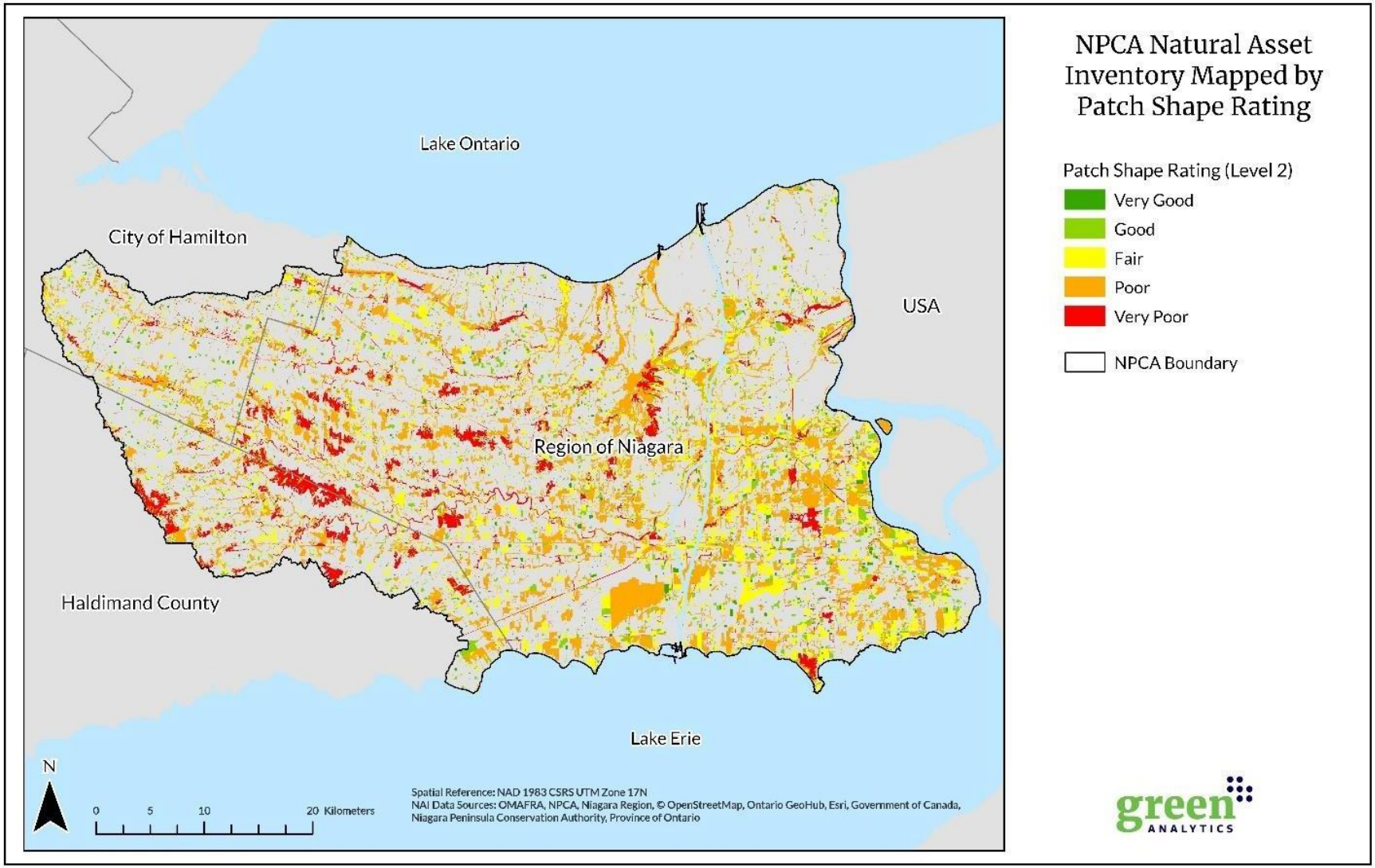

Figure 9-2. Natural asset inventory categorized by natural patch shape rating.

9.3 Road Density

INDICATOR: Density of roads within 120 m of the terrestrial natural assets with higher road density ranking less favorably.

RATIONALE: Roads both adjacent to and within natural areas are known to cause negative impacts to natural features and their functions because they contribute directly to fragmentation, introduce noise and pollutants associated with vehicles, and provide vectors that facilitate human access to these features, which can result in additional encroachments and impacts (e.g., Environment Canada 2013, Government of Ontario 2010). The objective of this indicator is to capture the relative level of human use/activity occurring in the lands adjacent to terrestrial natural features (including wetlands) as reflected in road density.

APPROACH: To develop locally appropriate road density ranges aligned with the five condition score ratings (i.e., very good, good, fair, poor, and very poor) the range of local road densities were assessed alongside research completed by DeCatanzaro and Chow-Fraser (2010). DeCatanzaro and Chow-Fraser (2010) demonstrate that for 77 marsh sites along the coast of Lakes Erie, Ontario, and Huron that the water quality index (WQI) and wetland macrophyte index (WMI) scores were highly negatively correlated with surrounding road densities. Their results show the highest road density was 102 m/ha (or 10.2 km/km^2). Given the correlation to condition indices noted above, it was assumed that 10 km/km^2 would be the threshold for very poor. Similarly, their lowest road density estimates for Lake Ontario 7.16 m/ha (or 0.72 km/km^2) was assumed to be the threshold between good and very good. Drawing on an assessment of the distribution of road densities associated with natural assets within the inventory, the other categories thresholds were assumed as outlined below.

SCORING: Road density was assessed within 120 m of the natural assets mapped at Level 1. Rankings were assigned as per the following:

- Very good: 0 to 0.7 km/km^2
- Good: 0.8 to 2.9 km/km^2
- Fair: 3 to 6.9 km/km^2
- Poor: 7 to 10 km/km^2 = Poor
- Very poor: > 10 km/km^2

RESULTS: Table 9-3 presents the condition rating breakdown by area. Most assets (88%) are rated as fair or better, an expected result as most of the NPCA area is outside of large urban centers and in more rural settings, with an overall lighter presence of roads. However, those areas closer to urban centers are consistently lower in rating, including those just around the periphery of an urban area. This can be seen in Figure 9-3, which demonstrates the spatial distribution of condition scores.

Table 9-3. Condition breakdown by road density.

Condition Rating	Natural Assets within the NPCA (ha)	Portion of Total Natural Asset Inventory
Very Good	5,142	8%
Good	24,202	36%
Fair	29,570	44%
Poor	5,848	9%
Very Poor	2,449	4%
Total	**67,211**	**100%**

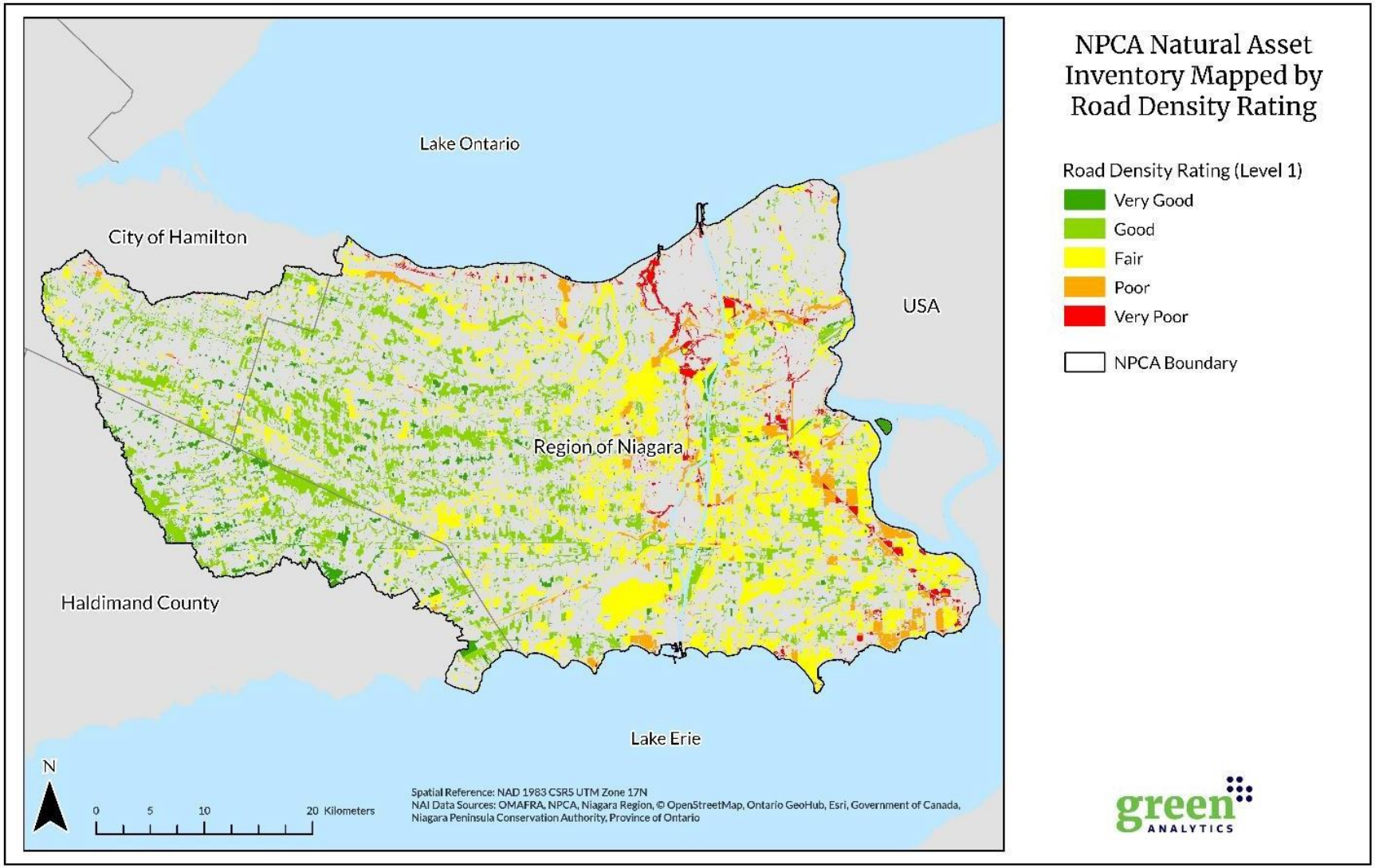

Figure 9-3. Natural asset inventory categorized by road density rating.

9.4 Natural Asset Proximity to Watercourses

INDICATOR: Distance between each asset and the nearest watercourse with assets in closer proximity rating higher than those further away.

RATIONALE: In addition to a natural assets size (interior habitat) and shape, its location in relation to other natural assets within a given area also influences the types of ecological functions it can provide. Proximity of a terrestrial natural asset to a watercourse network, or having a hydrologic feature within a terrestrial asset, is generally considered positive. Environment Canada's habitat guidelines for southern Ontario (Environment Canada 2013) and the Province's Natural Heritage Reference Manual (MNRF 2010) ascribe ecological significance to terrestrial habitats that contain or are close to hydrological features such as wetlands that occur within floodplains (which are associated with watercourses), woodlands with wetlands and/or watercourses within them, and grassland/meadow habitats adjacent or close to riparian and/or wetland habitats. Areas adjacent or near watercourses are also an indicator of improved connectivity. Specific distances / thresholds cited in these documents as heightening feature functions are as follows:

- Naturalized riparian habitat within at least 30 m of a watercourse edge (i.e., top of bank) (EC 2013), and
- Woodlands within 50 m of a watercourse (MNRF 2010).

In addition, 120 m is the standard distance used for considering adjacency to an identified natural asset in terms of the lands within which negative impacts to an asset may occur. These distances are used to inform the condition scoring noted below. The 120 m distance was doubled to 240 m as a basis for the poor and very poor thresholds.

APPROACH: The closest distance between watercourse lines and natural assets at Level 3 were measured.

SCORING: Ratings were allocated as follows:

- Very Good: Asset directly intersects watercourse.
- Good: Asset is within 30 m of a watercourse but does not directly intersect it.
- Fair: Asset is within 30 - 120 m of a watercourse.
- Poor: Asset is within 120 – 240 m of a watercourse.
- Very Poor: Asset is greater than 240 m away from a watercourse.

RESULTS: Sixty-one percent of natural assets within the NPCA directly intersect a watercourse asset as is shown in Table 9-4. Note, however, that the data employed to assess this condition indicator includes ephemeral streams. Given this, the result is potentially more favorable than if such streams were excluded from the analysis. Figure 9-4 demonstrates the spatial distribution of the proximity to watercourses indicator results.

Table 9-4. Area of natural assets by proximity to watercourse rating.

Condition Rating	Natural Assets within the NPCA (ha)	Portion of Total Natural Asset Inventory
Very Good	40,972	61%
Good	7,634	11%
Fair	7,120	11%
Poor	5,362	8%
Very Poor	6,123	9%
Total	**67,211**	**100%**

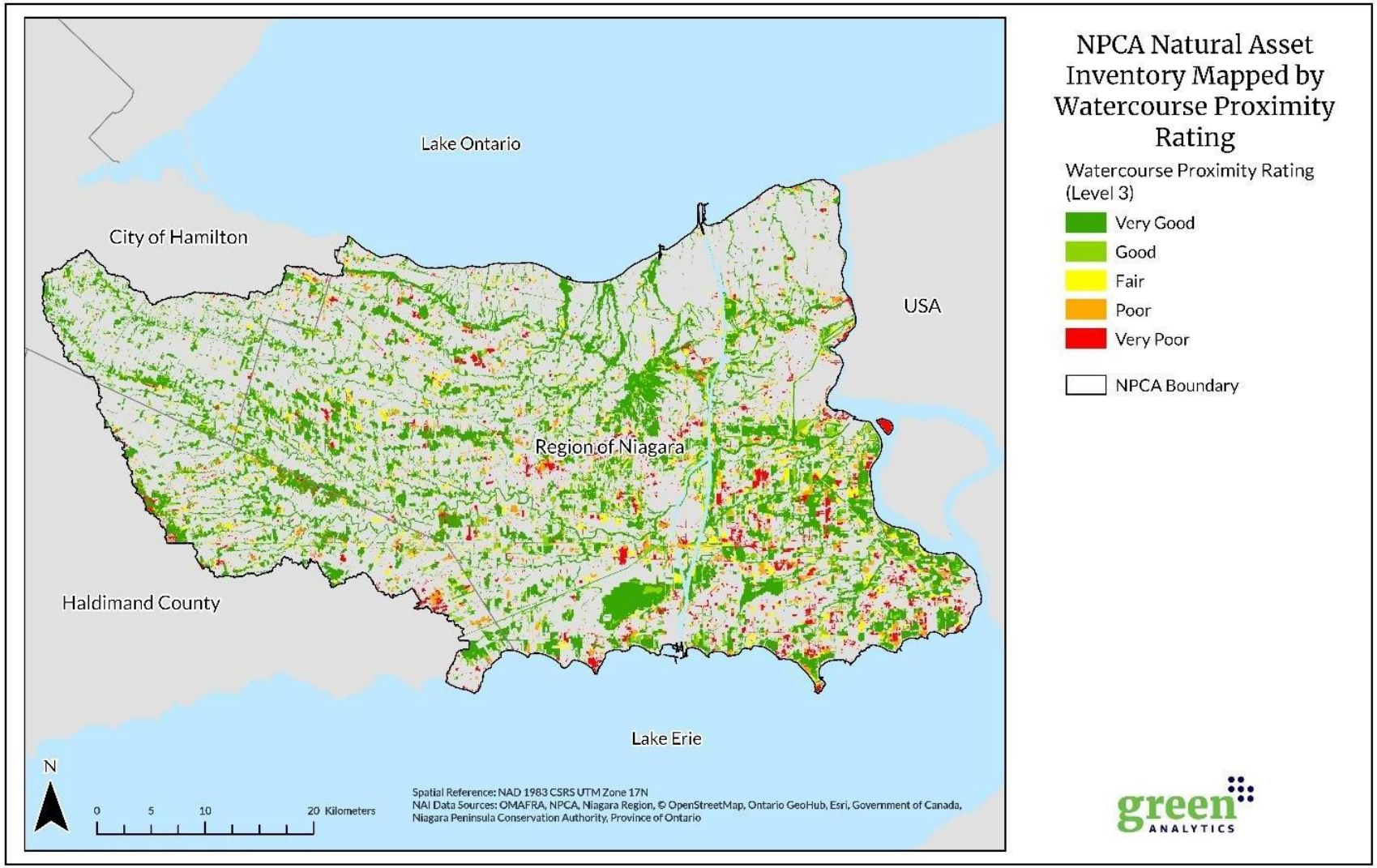

Figure 9-4. Natural asset inventory categorized by watercourse proximity rating.

9.5 Forest Proximity to Other Natural Assets

INDICATOR: A measure of the proximity of Level 2 forest assets to other Level 2 forest or wetland assets with assets in closer proximity rating higher than those further away.

RATIONALE: According to research by Environment Canada (2013):

- For forest birds, research has found that habitats near other natural areas support more species than isolated habitats of the same size, and that some species with large home ranges may use several patches instead of one large area.
- In landscapes with relatively low forest cover overall, species diversity and survivorship increase when the remaining habitat patches are larger and more clumped or aggregated.
- Based on the limited available science, the isolation between forest patches for forest birds generally occurs at about five kilometres, but for amphibians at between one and two kilometres. For forest plants, some level of immediate proximity is required.

APPROACH: Each Level 2 forest asset was buffered by the condition rating thresholds noted below and the appropriate rating was applied based on the closest buffer where another Level 2 forest or wetland asset was found.

SCORING: Based on the research noted by Environment Canada (2013) and the associated proximities, condition ratings were assigned as follows:

- Very good: Level 2 forest assets < 1 km from any other Level 2 forest or wetland asset
- Good: Level 2 forest assets within 1 to 2 km of any other Level 2 forest or wetland asset
- Fair: Level 2 forest assets within 2 to 3 km of any other Level 2 forest or wetland asset
- Poor: Level 2 forest assets within 3 to 5 km of any other Level 2 forest or wetland asset
- Very poor: Level 2 forest are > 5 km from any other Level 2 forest or wetland asset

RESULTS: Table 9-5 shows the area of assets by condition rating for the forest proximity indicator demonstrating that virtually all forest assets are within 1 km of other natural assets within the NPCA. This indicates that all the forested assets are relatively near each other, providing a network of natural assets for species living in these areas. Figure 9-5 demonstrates the spatial distribution of the results of the forest proximity indicator. Note, this indicator is applied to forest assets only (33.83% of the total natural asset inventory).

Table 9-5. Area of natural assets by forest proximity rating.

Condition Rating	Natural Assets within the NPCA (ha)	Portion of Total Natural Asset Inventory
Very Good	22,739	33.83%
Good	0.64	0.00%
Fair	0	0%
Poor	0	0%
Very Poor	0	0%
Total Assets Assessed	**22,740**	**33.83%**

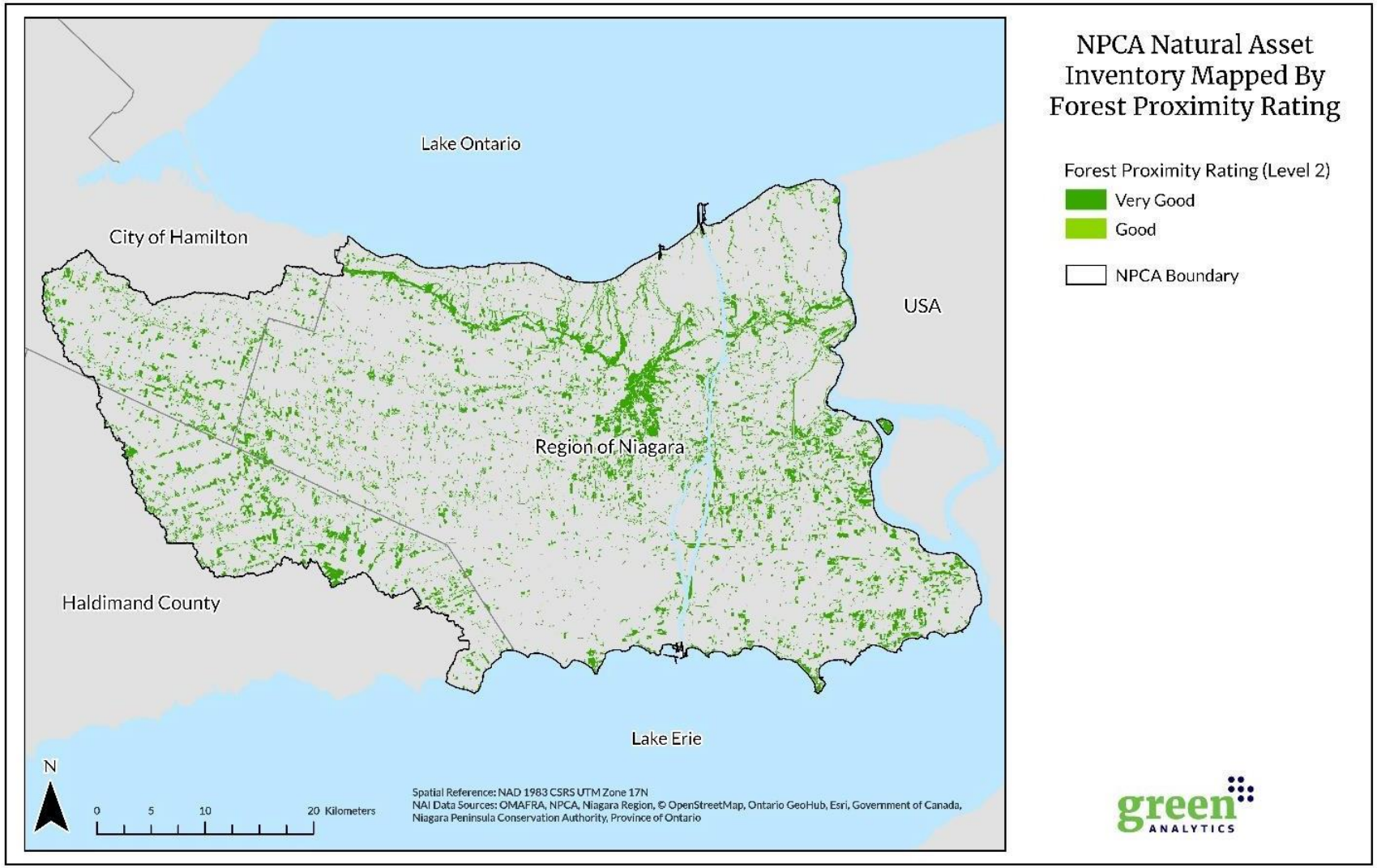

Figure 9-5.Natural asset inventory categorized by forest proximity rating.

9.6 Wetland Proximity to Other Natural Assets

INDICATOR: A measure of the proximity of Level 2 wetland assets to other Level 2 wetland or forest assets with assets in closer proximity rating higher than those further away.

RATIONALE: According to research documented by Environment Canada (2013):

- Fragmentation of wetland habitats degrades their functions by reducing habitat for species that are less tolerant of disturbances, that require more contiguous habitat, or both.
- Some of the negative impacts of fragmentation can be offset, at least for some species, by maintaining concentrations of natural habitat fragments in close proximity.
- The importance of adjacent natural areas, as well as proximity between patches of wetland, has been recognized for several wildlife species.
- Proximity distances range depending on the species from less than 500 m for turtles and spotted salamanders to as large as 3 km for birds.

APPROACH: Each Level 2 wetland asset was buffered by the condition rating thresholds noted below and the appropriate rating was applied based on the closest buffer where another Level 2 forest or wetland asset was found.

SCORING: Based on the research noted by Environment Canada (2013) and the associated proximities, condition ratings were assigned as follows:

- Very good: Level 2 wetland assets < 0.5 km from any other Level 2 forest or wetland asset
- Good: Level 2 wetland assets within 0.5 to 1 km of any other Level 2 forest or wetland asset
- Fair: Level 2 wetland assets within 1 to 2 km of any other Level 2 forest or wetland asset
- Poor: Level 2 wetland assets within 2 to 3 km of any other Level 2 forest or wetland asset
- Very poor: Level 2 wetlands are > 3 km from any other Level 2 forest or wetland asset

RESULTS: Table 9-6 shows the asset areas by condition ratings for the wetland proximity indicator. Wetland assets within the NPCA were rated good or very good meaning that wetlands are within 0.5 km of other natural assets. Figure 9-6 demonstrates the spatial distribution of the results. Note, this indicator was applied to wetland assets only (50.53% of the total natural asset inventory).

Table 9-6. Area of natural assets by proximity to wetland proximity rating.

Condition Rating	Natural Assets within the NPCA (ha)	Portion of Total Natural Asset Inventory
Very Good	33,952	50.52%
Good	8	0.01%
Fair	0	0%
Poor	0	0%
Very Poor	0	0%
Total Assets Assessed	**33,960**	**50.53%**

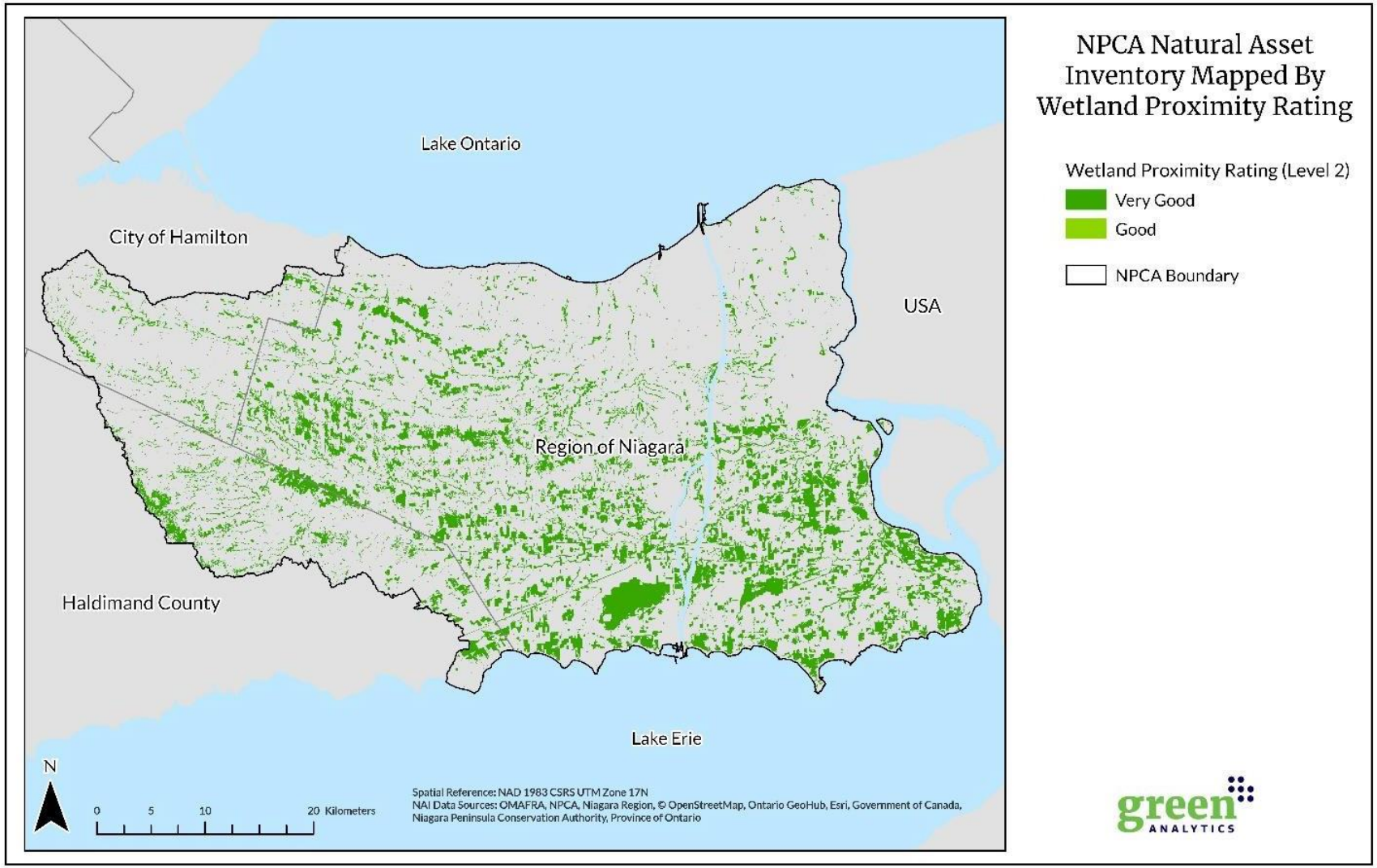

Figure 9-6. Natural asset inventory categorized by wetland proximity rating.

9.7 Extent of Adjacent Permeable Land Uses

INDICATOR: The extent of permeable land cover within 120 m of an asset with more permeable adjacent lands resulting in a more favorable rating.

RATIONALE: How and the extent to which a given natural area is influenced by drainage in the adjacent landscape varies depending on factors such as local topography and soils, where the feature "sits" in the landscape (e.g., upland versus lowland) and the size and nature of the feature itself. However, it is well-established that the condition of a terrestrial natural feature (including wetlands) in an urban context tends to be negatively impacted when more of the surrounding land uses are impervious (i.e., paved, concrete or buildings) as this tends to alter pre-existing drainage and infiltration pathways, which can cause a natural area to receive more, or less, drainage than prior to being in the urban context. Urban runoff also typically carries a host of sediments and contaminants, and when such runoff is directed to natural areas and not properly treated, it can negatively impact the feature and its functions.

Increases in the extent of impervious surfaces within a given watershed or catchment area are generally known to have negative impacts to natural features in that watershed or catchment area, particularly for features downstream of the impervious areas, resulting in a push towards planning that limits impervious surfaces and incorporates low impact development measures that facilitate local infiltration (e.g., Government of Ontario 2006, Government of Ontario 2018). Environment Canada's (2013) guidance for streams/watercourses in urbanized watersheds in southern Ontario states that "*impairment in stream water quality and quantity is highly likely above 10% impervious land cover and can often begin before this threshold is reached. In urban systems that are already degraded, a second threshold is likely reached at the 25 to 30% level.*"

However, land cover types with extensive pervious surfaces that are not "natural" *per se* but occur in the lands adjacent to natural areas, such as manicured parks/open spaces and agricultural lands, are recognized as potentially supporting the functions of nearby natural areas in some regards by providing one or more of the following:

- Permeable surfaces (and therefore potentially supporting hydrologic regimes),
- Temporary or permanent vegetation (e.g., isolated or small groupings of trees/landscaped areas, agricultural crops), and/or
- Intervening lands between natural areas and built areas that are used less frequently and/or less intensively by people.

For example, a school ground between a wooded area and a high-density residential area is generally considered preferable to having the high-density residential area directly abutting the natural area.

APPROACH: A 120 m buffer (exclusive of asset area) was drawn around each natural asset at Level 2 of the inventory. The extent of landcover associated with permeable land uses and natural assets was estimated in hectares within each buffer. Areas of permeable uses include agriculture, built-up pervious, and golf course land covers. These areas have vegetated cover but are not natural in the true sense of the definition. The area of the 120 m buffer was estimated in hectares, and the percentage of each buffer that consists of these natural areas/permeable land uses was estimated. A ranking was then applied to each buffer and linked to the relevant natural assets.

SCORING: A ranking was assigned to each asset based on the percentage of complementary land uses with the 120 m buffer as follows:

- Very Good: 51 to 100% permeable land uses
- Good: 31% to 50% permeable land uses
- Fair: 16% to 30% permeable land uses
- Poor: 1% to 15% permeable land uses
- Very Poor: 0% permeable land uses

RESULTS: Table 9-7 shows the area breakdown of assets by condition rating for the adjacent permeable land use indicator. Ninety-three percent of the natural assets in the NPCA rated very good for this indicator meaning most assets have over 50% of the adjacent land in permeable uses. Figure 9-7 demonstrates the spatial distribution of the results highlighting that the lower condition ratings are clustered around the more urbanized areas of NPCAs jurisdiction.

Table 9-7. Area of natural assets by adjacent complementary land use rating.

Condition Rating	Natural Assets within the NPCA (ha)	Portion of Total Natural Asset Inventory
Very Good	62,821.26	93.47%
Good	3,353.50	4.99%
Fair	705.33	1.05%
Poor	321.74	0.48%
Very Poor	9.65	0.01%
Total	**67,211**	**100%**

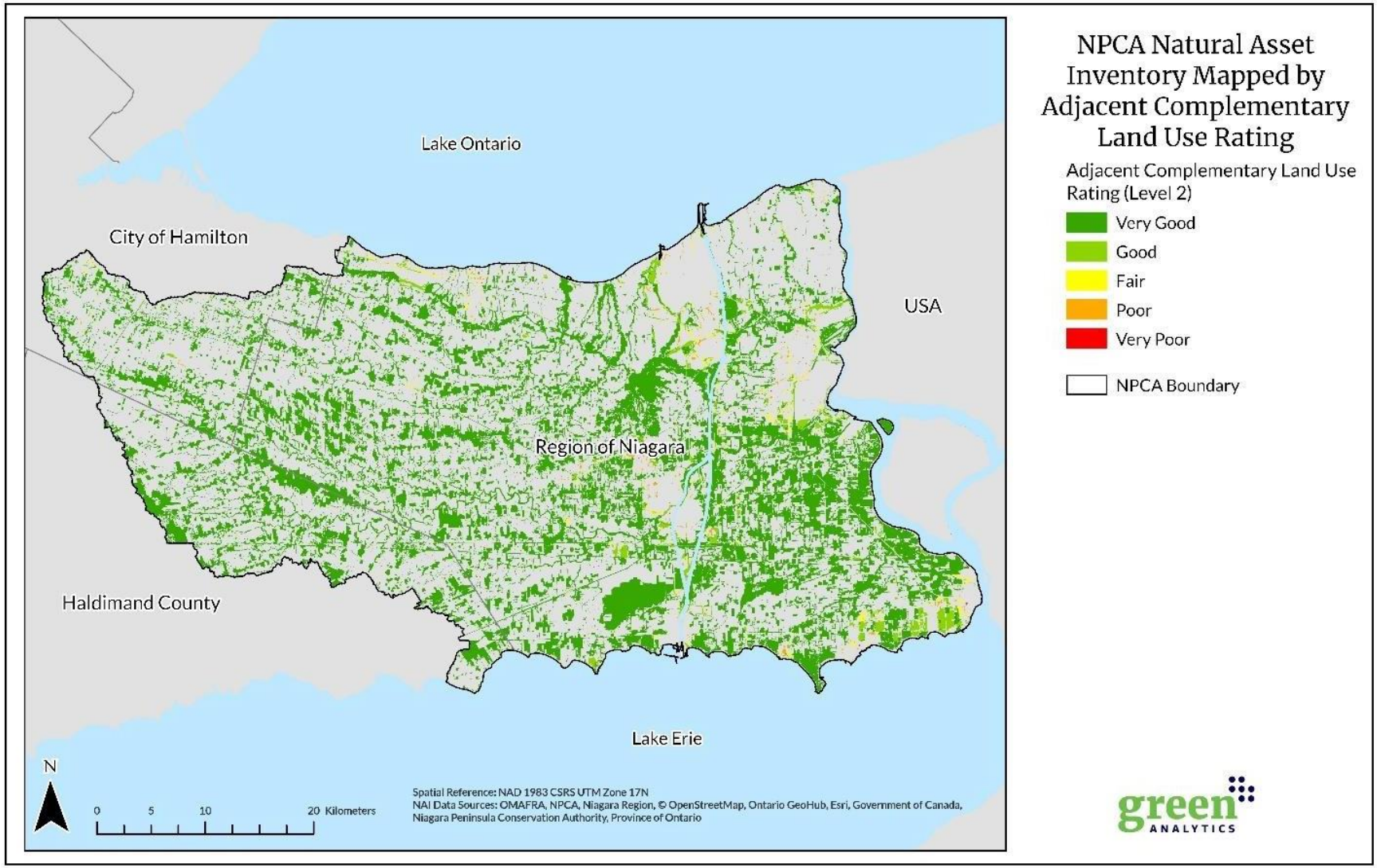

Figure 9-7. Natural asset inventory categorized by complementary area rating.

9.8 Percent of Forest Cover within Watersheds

INDICATOR: Percentage of watersheds covered by forest with higher forest cover ranking more favorably.

RATIONALE: According to Environment Canada (2013) research, it is recommended that between 30-50% of watersheds be forested. The greater the percent of forest cover the greater the conservation and habitat quality of the watershed. From a management perspective, any forest asset within a watershed with a high degree of forest cover will generally require less management intervention.

APPROACH: Watershed boundaries were overlayed on the natural asset inventory. The total area of all forest assets was estimated and compared against the total watershed area to establish the percent of forest cover within the watershed. All individual forest assets within the watershed were allocated the same condition rating based on the scoring thresholds noted below.

SCORING: The area of forest assets within each watershed area was estimated as a percent of the watershed's area. Watersheds, and by extension the forest assets within them, were rated as follows:

- Very Good: watersheds with > 50% forest cover
- Good: watersheds with 41 to 50% forest cover
- Fair: watersheds with 31 to 40% forest cover
- Poor: watersheds with 16 to 30% forest cover
- Very poor: watersheds with <16% forest cover

RESULTS: Table 9-8 shows the condition rating by area of assets within the NPCA. Assets largely rank very poor (88% of forest assets) meaning that the watersheds have less than 16% forest cover. This result is expected due to significant presence of agriculture throughout the NPCA jurisdiction. The rating is applied to forest assets within the NPCA. However, not all forests are rated; a small subset of forest assets was outside the watershed extent and are hence unrated (less than 200 ha). Hence, the rating is applied to 33.62% of the forest assets within the natural asset inventory. Figure 9-8 demonstrates the spatial distribution of the forest cover indicator results. Forest assets within the NPCA rate very poor and poor for this indicator.

Table 9-8. Area of natural assets by forest cover rating.

Condition Rating	Natural Assets within the NPCA (ha)	Portion of Total Natural Asset Inventory
Very Good	0	0%
Good	0	0%
Fair	0	0%
Poor	2,565	3.82%
Very Poor	20,030	29.80%
Total Assets Assessed	**22,595**	**33.62%**

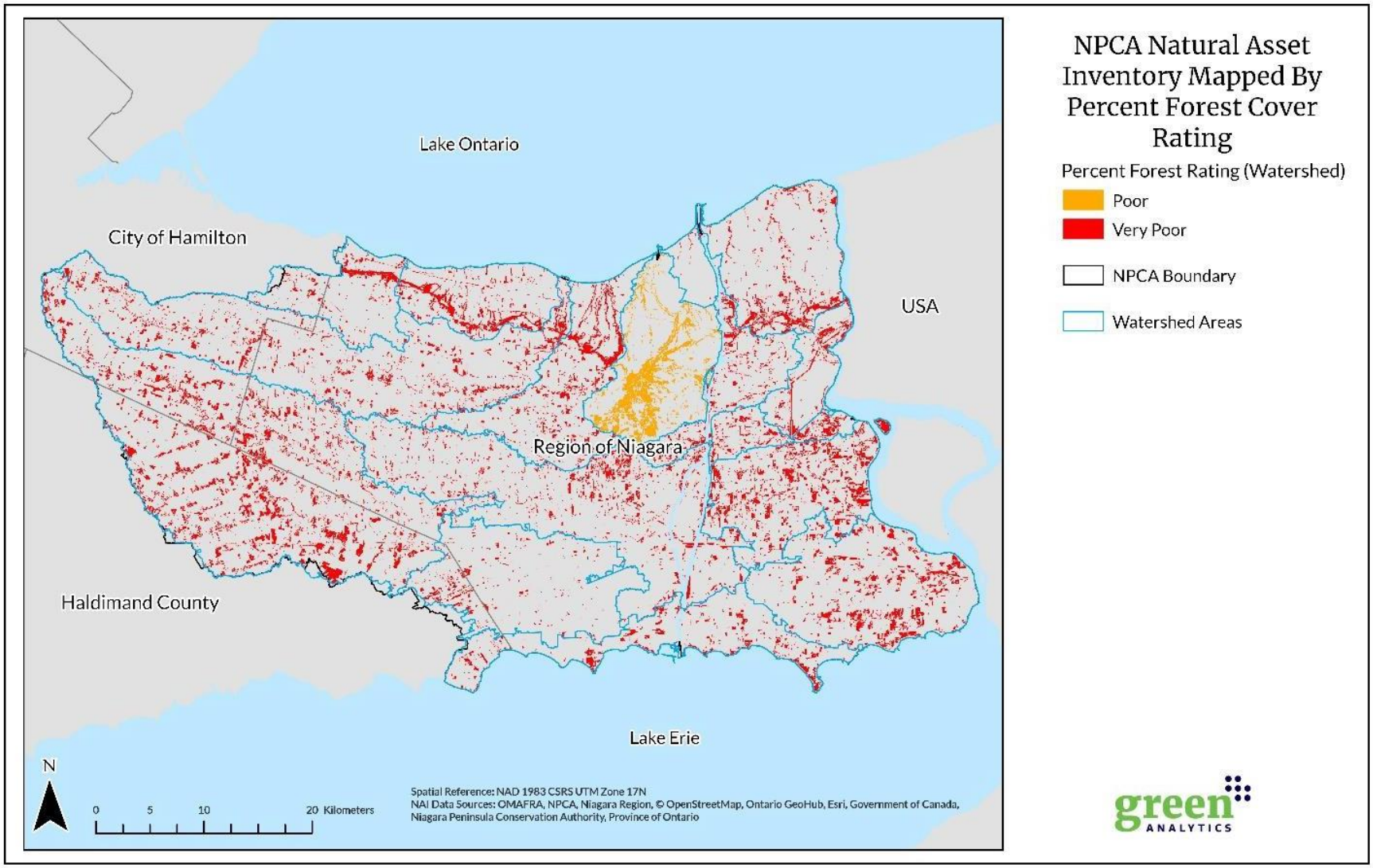

Figure 9-8. Natural asset inventory forest assets categorized by watershed percent forest rating.

9.9 Percent of Wetland Cover within Watersheds

INDICATOR: Percentage of watersheds covered by wetland with higher wetland cover ranking more favorably.

RATIONALE: According to Environment Canada (2013) the guideline for percent of wetland cover within a watershed is described as: at a minimum, the greater of (a) 10% of each major watershed and 6% of each subwatershed, or (b) 40% of the historic watershed wetland coverage should be protected and restored.

APPROACH: Watershed boundaries were overlayed on the natural asset inventory. The total area of all wetland assets was estimated and compared against the total watershed area to establish the percent of wetland cover within the watershed. All individual wetland assets within the watershed were allocated the same condition rating based on the scoring thresholds noted below.

SCORING: The area of wetland assets within each watershed was estimated as a percent of the watershed's area. Watersheds, and by extension the wetland assets within them, were rated as follows:

- Very Good: watersheds with > 10% wetland cover
- Good: watersheds with 7 to 10% wetland cover
- Fair: watersheds with 5 to 7% wetland cover
- Poor: watersheds with 3 to 5% wetland cover
- Very poor: watersheds with <3% wetland cover

RESULTS: Table 9-9 shows the condition rating by area of assets within the NPCA. For wetland cover, most of the assets assessed rate very good, meaning the assets within the NPCA are in watersheds that have at least 10% wetland cover. Note that not all wetlands are rated; a small subset is outside of available watershed extent and are hence unrated (less than 200 ha). Hence, the rating is applied to 49.5% of the assets within the natural asset inventory. Figure 9-9 demonstrates the spatial distribution of the wetland cover indicator results.

Table 9-9. Area of natural assets by wetland cover rating.

Condition Rating	Natural Assets within the NPCA (ha)	Portion of Total Natural Asset Inventory
Very Good	29,087	43.28%
Good	3,274	4.87%
Fair	0	0%
Poor	1,050	1.56%
Very Poor	364	0.54%
Total Assets Assessed	**33,776**	**49.50%**

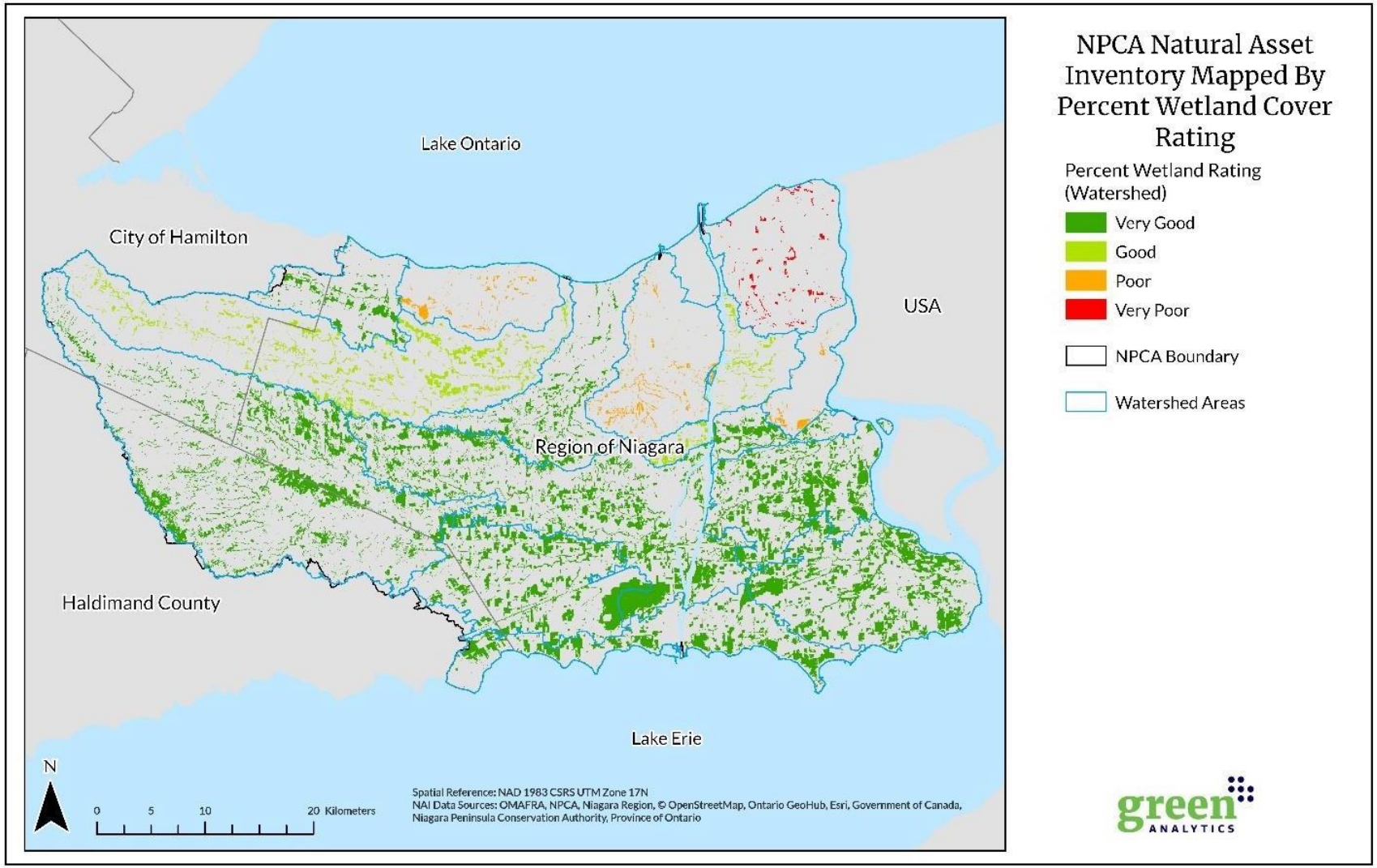

Figure 9-9. Natural asset inventory wetland assets categorized by watershed percent wetland rating,

10 Appendix D: Detailed Ecosystem Service Value Tables

Table 10-1. Recreational Values by ELC Class.

ELC Class	Area (hectares)	ESV per ha lookup	$/hectare	Value ($)
Agricultural Infrastructure	3	Agriculture	238.79	651
Open Agriculture	107	Agriculture	238.79	25,537
Shrub Agriculture	10,132	Agriculture	238.79	2,419,436
Agriculture Crop Defined	105,542	Agriculture	238.79	25,202,374
Agriculture and Undifferentiated Rural Land Use	9,533	Agriculture	238.79	2,276,385
Mixed Ponds	120	N/A	N/A	-
Open Aquatic	406	N/A	N/A	-
Open Water	2	N/A	N/A	-
Open Water (Varied Type)	3,123	N/A	N/A	-
SWM Pond	4	N/A	N/A	-
Canal	721	N/A	N/A	
Reservoir	290	N/A	N/A	
Water (ESRI)	8	N/A	N/A	-
Cemetery	264	Grassland/ pasture	92.39	24,391
Green Lands	1	Grassland/ pasture	92.39	51
Mixed Grasses	196	Grassland/ pasture	92.39	18,136
Mixed Pervious	2,368	N/A	N/A	-
Mixed Pervious Surfaces (UAB)	845	N/A	N/A	-
Open Aquatic	406	N/A	N/A	-
Park	1,112	Forest: non-urban	257.50	286,340
Coniferous Forest	538	Forest: suburban	2,414.33	1,297,714
Coniferous Savanna	106	Forest: suburban	2,414.33	255,985
Coniferous Thicket	37	Forest: suburban	2,414.33	89,122
Coniferous Woodland	146	Forest: suburban	2,414.33	351,446
Deciduous Forest	14,351	Forest: suburban	2,414.33	34,649,063
Deciduous Savanna	30	Forest: suburban	2,414.33	72,552
Deciduous Thicket	3,854	Forest: suburban	2,414.33	9,304,669
Deciduous Woodland	1,082	Forest: suburban	2,414.33	2,611,850
Mixed Forest	1,218	Forest: suburban	2,414.33	2,941,277
Mixed Savanna	10	Forest: suburban	2,414.33	25,281
Mixed Thicket	95	Forest: suburban	2,414.33	229,051
Mixed Woodland	224	Forest: suburban	2,414.33	541,364

ELC Class	Area (hectares)	ESV per ha lookup	$/hectare	Value ($)
Treed Agriculture	1,048	Forest: suburban	2,414.33	2,531,290
Golf	1,939	N/A	N/A	-
Coniferous Hedgerows	65	Forest: suburban	2,414.33	157,440
Deciduous Hedgerows	1,329	Forest: suburban	2,414.33	3,207,544
Mixed Hedgerows	15	Forest: suburban	2,414.33	36,576
Forb Meadow	4	Grassland/ pasture	92.39	379
Graminoid Meadow	69	Grassland/ pasture	92.39	6,351
Mixed Meadow	5,064	Grassland/ pasture	92.39	467,876
Open Bluff	6	N/A	N/A	-
Open Cliff	0	N/A	N/A	-
Open Rock Barren	11	N/A	N/A	-
Open Talus	1	N/A	N/A	-
Shrub Bluff	7	N/A	N/A	-
Shrub Cliff	0	N/A	N/A	-
Shrub Rock Barren	5	N/A	N/A	-
Shrub Talus	6	N/A	N/A	-
Treed Bluff	24	N/A	N/A	-
Treed Cliff	57	N/A	N/A	-
Treed Rock Barren	4	N/A	N/A	-
Treed Sand Barren and Dune	3	N/A	N/A	-
Treed Talus	2	N/A	N/A	-
Open Shoreline	148	Fresh wetland: Great lakes coast	738.28	108,961
Shrub Shoreline	10	Fresh wetland: Great lakes coast	738.28	7,088
Treed Shoreline	25	Fresh wetland: Great lakes coast	738.28	18,586
Coniferous Swamp	38	Fresh wetland: Great lakes coast	738.28	28,254
Deciduous Swamp	23,402	Fresh wetland: Great Lakes coast	738.28	17,277,000
Floating-leaved Shallow Aquatic	17	Fresh wetland: Great Lakes coast	738.28	12,874
Marsh (Unknown Type)	1,522	Fresh wetland: Great Lakes coast	738.28	1,123,651
Meadow Marsh	3,277	Fresh wetland: Great Lakes coast	738.28	2,419,431
Mixed Shallow Aquatic	8	Fresh wetland: Great Lakes coast	738.28	5,666

ELC Class	Area (hectares)	ESV per ha lookup	$/hectare	Value ($)
Mixed Swamp	458	Fresh wetland: Great Lakes coast	738.28	337,885
Shallow Marsh	1,126	Fresh wetland: Great Lakes coast	738.28	831,342
Shrub Bog	101	Fresh wetland: Great Lakes coast	738.28	74,457
Submerged Shallow Aquatic	8	Fresh wetland: Great Lakes coast	738.28	5,835
Thicket Bog	364	Fresh wetland: Great Lakes coast	738.28	268,718
Thicket Swamp	3,639	Fresh wetland: Great Lakes coast	738.28	2,686,702
Subtotal:	**200,262**			**114,236,581**

Carbon Sequestration Values

Table 10-2. Yearly per hectare sequestration rates by ELC Class.

ELC Class	Carbon Sequestration (tCO_2e / ha / yr)	CO_2e min price ($/ ha)	SCC CO_2e ($/ha)	Value with min price ($)	Value with SCC ($)	Area (hectares)
Agriculture Crop Defined	1.19	$77.29	$345.61	$7,900,710.51	$35,328,392.50	105,542
Deciduous Swamp	8.24	$ 35.92	$2,396.39	$12,554,452.04	$56,137,812.98	23,402
Deciduous Forest	7.58	$ 492.44	$2,201.97	$7,150,636.67	$31,974,402.63	14,351
Shrub Agriculture	3.08	$200.20	$895.20	$2,028,403.74	$9,070,101.15	10,132
Agriculture and Undifferentiated Rural Land Use	1.14	$74.20	$331.78	$707,355.96	$3,162,974.89	9,533
Mixed Meadow	1.76	$114.40	$511.54	$579,317.95	$2,590,446.99	5,064
Deciduous Thicket	2.97	$192.82	$862.20	$743,235.64	$3,323,412.56	3,854
Thicket Swamp	2.97	$193.03	$863.13	$702,456.76	$3,141,067.90	3,639
Meadow Marsh	5.83	$378.66	$1,693.21	$1,240,921.85	$5,548,839.45	3,277
Open Water (Varied Type)	-	-	-	-	-	3,123
Mixed Pervious	1.76	$114.40	$511.54	$270,925.21	$1,211,454.59	2,368
Golf	6.34	$412.32	$1,843.69	$799,603.19	$3,575,462.64	1,939
Marsh (Unknown Type)	5.83	$378.66	$1,693.21	$576,317.06	$2,577,028.39	1,522
Deciduous Hedgerows	7.46	$484.58	$2,166.82	$643,846.15	$2,878,987.84	1,329
Mixed Forest	4.86	$316.10	$1,413.47	$382,632.35	$1,710,958.27	1,218
Shallow Marsh	5.81	$377.76	$1,689.16	$425,370.69	$1,902,064.73	1,126
Park	1.76	$114.40	$511.54	$127,190.67	$568,738.96	1,112
Deciduous Woodland	4.51	$293.35	$1,311.73	$315,944.21	$1,412,759.14	1,082
Treed Agriculture	2.97	$193.17	$863.77	$202,326.12	$904,710.60	1,048
Mixed Pervious Surfaces (UAB)	1.14	$74.20	$331.78	$62,242.87	$278,321.89	839
Canal	-	-	-	-	-	721
Coniferous Forest	5.23	$339.68	$1,518.91	$179,080.99	$800,768.95	538
Mixed Swamp	2.88	$187.41	$838.01	$86,569.49	$387,099.48	458
Open Aquatic	-	-	-	-	-	406
Thicket Bog	5.83	$378.66	$1,693.21	$137,824.43	$616,288.30	364

ELC Class	Carbon Sequestration (tCO_2e / ha / yr)	CO_2e min price ($/ ha)	SCC CO_2e ($/ha)	Value with min price ($)	Value with SCC ($)	Area (hectares)
Reservoir	-	-	-	-	-	290
Cemetery	1.10	$ 71.50	$319.72	$18,842.74	$84,256.16	264
Mixed Woodland	2.97	$192.74	$861.83	$ 43,302.22	$193,627.90	224
Mixed Grasses	1.76	$114.40	$511.54	$22,398.08	$100,154.06	196
Open Shoreline	-	-	-	-	-	148
Coniferous Woodland	5.77	$375.04	$1,677.02	$54,335.34	$242,962.98	146
Mixed Ponds	-	-	-	-	-	120
Open Agriculture	1.14	$74.20	$331.78	$7,934.88	$35,481.20	107
Coniferous Savanna	5.22	$339.60	$1,518.55	$ 36,007.24	$161,008.04	106
Shrub Bog	7.41	$481.43	$2,152.75	$ 48,553.27	$217,108.18	101
Mixed Thicket	2.96	$192.68	$861.59	$18,280.15	$81,740.51	95
Graminoid Meadow	1.76	$114.40	$511.54	$7,864.26	$35,165.41	69
Coniferous Hedgerows	5.22	$339.60	$1,518.55	$ 22,145.85	$99,026.18	65
Treed Cliff	-	-	-	-	-	57
Coniferous Swamp	6.43	$418.15	$1,869.78	$15,994.61	$71,520.66	38
Coniferous Thicket	5.22	$339.60	$1,518.55	$12,536.01	$56,055.37	37
Deciduous Savanna	5.22	$339.42	$1,517.74	$10,199.80	$45,608.86	30
Treed Shoreline	3.96	$257.40	$1,150.98	$6,483.48	$28,991.18	25
Treed Bluff	3.96	$257.40	$1,150.98	$6,257.40	$27,980.27	24
Floating-leaved Shallow Aquatic	7.83	$508.84	$2,275.31	$8,873.29	$39,677.34	17
Mixed Hedgerows	2.96	$192.68	$861.59	$2,919.04	$13,052.64	15
Open Rock Barren	-	-	-	-	-	15
Mixed Savanna	4.54	$294.93	$1,318.80	$3,088.28	$13,809.40	10
Shrub Shoreline	3.96	$257.40	$1,150.98	$2,471.31	$11,050.59	10
Submerged Shallow Aquatic	5.81	$377.76	$1,689.16	$2,985.77	$13,351.02	8
Mixed Shallow Aquatic	5.94	$386.10	$1,726.46	$2,963.27	$13,250.38	8
Water (ESRI)	-	-	-	-	-	8
Shrub Bluff	-	-	-	-	-	7

ELC Class	Carbon Sequestration (tCO_2e / ha / yr)	CO_2e min price ($/ ha)	SCC CO_2e ($/ha)	Value with min price ($)	Value with SCC ($)	Area (hectares)
Shrub Talus	-	-	-	-	-	6
Open Bluff	-	-	-	-	-	6
Shrub Rock Barren	1.14	$74.20	$331.78	$ 349.54	$1,562.97	5
Treed Rock Barren	-	-	-	-	-	4
Forb Meadow	1.76	$114.40	$511.54	$469.20	$2,098.06	4
Treed Sand Barren and Dune	-	-	-	-	-	3
Agricultural Infrastructure	1.14	$74.20	$331.78	$202.26	$904.41	3
Treed Talus	-	-	-	-	-	2
Open Water	-	-	-	-	-	2
Open Talus	-	-	-	-	-	1
Green Lands	6.34	$412.32	$1,843.69	$225.66	$ 1,009.05	1
Open Cliff	-	-	-	-	-	0
SubTotal	**-**	**-**	**-**	**$38,137,048**	**$170,692,548**	**200,262**

Air Quality Regulation Values

The census datasets were from 2021.

Table 10-3. Air quality regulation values by census area.

Census Area	Forest/Hedge Area (ha)	Pop Density (people / km2) (2021 Census Data)	Total Value ($2023)
Hamilton	2,084	505	$763,333
Fort Erie	2,061	197	$297,482
Port Colborne	800	161	$94,716
Wainfleet	769	31	$19,182
West Lincoln	2,532	40	$78,318
Pelham	2,037	143	$214,933
Welland	858	660	$409,732
Thorold	1,548	269	$303,721
Niagara Falls	3,113	441	$997,177
Niagara-on-the-Lake	1,081	142	$112,962
St. Catharines	1,034	1,364	$1,019,596
Lincoln	1,964	155	$224,608
Grimsby	717	419	$218,427
Haldimand County	3,558	39	$107,727
Subtotal:	**24,157**		**$ 4,861,915**

Stormwater Values

Table 10-4. stormwater values by ELC class.

ELC Class	Stormwater value per hectare - Forest	Stormwater value per hectare - Wetlands	Stormwater value per hectare - Meadow	Area (ha)	Stormwater
Deciduous Forest	$2,062	$-	$-	14,351	$ 29,592,697
Deciduous Thicket	$2,062	$-	$-	3,854	$ 7,946,869
Deciduous Hedgerows	$2,062	$-	$-	1,329	$ 2,739,597
Mixed Forest	$2,062	$-	$-	1,218	$ 2,512,093
Deciduous Woodland	$2,062	$-	$-	1,082	$ 2,230,736
Treed Agriculture	$2,062	$-	$-	1,048	$ 2,161,868
Coniferous Forest	$2,062	$-	$-	538	$ 1,108,347
Mixed Woodland	$2,062	$-	$-	224	$462,358
Coniferous Woodland	$2,062	$-	$-	146	$300,129
Coniferous Savanna	$2,062	$-	$-	106	$218,629
Mixed Thicket	$2,062	$-	$-	95	$195,625
Coniferous Hedgerows	$2,062	$-	$-	65	$134,465
Coniferous Thicket	$2,062	$-	$-	37	$76,116
Deciduous Savanna	$2,062	$-	$-	30	$61,964
Mixed Hedgerows	$2,062	$-	$-	15	$31,238
Mixed Savanna	$2,062	$-	$-	10	$21,592
Deciduous Swamp		$1,445	$-	23,402	$ 33,815,204
Thicket Swamp		$1,445	$-	3,639	$ 5,258,653
Meadow Marsh		$1,445	$-	3,277	$ 4,735,417
Marsh (Unknown Type)	$-	$ 1,445	$-	1,522	$ 2,199,254
Shallow Marsh	$-	$1,445	$ -	1,126	$ 1,627,127
Mixed Swamp	$-	$1,445	$ -	458	$661,343
Thicket Bog	$-	$1,445	$ -	364	$525,945
Shrub Bog	$-	$1,445	$ -	101	$145,730
Coniferous Swamp	$-	$1,445	$ -	38	$55,301
Floating-leaved Shallow Aquatic	$-	$1,445	$ -	17	$25,198
Submerged Shallow Aquatic	$-	$1,445	$ -	8	$11,421
Mixed Shallow Aquatic	$-	$1,445	$ -	8	$11,090
Mixed Meadow	$-	$-	$ 740	5,064	$ 3,747,336
Graminoid Meadow	$-	$-	$ 740	69	$50,870
Forb Meadow	$-	$-	$ 740	4	$ 3,035
Subtotal				**63,245**	**$ 102,667,246**

Niagara Peninsula Watershed Natural Asset Analysis and Valuation

NPCA Board of Directors

JULY 19, 2024

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Presentation Outline

- Introduction & Project Overview
- Natural Asset Inventory Approach
- Natural Asset Condition Assessment
- Asset Replacement Cost & Ecosystem Service Valuation
- Fort Erie Case Study

Asset Management Planning Process

1) State of infrastructure

- Asset register & inventory, condition, risk, valuation

2) Levels of service

- Metrics on current and proposed services

3) Life cycle management strategy

- Management options, risks, costs

4) Financial strategy

- Costs of plan, funds available, shortfalls

Continuous improvement

Counting nature as an asset

- Stock of natural resources managed by government
  - Wetlands, forests, meadows, etc.
  - Green infrastructure

- These types of assets provide many services to the community:
  - Climate regulation, stormwater regulation, ecosystem function, recreation, air quality, flood protection

Project Scope

Natural Asset Inventory

Delineate and quantify the type, location and extent of natural assets within the NPCA using the best available land cover and land use data.

Condition Assessment

Assess the condition of the natural assets through a desktop condition assessment that aligns with the Canadian Standards Association's standard for natural asset Inventories.

Carbon Storage and Sequestration

Quantify carbon storage and sequestration from natural assets within the NPCA jurisdiction.

Asset Replacement

Estimate the replacement value of natural assets by assigning a per unit restoration cost to the area of natural assets by type.

Ecosystem Service Value

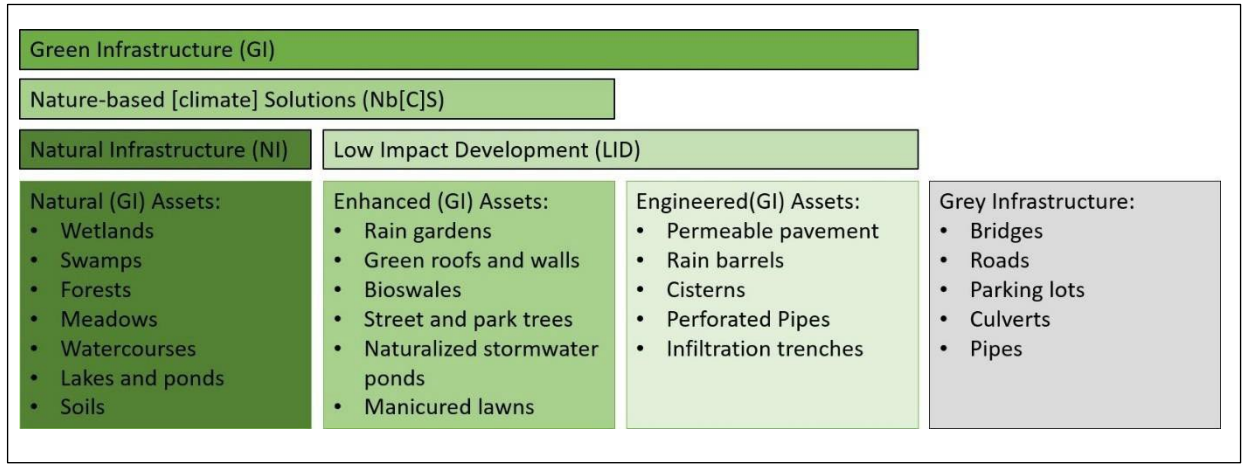
Quantify the value of some of the ecosystem services provided by the natural assets within the NPCA.

Dashboard

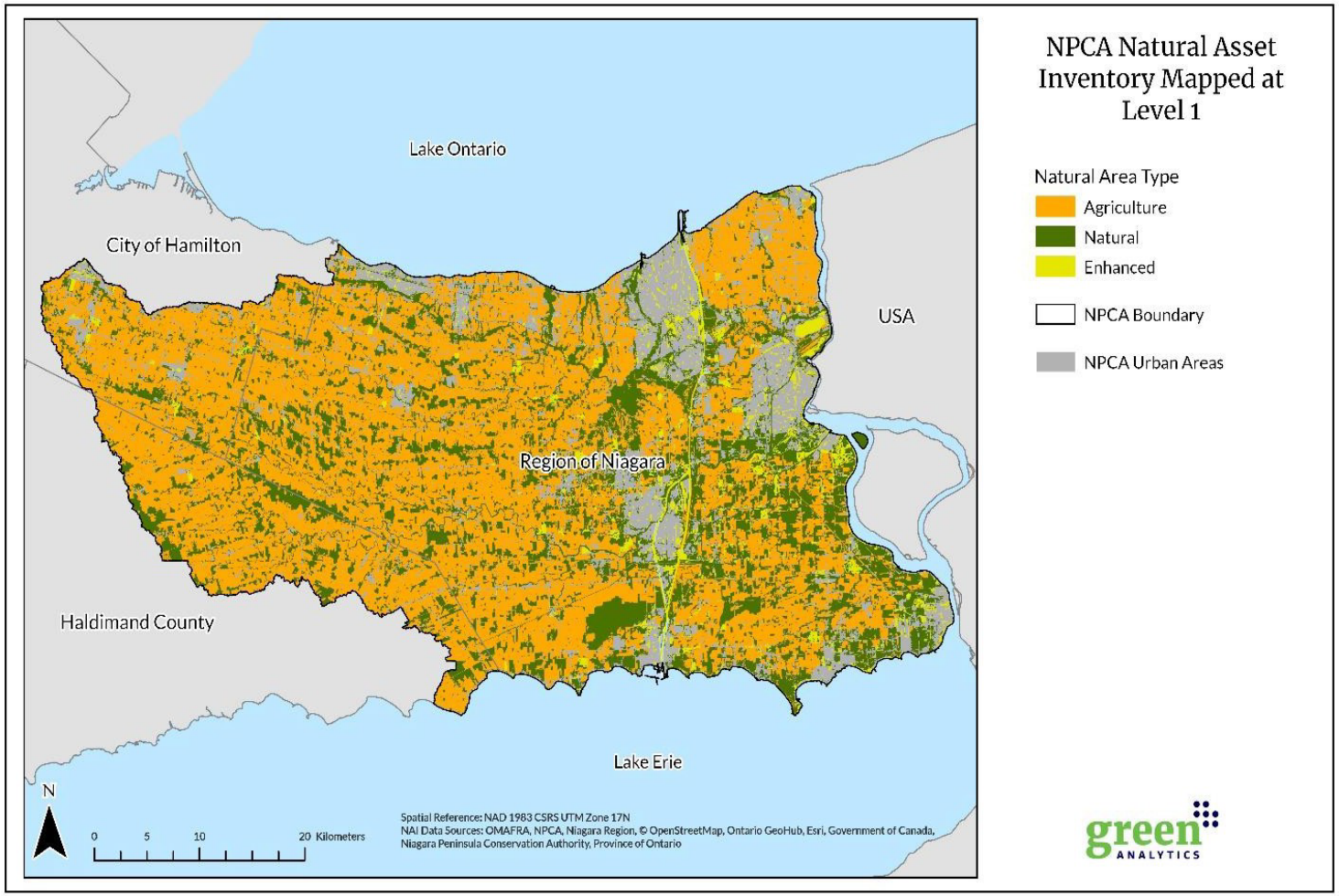
House the inventory in an online, interactive dashboard.

Inventory Approach Overview

Focus on natural and some enhanced assets as well as agriculture assets.

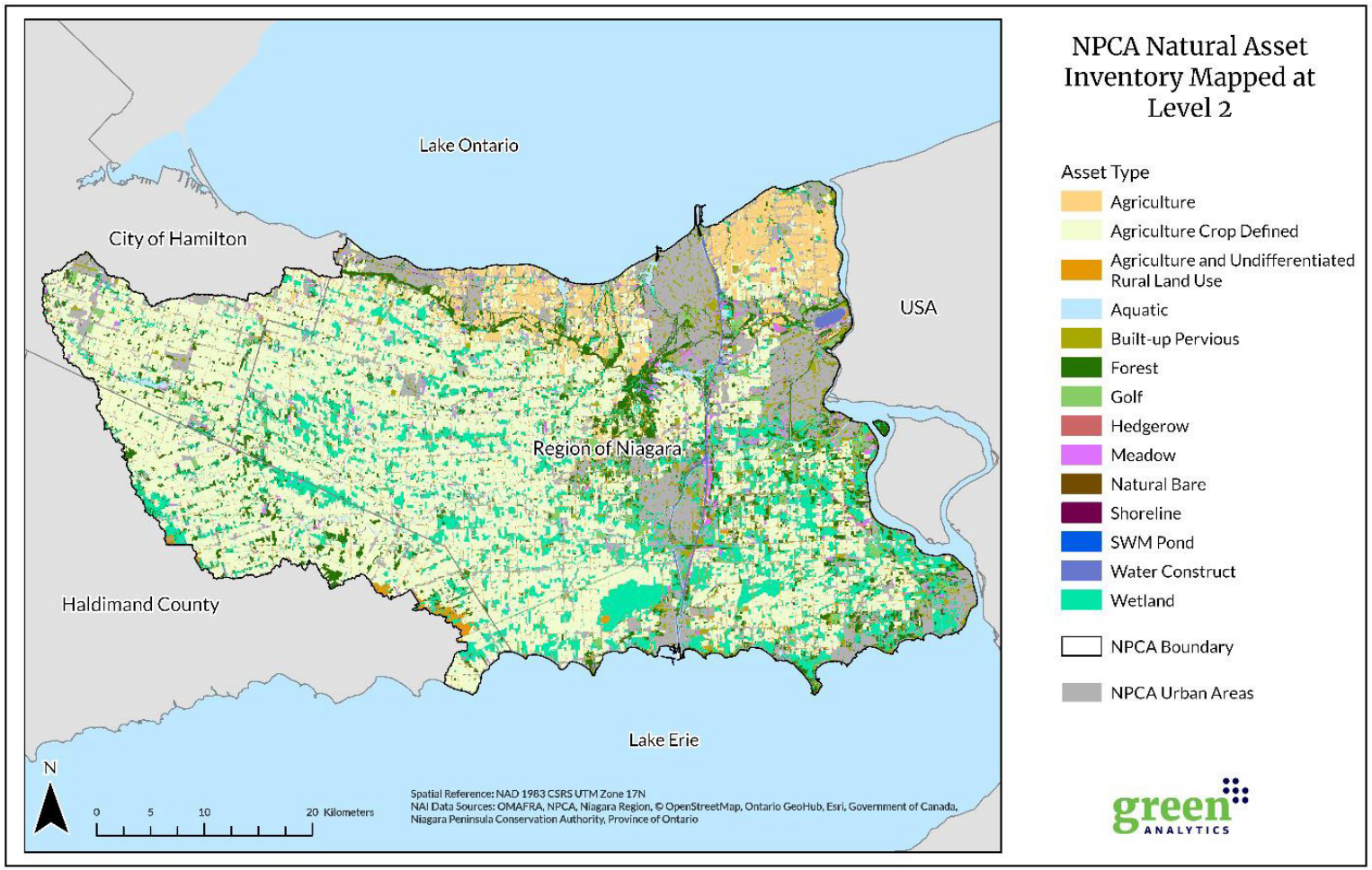


- The inventory was created using GIS to organize data on natural assets within the NPCA.
- It provides a comprehensive view of the type, location, and extent of these assets.
- Assets are categorized into three levels:
  - Level 1: Continuous area of natural landcover regardless of the land cover type. Distinguishes between natural area assets, agriculture assets, and enhanced assets.
  - Level 2: Further categorizes these areas by specific land cover types, such as forests, wetlands or hedgerows.
  - Level 3: Provides more detailed differentiation within these categories, identifying specific types like coniferous forests, deciduous forests, and mixed forests.

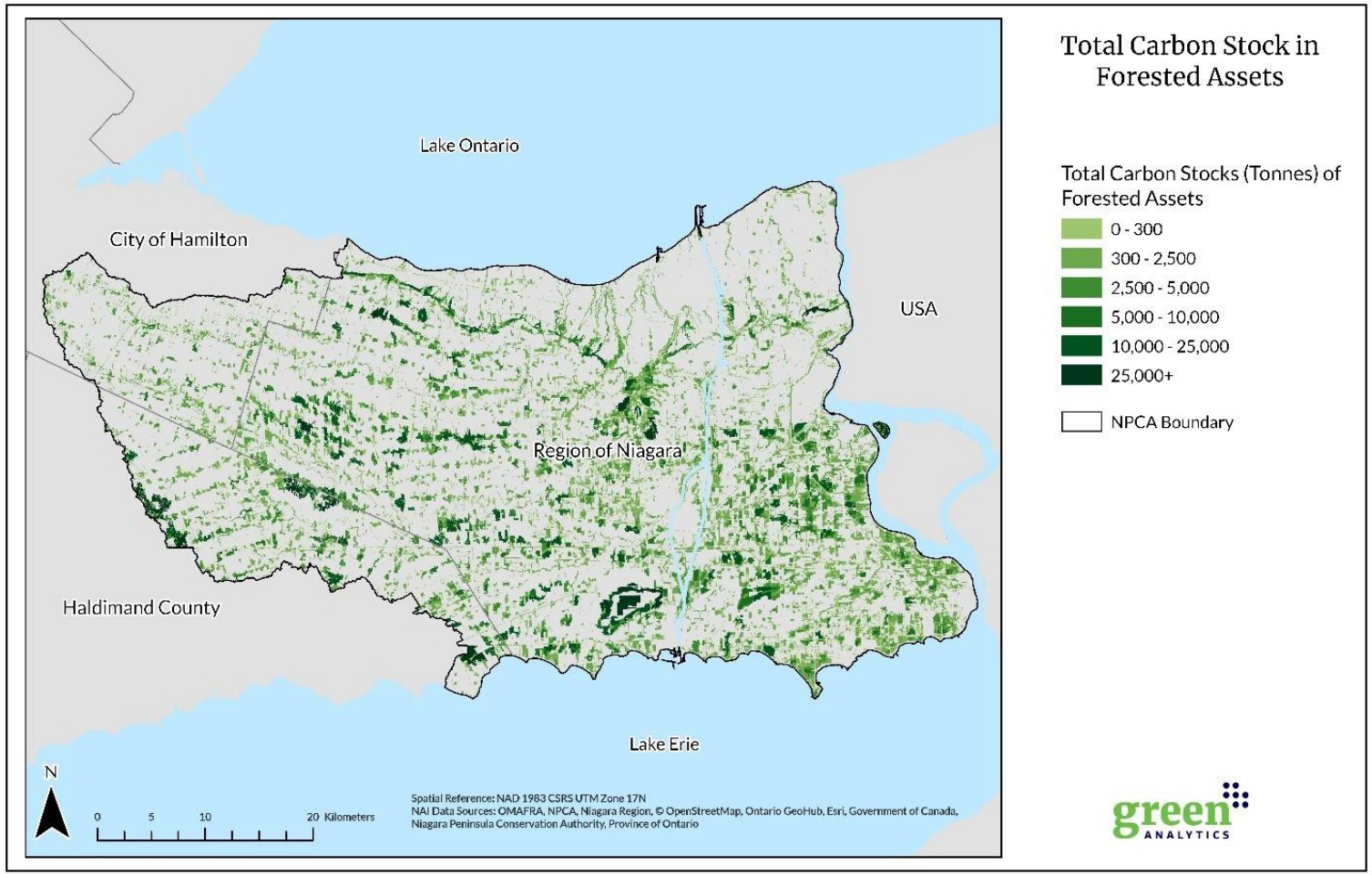


Natural Asset Inventory – Level 1

Asset Type (Level 1)	Natural Assets within the NPCA (ha)	Portion of NPCA Jurisdiction
Agriculture	125,317	**51.6%**
Natural	67,211	**27.6%**
Enhanced	7,734	**3.2%**
Total	**200,262**	**82.4%**

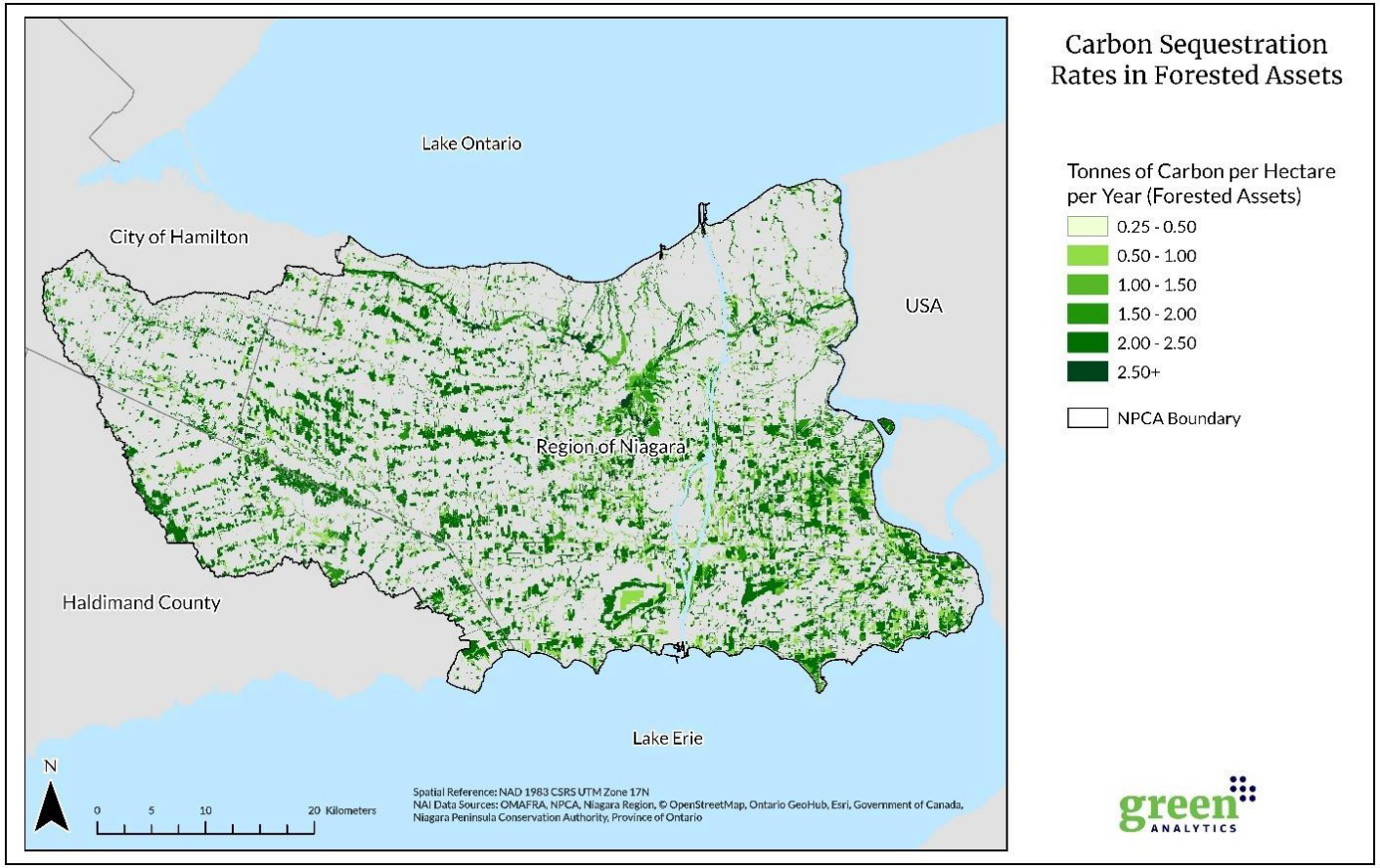


Natural Asset Inventory – Level 2



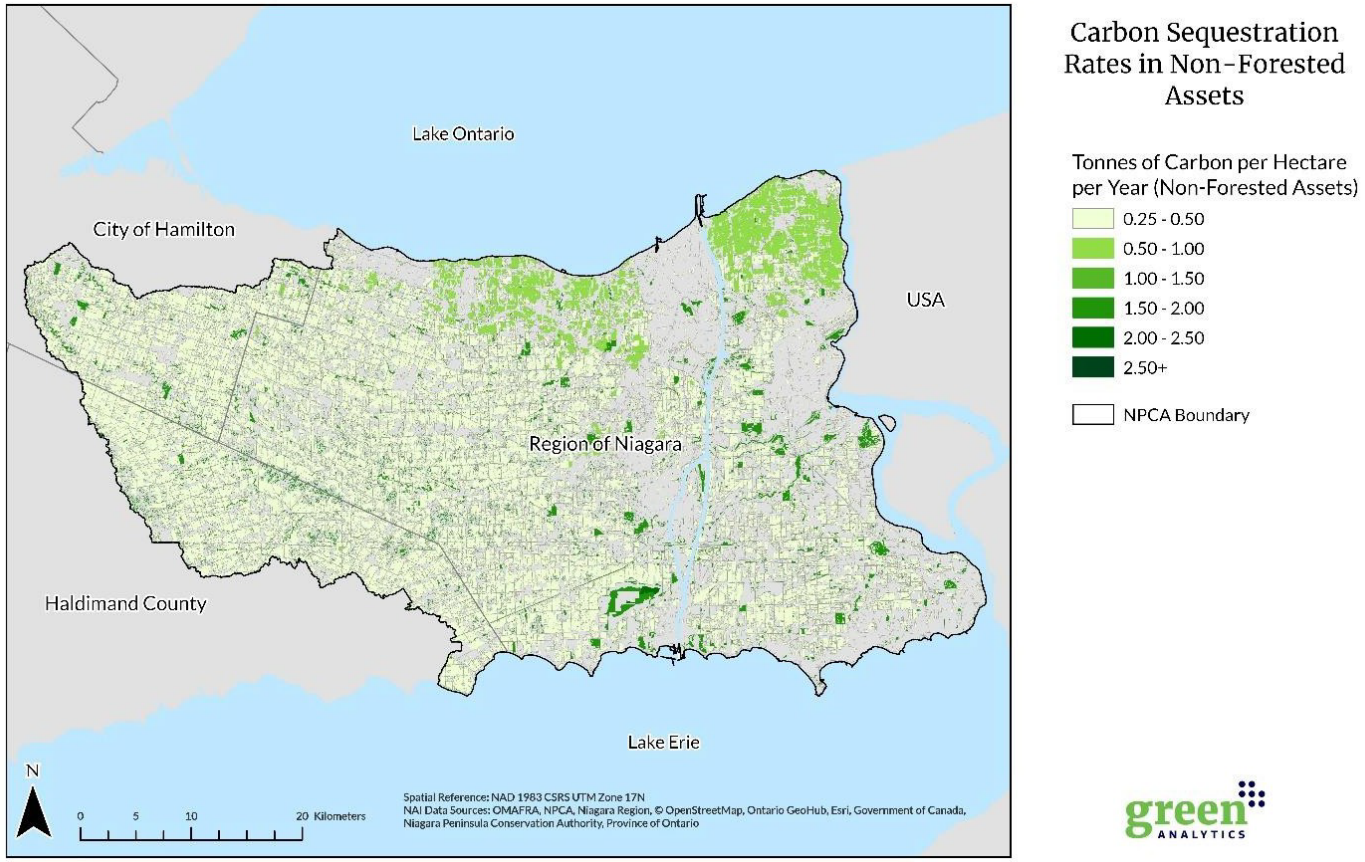
Carbon Storage in Forest Assets

Total Carbon Storage in Forested Assets	**13,539,320 tonnes**



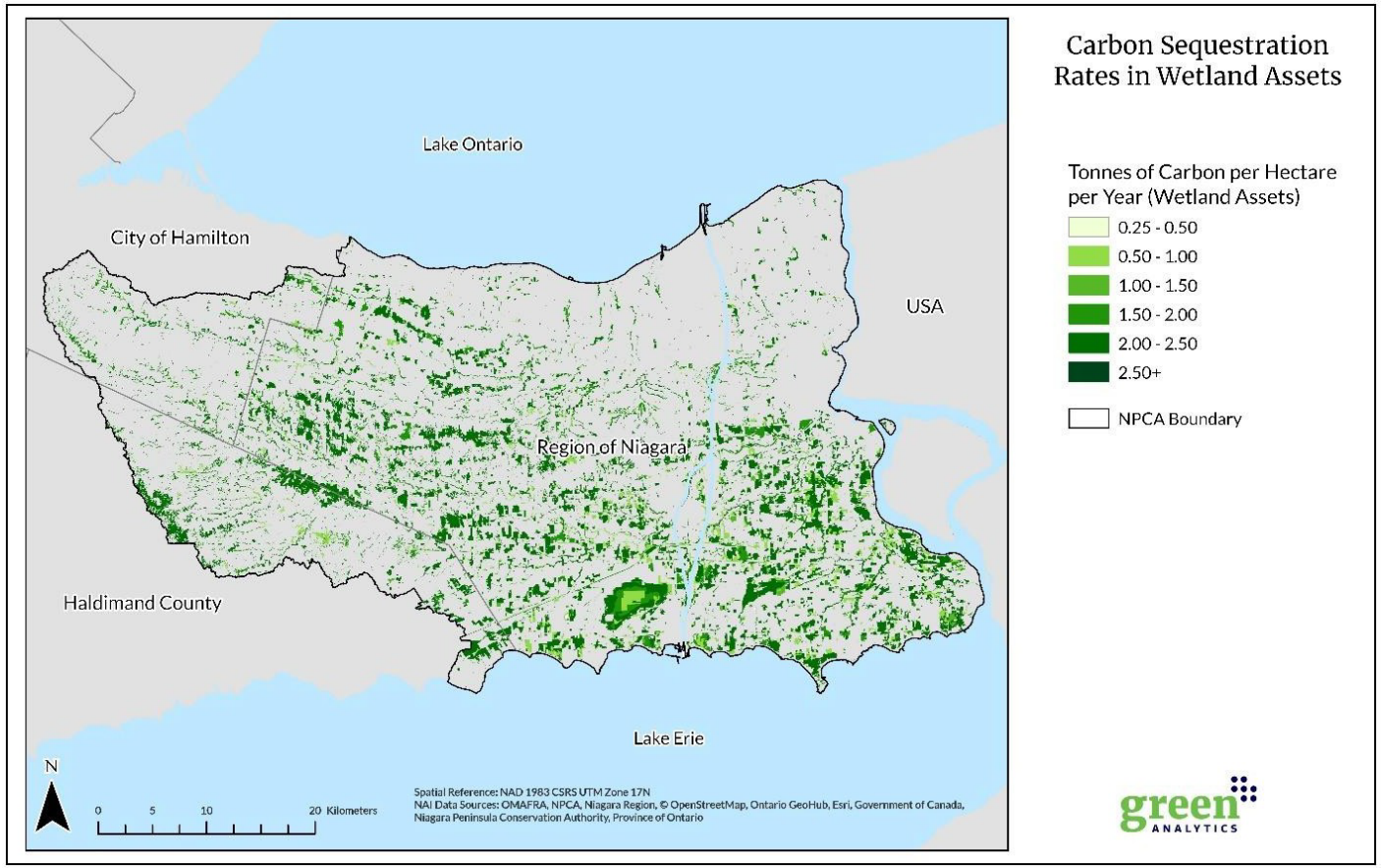
Carbon Sequestration from Forested Assets

Average Carbon Sequestration in Forest Assets	**1.88 tonnes per ha per year**



Carbon Sequestration from Non-Forest Assets

Average Carbon Sequestration in Non-forest Assets	**0.37 tonnes per ha per year**



Carbon Sequestration from Wetland Assets

Average Carbon Sequestration in Wetland Assets	**1.6 tonnes per ha per year**

Condition Assessment – Approach Overview

- Nine indicators for condition were applied in a desktop assessment.
- The indicators are proxies for ecological health.
- The assumption is that assets in good ecological health are able to deliver a good level of services.
- Scoring thresholds were established for each indicator – scores range from very poor to very good.
- Overall condition score assigned to natural assets by combining results of all indicators assuming equal weight.

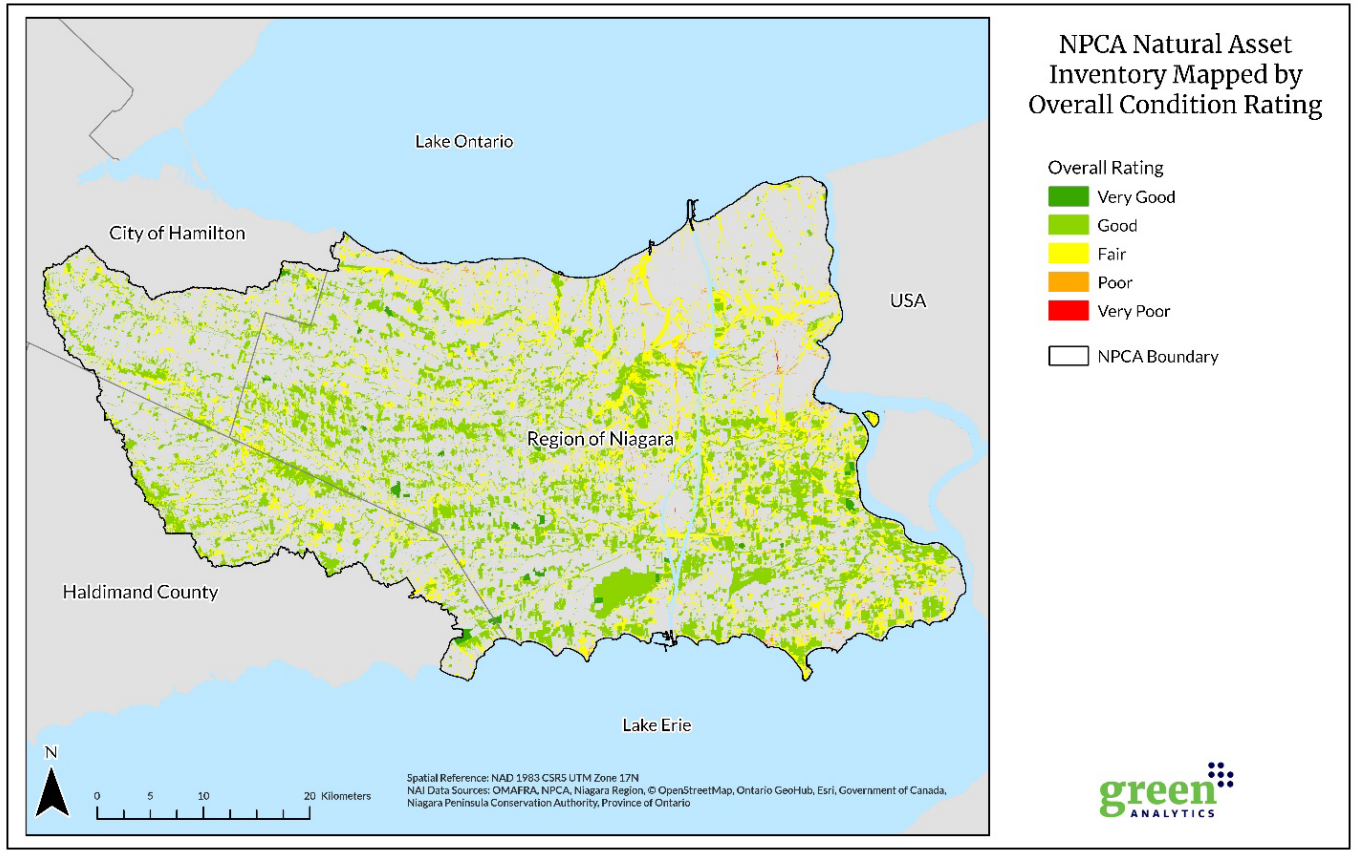
CRITERIA FOR PHYSICAL CONTEXT:

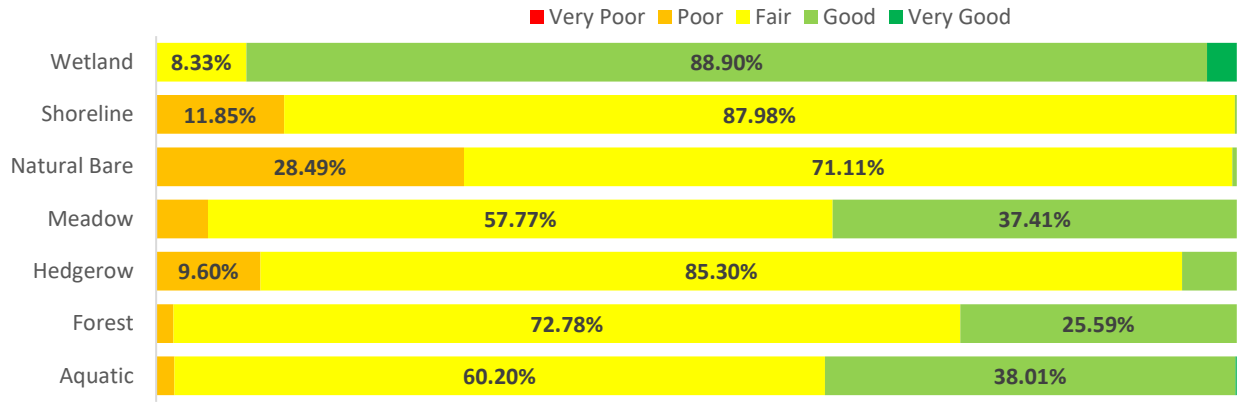
- Interior Habitat
- Natural Area Patch Shape
- Road Density
- Natural Asset Proximity to Watercourses
- Forest Proximity to other Natural Assets
- Wetland Proximity to other Natural Assets

CRITERIA FOR LANDSCAPE CONTEXT:

- Extent of Adjacent Permeable Land Uses
- Percent of Forest Cover within Watersheds
- Percent of Wetland Cover with Watersheds

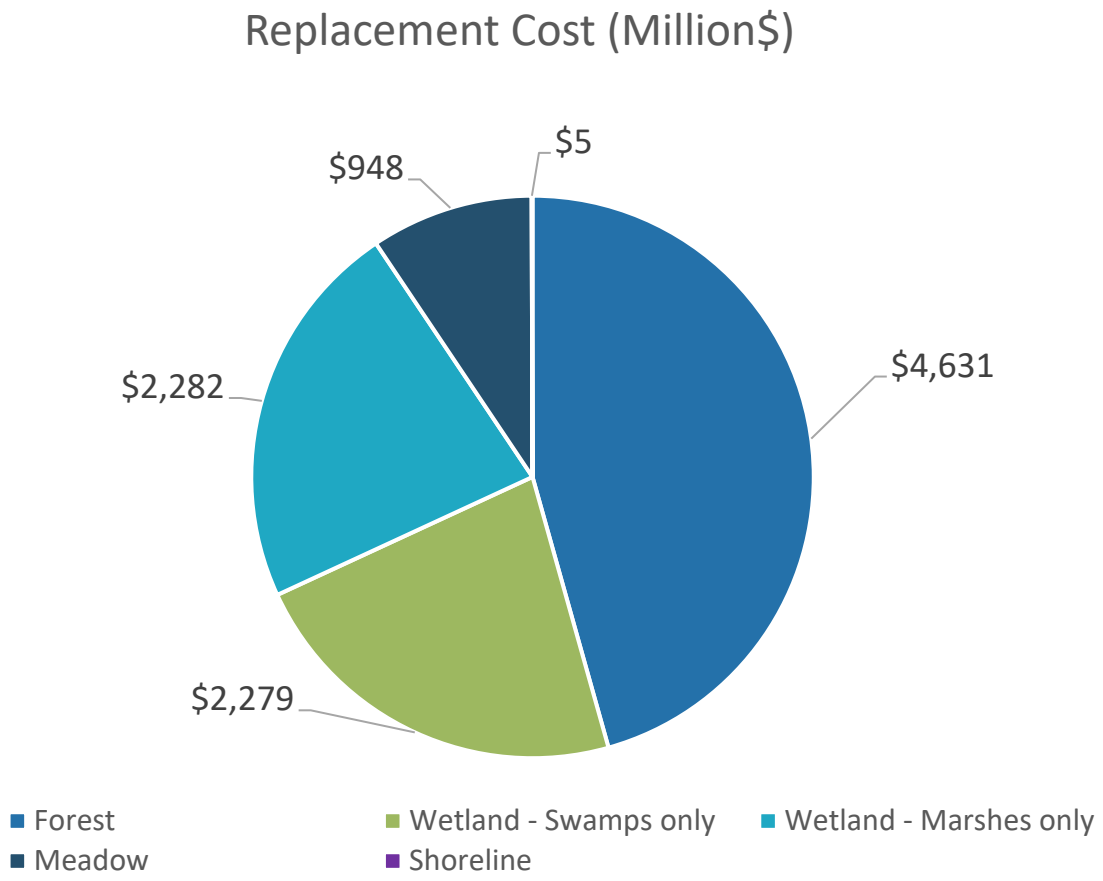
Condition Assessment - Results





Note that we are lacking an indicator for ecological context – this can be addressed in the future through data collection on invasive species, species composition, habitat condition – and may change the results of the overall condition scores.

Natural Assets - Total Replacement Costs



Total Replacement Cost Value: $10.1 billion

Ecosystem Service	Focus of the Valuation	Valuation Methods
Provision of recreation opportunities	Enjoyment of recreation activities	Value Transfer ($/ha by asset type from Voigt et al. 2013)
Carbon sequestration	Value of carbon dioxide removed from the atmosphere.	Estimate carbon sequestration using carbon modelling. Apply a carbon price per unit of carbon (Social Cost of Carbon, or Minimum National Carbon Pollution Price) sequestrated.
Air quality regulation	Avoided costs associated with health issues derived from air pollution	Avoided health care costs associated with exposure to air pollutants (regression equation adapted from Nowak et al. 2014).
Regulation of stormwater	Avoided stormwater management infrastructure costs	Value per hectare for forests, meadows, and wetlands to abate stormwater adapted from Saini et al. (2018).
Preservation values	Value people place on knowing habitat (and associated biodiversity) is preserved	The regression analysis, adapted from Brander and Koetse (2011), to estimate the habitat preservation values.
Contribution to crop productivity	Improved crop productivity generated from wild pollinators	Crop dependence on wild pollination determined using study by Aizen et al. (2009, 2019) and Klein et al. (2006, 2007). The dependency percentages were applied to the annual harvest values to infer the value of pollinators.

Ecosystem Service Valuation - Approach

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Ecosystem Service Valuation - Results

	Annual Value (2023 $ million CDN)	
Ecosystem Service	Low Estimate	High Estimate
Recreation Opportunities	114	114
Carbon Sequestration	38	170
Air Quality Regulation	9	9
Stormwater Regulation	103	103
Habitat / Biodiversity	27	27
Crop Production/Wild Pollinators	40	40
Total	331	463

Results Summary

Natural Asset Inventory

Agricultural land makes up 52.6% of the natural asset composition within the NPCA. Natural assets account for 28.1% of the NPCA area. Combined, agriculture, natural, and pervious area assets cover 83.5% of the NPCA's jurisdiction.

Condition Assessment

98% of the natural assets are in fair or good condition. Wetland assets are rated as good, while other natural assets are generally rated as fair.

Carbon Storage and Sequestration

Forest assets in NPCA sequester 0.25 to over 2.5 tonnes of carbon per hectare per year, with a total carbon storage exceeding 13 millions tonnes. Sequestration rates for non-forest vary by type and are derived from literature.

Asset Replacement

The overall replacement costs for assets owned and managed by the town were estimated to exceed $10 billion.

Ecosystem Service Value

The estimated annual ecosystem services provided by natural assets in the NPCA region ranges between $331 million and $463 million.

The state of Infrastructure Report – the Fort Erie Case Study

Provides an evaluation of the municipality's natural assets and their capacity to deliver services

- Will contribute to compliance with O Reg 588/17 which requires municipalities in Ontario to incorporate green infrastructure into asset management plans
- Scope of analysis covers:
  - Natural Asset Inventory
  - Condition Assessment
  - Risk Assessment
  - Levels of Services
  - Asset Replacement Values
  - Ecosystem Services Values

Fort Erie Case Study Overview of Scope

Thank you!

For more information, please contact:

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NPCA staff measuring a tree for the Fort Erie Urban Street Tree Inventory

Report To: **Board of Directors**

Subject: **Delegation of Authority under the Conservation Authorities Act**

Report No: **FA-35-24**

Date: **July 19, 2024**

Recommendation:

THAT Report No. FA-35-24 RE: Delegation of Authority under the *Conservation Authorities Act* **BE RECEIVED;**

AND THAT the Board **DELEGATE AUTHORITY**, under Section 28.4 of the *Conservation Authorities Act*, to the Director, Watershed Strategies and Climate Change as signatory on Section 28 work permits, for the terms of their employment with the Niagara Peninsula Conservation Authority (NPCA);

AND THAT the Board **DELEGATE AUTHORITY**, under Section 28.4 of the *Conservation Authorities Act,* to the Director, Watershed Strategies and Climate Change to carry out administrative reviews of complete permit applications under Section 8 of Ontario Regulation 41/24 for the terms of their employment with the NPCA.

Purpose:

To obtain Board approval to re-delegate permit signatory authority for all Section 28 work permits to Leilani Lee-Yates, Director, Watershed Strategies and Climate Change pursuant to Section 28.4 of the *Conservation Authorities Act*.

To obtain Board approval to re-delegate authority to Leilani Lee-Yates, Director, Watershed Strategies and Climate Change to undertake administrative reviews of complete permit applications pursuant to Section 28.4 of the *Conservation Authorities Act* and Section 8 of Ontario Regulation (O. Reg. 41/24).

Background:

Section 28.4 Delegation of Power under the *Conservation Authorities Act* (Act) allows a conservation authority to delegate any of its powers related to the

issuance or cancellation of permits under the Act or its regulations to any other person or body, subject to any limitations or requirements that may be prescribed by regulation. As a standard best practice, many conservation authorities have delegated powers to their executive committees and/or staff related to the granting of work permits.

Through previous Board approvals, specific senior management staff, including the CAO/Secretary-Treasurer and Director, Planning and Development have been delegated the authority to sign Section 28 Permits as part of the authority's commitment to excellent customer service delivery and continuous improvement.

Discussion:

The ability to delegate authority to senior staff to sign work permits is essential to ensure the NPCA meets the permit review timeline of 90 days, as prescribed by the Province under the amendments to the *Conservation Authorities Act* that came into force on April 1, 2024. If the NPCA fails to give the applicant notice of a decision with respect to a permit application within 90 days after the application is deemed complete, the applicant may appeal the application directly to the Ontario Land Tribunal (OLT). The delegation of signatories for work permits ensures that the NPCA provides a client-centric focus on the timely issuance of permits.

Effective on April 1, 2024, Section 8 of O. Reg. 41/24 allows for an applicant to request a review of the conservation authority if:

a) The applicant has not received a written notice from the authority within 21 days of submitting an application that states whether the permit application is deemed to be complete;
b) The applicant disagrees with the authority's determination that the application for a permit is incomplete; or
c) The applicant is of the view that a request by the authority for other information, studies or plans to form a complete application is not reasonable.

This administrative review requested by an applicant shall be completed by the authority no later than 30 days after it is requested. The authority must:

a) Confirm that the application meets the requirements of a complete application or provide reasons why the application is incomplete; or
b) Provide reasons why a request for other information, studies or plans to form a complete application is reasonable or withdraw the request for all or some of the information, studies or plans.

The administrative review is not subject to the *Statutory Powers Procedure Act*, and there is no mechanism for an appeal of the decision.

With the pending resignation of Chandra Sharma, CAO/Secretary-Treasurer and the appointment of Leilani Lee-Yates as the Director, Watershed Strategies and Climate Change, there is an administrative requirement for Director Lee-Yates to retain delegated authority to approve Section 28 Permits and undertake administrative reviews of complete permit applications pursuant to the Act and O. Reg. 41/24 to ensure NPCA satisfies legislative timelines.

When a new CAO/Secretary-Treasurer and Director of Planning and Development are hired, staff will bring forward a recommendation report for a delegation of authority under the Act. It is recommended that Director Lee-Yates retain delegated authority for the term of their employment with the NPCA as additional operational support.

Financial Implications:

There are no financial implications associated with this report.

Links to Policy/Strategic Plan

The daily work of the Planning and Development department contributes to a healthy and resilient climate and supports sustainable growth by protecting people and properties from natural hazards and climate impacts. The recommendations included herein empower NPCA to maintain a high standard of client services, tools, and procedures for regulating and issuing permits consistent with NPCA policies.

Related Reports and Appendices:

None.

Authored by:

Original signed by:

Leilani Lee-Yates, MCIP, RPP
Director, Watershed Strategies and Climate Change
Interim Director, Planning and Development

Submitted by:

Original signed by:

Chandra Sharma, MCIP, RPP
Chief Administrative Officer/Secretary-Treasurer

Report To: **Board of Directors**

Subject: **Niagara Peninsula Conservation Authority (NPCA) – Appointment of Regulations Officers**

Report No: **FA-33-24**

Date: **July 19, 2024**

Recommendation:

THAT Report No. FA-33-24 RE: Niagara Peninsula Conservation Authority (NPCA) – Appointment of Regulations Officers **BE RECEIVED;**

AND THAT the NPCA staff named below, **BE APPOINTED**, under Section 30 of the *Conservation Authorities Act* for the terms of their employment with the NPCA, as Officers of the NPCA and Provincial Offences Officers.

Purpose:

The purpose of this report is to appoint Joel Bilodeau and Sarah Hutley as Officers and Provincial Offences Officers for the purposes of compliance and enforcement of Regulations made pursuant to Section 29 of the *Conservation Authorities Act* and the *Trespass to Property Act* by the Board of Directors of the Niagara Peninsula Conservation Authority.

Background:

The *Conservation Authorities Act* provides for a conservation authority to appoint Officers to enforce its regulations. Furthermore, the Minister of Natural Resources has implemented under the authority of Subsection 1(3) of the *Provincial Offences Act*, a class designation process for all conservation authorities whereby a conservation authority Officer appointed under Section 30 of the *Conservation Authorities Act* shall be designated by the Minister simultaneously as a Provincial Offences Officer.

Discussion:

Officers appointed under Section 30 of the *Conservation Authorities Act* have the authority to enforce offences and Regulations under the *Conservation Authorities*

Act and the *Trespass to Property Act* when carrying out their duties within the jurisdiction of the conservation authority.

The prerequisite to the Minister's Provincial Offences Officer appointment is that all candidate officers:

I. Be adequately trained in the legislation to be enforced, including the *Provincial Offences Act*;
II. Have proof of a clean criminal record check, and;
III. Be appointed as an Officer to enforce conservation authority legislation at an official Board meeting.

Pursuant to the approval of the above-noted appointment, the Minister's requirements will have been addressed.

NPCA Officers are appointed specifically for the sections of the *Conservation Authorities Act* they are responsible for enforcing.

NPCA Regulations Officers are responsible for compliance and enforcement on private and public properties subject to Ontario Regulation 41/24 and Section 28 of the *Conservation Authorities Act*.

NPCA Conservation Areas staff (Superintendents, Land Care Coordinators) are responsible for compliance and enforcement in active parks and on lands owned by the NPCA where the rules of conduct in conservation areas, permitted uses and activities on the property are subject to Ontario Regulation 688/21 and Section 29 of the *Conservation Authorities Act*.

Financial Implications:

There are no financial implications specific to the appointment of NPCA Officers or Provincial Offences Officers.

Links to Policy/Strategic Plan:

The duties carried out by the Compliance and Enforcement business unit are part of the NPCA's mandate and support NPCA's *Strategic Plan 2021-2031* to protect people and properties from natural hazards and climate impacts.

Related Reports and Appendices:

None.

Authored by:

Original Signed by:

_____

Adam Christie
Director, Conservation Areas

Submitted by:

Original Signed by:

_____

Chandra Sharma, MCIP, RPP
Chief Administrative Officer/Secretary-Treasurer