



Board of Directors Meeting Agenda

Thursday November 6, 2025

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Board of Directors Meeting

Thursday, November 6, 2025 at 6:00 p.m.

Hamilton Conservation Authority is now conducting meetings in a hybrid format via an in-person and WebEx platform.

All meetings can be viewed live on HCA's You Tube Channel:
<https://www.youtube.com/user/HamiltonConservation>

1. **Call to Order** – Brad Clark
 - 1.1. Land Acknowledgement
2. **Declarations of Conflict of Interest**
3. **Approval of Agenda**
4. **Delegations**
5. **Consent Items for Applications, Minutes and Correspondence**
 - 5.1. Permit Applications Summary Report Page 1
 - 5.2. Approval of Board of Directors Minutes – October 2, 2025 Page 7
 - 5.3. Approved – June 12, 2025 Conservation Advisory Board Minutes – for receipt only Page 15
 - 5.4. Correspondence from City of Hamilton, Office of the Mayor with respect to 2026 Budget Directive Page 21
 - 5.5. Correspondence from the City of Hamilton, Office of the Mayor with respect to Mayoral Directive to Staff Page 23
6. **Foundation Briefing** Foundation Chair – André Chabot

7. Member Briefing

8. Business Arising from the Minutes

9. Reports from Budget & Administration Committee and Conservation Advisory Board

9.1. Conservation Advisory Board – October 9, 2025 – Wayne Terryberry
(Recommendations)

| | | |
|----------------|--|----------|
| 9.1.1. CA 2522 | HCA's Planning Regulations Policy Document | Page 27 |
| 9.1.2. CA 2523 | Final Eramosa Karst Conservation Area Master Plan and Chippawa Rail Trail Management Plan for Approval | Page 145 |
| 9.1.3 CA 2524 | Water Resource Engineering Monitoring Network – Review and Enhancements | Page 345 |

10. Other Staff Reports/Memorandums

Memorandums to be received

| | | |
|---|--------------------|----------|
| 10.1. Watershed Conditions Memorandum | – Jonathan Bastien | Page 377 |
| 10.2. Conservation Area Services Update | – Liam Fletcher | Page 383 |

11. New Business

12. In-Camera Items

12.1. Confidential Report BD/Nov 01-2025
(Land Matter)

13. Next Meeting – Thursday, December 4, 2025 at 6:00 p.m.

14. Adjournment



Report to: Board of Directors

Approved for Circulation By: Lisa Burnside, CAO

Reviewed By: T. Scott Peck, MCIP, RPP, Deputy Chief Administrative Officer/Director, Watershed Management Services

Prepared By: Mike Stone, MCIP, RPP, Senior Manager, Watershed Planning, Stewardship & Ecological Services

Meeting Date: November 6, 2025

Subject: Permit Applications Summary Report

HCA permit applications approved by staff under the *Conservation Authorities Act* and Ontario Regulation 41/24 between the dates of September 18, 2025 and October 24, 2025 are summarized in the following Permit Applications Summary Report (PASR-8/25).

Recommendation:

THAT the Board of Directors receive this Permit Application Summary Report PASR-8/25 as information.

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HAMILTON REGION CONSERVATION AUTHORITY

PERMIT APPLICATION SUMMARY REPORT (PASR 8/25)

HCA permit applications approved under the Conservation Authorities Act and Ontario Regulation 41/24 between the dates of September 17, 2025 - October 24, 2025

| File Number | Date Received | Date Permit Issued | Review Days | Applicant Name | Location | Application Description | Recommendation / Conditions |
|---------------|---------------|--------------------|-------------|----------------|---|---|--|
| F/F,C/25/66 | 10-Sep-25 | 18-Sep-25 | 12 | | 6 Fallsview Rd Lot 10,11, Concession 1 Flamborough | for the replacement of an existing septic system | Approved subject to standard conditions. |
| SC/F,C/25/67 | 17-Sep-25 | 30-Sep-25 | 27 | | 57 Windemere Dr Lot 1, Concession BF Stoney Creek | for the installation of new 1 ¼ PE road crossing service | Approved subject to standard conditions. |
| H/F,C,A/25/68 | 23-Sep-25 | 30-Sep-25 | 11 | | Glover Rd at Rymal Rd E Lot , Concession Hamilton | for the expansion of Hydro Distribution plant to service new development at 60 Glover Road | Approved subject to standard conditions. |
| H/F,C/25/65 | 10-Sep-25 | 30-Sep-25 | 22 | | 700 Woodward Ave Lot 29, 30, Concession BF Hamilton | upgrading existing underground Valve Chambers No. 4, 5, 6, and 9, and extend the existing below-grade Raw Water Control Valve Chamber No. 1 | Approved subject to standard conditions. |
| F/F,C/25/62 | 25-Aug-25 | 02-Oct-25 | 30 | | 1527 Safari Rd Lot 28, 29, Concession 7 Flamborough | for the repair works to an existing pipeline at dig site 4403 | Approved subject to standard conditions. |
| F/A/25/75 | 25-Sep-25 | 09-Oct-25 | 16 | | 331 Sydenham Rd Lot 17, Concession 2 Flamborough | for the alteration of a watercourse | Approved subject to standard conditions. |

HAMILTON REGION CONSERVATION AUTHORITY

PERMIT APPLICATION SUMMARY REPORT (PASR 8/25)

HCA permit applications approved under the Conservation Authorities Act and Ontario Regulation 41/24 between the dates of September 17, 2025 - October 24, 2025

| | | | | | | | |
|----------------|-----------|-----------|-----|--|--|--|---|
| F/F,C/25/70 | 22-Sep-25 | 09-Oct-25 | 19 | | 1462 Valens Rd Lot 25, 26, Concession 7 Flamborough | for the lowering of an existing pipeline and adding fill to provide adequate cover for the pipeline | Approved subject to standard conditions. |
| SC/F,C,A/25/72 | 29-Sep-25 | 15-Oct-25 | 105 | | W of 1 Wendakee Dr and East St Lot 4, Concession BF Stoney Creek | for shoreline protection works | Approved subject to standard conditions. |
| SC/F,C,A/25/73 | 29-Sep-25 | 15-Oct-25 | 105 | | Adjacent to 531 Winona Rd Lot 4, 5, Concession BF Stoney Creek | for shoreline protection works | Approved subject to standard conditions. |
| H/F,C,A/25/64 | 10-Sep-25 | 22-Oct-25 | 24 | | 470 Cootes Dr Lot 57, Concession 1 Hamilton | for the construction of a wetland, watercourse alteration, and associated site alteration | Approved subject to standard conditions. |
| A/F,C,A/25/47V | 14-Oct-25 | 23-Oct-25 | 11 | | 1031 Mineral Springs Rd Lot 39, Concession 1 Ancaster | for the alteration of a watercourse and construction of a pedestrian bridge | Approved subject to standard conditions. |
| SC/F,A/25/74 | 29-Sep-25 | 23-Oct-25 | 26 | | 1865 Rymal Rd E Lot 32, Concession 8 Stoney Creek | for the remediation (close-out) of a karst grike feature | Approved subject to standard conditions. |

HAMILTON REGION CONSERVATION AUTHORITY

PERMIT APPLICATION SUMMARY REPORT (PASR 8/25)

HCA permit applications approved under the Conservation Authorities Act and Ontario Regulation 41/24 between the dates of September 17, 2025 - October 24, 2025

| | | | | | | | |
|-------------|-----------|-----------|----|--|--|--|--|
| F/F,C/25/71 | 29-Sep-25 | 23-Oct-25 | 12 | | | for the placement of two modular homes, construction of modular home foundations, and associated site alteration | Approved subject to standard conditions. |
| | | | | | | | |

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Hamilton Region Conservation Authority

Minutes

Board of Directors Meeting

October 2, 2025

Minutes of the Board of Directors meeting held on Thursday, October 2, 2025 at 6:00 p.m., at the HCA main office, 838 Mineral Springs Road, in Ancaster, and livestreamed on YouTube.

PRESENT:

| | |
|--------------------------------------|---------------------|
| Susan Fielding – in the Chair | |
| Jeff Beattie | Craig Cassar |
| Lisa DiCesare | Matt Francis |
| Wayne Terryberry | Alex Wilson |
| Maureen Wilson | |

Graham Reid – Foundation Vice Chair

REGRETS: **Brad Clark, Mike Spadafora**

STAFF PRESENT: **Nancy Arnold, Jonathan Bastien, Lisa Burnside, Gord Costie, Marlene Ferreira, Scott Fleming, Liam Fletcher, Ben Garvie, Brandon Good, Rob Gray, Matt Hall, Amanda Martin, Stacey McConnell, Scott Peck, Carissa Smith, Mike Stone, Jaime Tellier, Sandra Winner**

OTHERS: **Paul Williams (Haudenosaunee Wildlife and Habitat Committee)**

1. Call to Order

The Chair called the meeting to order and welcomed everyone present. HCA's Indigenous Land Acknowledgement was read.

2. Declarations of Conflict of Interest

The Chair asked members to declare any conflicts under the Board's Governance Policy. There were none.

3. Approval of Agenda

The Chair requested any additions or deletions to the agenda; there were none.

BD12, 3538

**MOVED BY: Craig Cassar
SECONDED BY: Jeff Beattie**

THAT the agenda be approved.

CARRIED

4. Delegations

There were none.

5. Consent Items for Applications, Minutes and Correspondence

The following consent items were adopted:

5.1. Permit Applications Summary Report

5.2. Approval of Board of Directors Minutes – September 4, 2025

5.3. Approved – August 21, 2025 Budget & Administration Committee Minutes – for receipt only

6. Foundation Briefing

Graham Reid, Vice Chair of the Conservation Foundation, reported that between September 1st and 30th, the Foundation received \$145,843 in donations. This brings the fiscal year-to-date fundraising total to \$989,805, and that the Foundation has officially surpassed the original fundraising goal of \$847,300. This is in large part due the securement of a new major gift commitment of \$200,000 from the RBC Foundation in support of the Saltfleet Wetland Restoration Project. The first installment of \$100,000 was received in September, and a formal gift announcement will be shared publicly soon.

BD12, 3539

**MOVED BY: Wayne Terryberry
SECONDED BY: Matt Francis**

THAT the Foundation Briefing be received.

CARRIED

7. Member Briefing

There was none.

8. Business Arising from the Minutes

There was none.

9. Reports from Budget & Administration Committee and Conservation Advisory Board

9.1. Budget & Administration Committee – September 18, 2025 (Recommendations)

9.1.1. BA 2535 Draft 2026 Operating and Capital Budgets

Susan Fielding brought forward an overview of the staff report, followed by a presentation by Scott Fleming with key highlights as follows:

- The 2026 budget for HCA invests \$20.7 million to protect natural spaces, enhance public accessibility and engagement opportunities and supporting environmental initiatives across the watershed.
- The operating budget contains a 3.3% increase to municipal levy, and is balanced in part by self-generated revenue, with \$1.8 million coming from the conservation areas.
- The Capital budget, using the \$2M block funding from the City of Hamilton, supports both major maintenance as well as special projects within the HCA. Additionally, \$500k from HCA reserves will be used toward finalizing the design of the third wetland at Saltfleet.
- A key initiative in the HCA's Strategic Plan is land acquisition. This long-term project seeks to protect and expand natural areas, strengthen climate resilience and enhance green space across the watershed. To help reach this objective, a special funding request to the City of Hamilton for \$500,000/year over a ten-year period is included in the 2026 budget. This money along with 10% of revenues from HCA's Annual Membership Pass sales, and support from our Foundation will be put towards the initiative.
- The draft budget once approved will be circulated to our two participating municipalities for any comments and returned to the HCA Board in December for final approval.

Councillor Beattie requested additional information on a planned project for Fifty Point Conservation Area, Phase 3 of the road construction. This item will be raised under New Business.

BD12, 3540

**MOVED BY: Susan Fielding
SECONDED BY: Jeff Beattie**

THAT the Budget & Administration Committee recommend to the Board of Directors:

- **THAT the 2026 Draft Operating Budget, as presented, be endorsed for approval and;**
- **THAT the 2026 Draft Capital Budget, as presented, be endorsed for Approval**

CARRIED

9.1.2 BA 2536 External Audit Services – Request for Proposal Results

Susan Fielding brought forward the staff report indicating a Request For Proposal was circulated to secure external audit services for the next five-year term. KPMG LLP was recommended for appointment; as the lowest bid, and they demonstrated strong qualifications, extensive experience with conservation authorities and a comprehensive understanding of Public Sector Accounting Standards.

BD12, 3541

**MOVED BY: Susan Fielding
SECONDED BY: Alex Wilson**

HCA the Budget & Administration Committee recommends to the Board of Directors:

THAT the contract for external audit services for the Hamilton Conservation Authority, Confederation Beach Park, and the Hamilton Conservation Foundation for the five-year period beginning with the year ending December 31, 2025, be awarded to KPMG LLP for a total cost of \$341,330.00, exclusive of HST and further;

THAT the Hamilton Conservation Authority appoints KPMG as its auditors for the 2025 fiscal year.

CARRIED

10. Other Staff Reports/Memoranda

Reports to be Approved

10.1. Dundas Valley Study Area Master and Management Plans – Results of Request for Proposals for Consultant Services.

Madolyn Armstrong brought forward the staff report indicating that Request for Proposal was sent out to assist with staff with developing the Master and Management Plans for the conservation areas within the Dundas Valley study area. Staff are recommending that “thinc design” be awarded the contract based on their low bid in addition to their experience in developing master plans for natural areas similar to the Dundas Valley.

BD12, 3542

**MOVED BY: Craig Cassar
SECONDED BY: Wayne Terryberry**

THAT the consulting services for the development of new Master & Management Plans for the Dundas Valley Study Areas, be awarded to “thinc design” for a total cost of \$164,510 (excluding HST, including \$15,000 contingency).

CARRIED

10.2. Specific Agreement with the Haudenosaunee Wildlife and Habitat Committee

Gord Costie brought forward the staff report seeking approval for a three-year agreement between the Haudenosaunee Wildlife and Habitat Committee (HWHC) and the HCA, to continue to allow deer harvesting withing specific areas of the Dundas Valley. Paul Williams, a member of the HWHC, provided background information to Board Members on the agreement between the two groups as well as the importance of the deer harvest to the Haudenosaunee community.

BD12, 3543

**MOVED BY: Craig Cassar
SECONDED BY: Wayne Terryberry**

THAT the Board of Directors approve the attached agreement allowing for a deer harvest in an area of Dundas Valley Conservation Area identified as Schedule ‘A’, and generally bounded by Martin Road to the east, Jerseyville Road to the south, Paddy Green Road to the west, and Powerline Road to the north and; identified as Schedule ‘B’ and generally bounded by 50 metres into HCA lands between Weir’s Lane to the east, the CN rail line to the

north, the lot line of private properties along the south and west only on weekdays excluding Fridays between November 3 and December 4, 2025, inclusive for 2025 and further,

THAT the agreement extends to 2026 and 2027 for the same locations only on weekdays excluding Fridays between November 2 to December 3, 2026 and November 1 to December 2, 2027 inclusive

CARRIED

10.3. Watershed Conditions Report

Jonathan Bastien presented a summary of the memorandum, noting that during the period of August 20th to September 23rd 2025, there weren't any significant watercourse flooding events, or significant watercourse water safety concerns, and, there wasn't any Lake Ontario shoreline flooding events.

BD12, 3544

**MOVED BY: Lisa DiCesare
SECONDED BY: Alex Wilson**

THAT the memorandum entitled Watershed Conditions Report be received.

CARRIED

10.4. Conservation Areas Experiences Update

Liam Fletcher provided a summary of the memorandum on various activities in our conservation areas this month.

BD12, 3545

**MOVED BY: Maureen Wilson
SECONDED BY: Craig Cassar**

THAT the memorandum entitled Conservation Areas Experiences Update be received.

CARRIED

11. New Business

Fifty Point Road Reconstruction

Jeff Beattie brought forward a resident issue at Fifty Point Conservation Area as a result of road reconstruction within the conservation area. Lisa Burnside indicated that the road reconstruction underway involves an internal roadway within Fifty Point adjacent to a residential area. Major capital projects are communicated through website alerts, with on-site signage added where appropriate. In this case, once a few resident inquiries were received, a full project information page was shared online. Staff are following up directly with residents that have contacted HCA and are also working collaboratively with the ward councillor's office to address any concerns. Preparation work is nearly complete, with paving anticipated near the end of October which will be much quieter. Recognizing the proximity of nearby residential development, staff will look for ways to further enhance communication for future projects and will coordinate with the councillor's office on next year's planned final phase of road work in the 2026 capital budget.

12. In-Camera Items

There was none.

13. Next Meeting

The next meeting of the Board of Directors will be held on Thursday, November 6, 2025 at 6:00 p.m. at the HCA Main Administration Office – Woodend Auditorium, 838 Mineral Springs Road, Ancaster, Ontario.

14. Adjournment

On motion, the meeting adjourned.

Scott Fleming
Secretary-Treasurer

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HAMILTON CONSERVATION AUTHORITY

Conservation Advisory Board

MINUTES

June 12, 2025

Minutes of the Conservation Advisory Board meeting held on Thursday, June 12, 2025 at 4:00 p.m., at the HCA main office, 838 Mineral Springs Road, in Ancaster, and livestreamed on YouTube.

PRESENT: **Wayne Terryberry – in the Chair**
 Craig Cassar **Elise Copps**
 Jamie Freeman **Haley McRae**
 Cortney Oliver **Noah Stegman**

REGRETS: **Tyler Cunningham, Natalie Faught, Brian McHattie,**
Brad Clark – Ex-Officio, Susan Fielding – Ex-Officio

STAFF PRESENT: **Madolyn Armstrong, Lisa Burnside, Lindsay Davidson,**
Marlene Ferreira, Sarah Gauden, Brandon Good, Matt
Hall, Natalie Kemp, Amanda Martin, Griffin Moore, Scott
Peck, Mike Stone, Jaime Tellier, and Sandra Winninger

OTHERS: **Media – None**

1. Welcome

The Chair called the meeting to order and welcomed everyone present.

2. Declaration of Conflict of Interest

The Chair asked members to declare any conflicts under the HCA Administrative By-law. There were none.

3. Approval of Agenda

The Chair requested any additions or deletions to the agenda.

**CA 2510 MOVED BY: Craig Cassar
 SECONDED BY: Noah Stegman**

THAT the agenda be approved.

CARRIED

4. Delegations

There were none.

5. Election of Vice Chair

An interim Vice Chair for the Conservation Advisory Board is required due to Sherry O'Connor's leave of absence.

Wayne Terryberry called for nominations for the 2025 Vice Chair.

**Nominated: Noah Stegman
By-Mover: Jamie Freeman**

The Chair called for nominations twice more. Having no further nominations, he asked Sherry O'Connor if she accept the nomination. The election for the office of Vice Chair of the Conservation Advisory Board for 2025 was then closed and the position acclaimed with the following resolution.

**CA 2512 MOVED BY: Jamie Freeman
 SECONDED BY: Cortney Oliver**

THAT nominations for the Vice-Chair of Conservation Advisor Board be closed and Noah Stegman be confirmed as interim Vice-Chair of the Conservation Advisory Board.

CARRIED

6. Member Briefing

6.1. The Basadinaa Experience Video

Lindsay Davidson provided background on the project that has been installed along the Main Loop Trail in the Dundas Valley and officially opened on June 10, 2025. She noted that the project process inspired the creation of a video, which highlights

the contributing partners of the project. The video was shown to members. It was noted that the video will be available on the HCA's website.

CA 2513

**MOVED BY: Noah Stegman
SECONDED BY: Jamie Freeman**

THAT the Member Briefing be received.

CARRIED

7. Chairman's Report on Board of Directors Actions

Wayne Terryberry reported that the following items were approved at the March 6, 2025 Board of Director's meeting:

- 7.1 CA 2504 Westfield Artifact Accessions for 2024
- 7.2 CA 2505 HCA Open Data Portal
- 7.3 CA 2506 Expansion of the Check out the Great Outdoors Library Program: First Nations

8. Approval of Minutes of Previous Meeting

8.1. Minutes – Conservation Advisory Board (April 10, 2025)

CA 2514

**MOVED BY: Haley McRae
SECONDED BY: Jamie Freeman**

THAT the minutes of the April 10, 2025 Conservation Advisory Board meeting be approved.

CARRIED

9. Business Arising from the Minutes

9.1. Tiffany Falls Visitor Use Management Plan

Matt Hall provided an overview of the report, highlighting the process taken in the creation of the Visitor Use Management Plan. He stated that the plan addresses three main considerations: visitor experience, staff management of the site and ecological conditions; these form the basis of the strategies considered in the plan.

The strategy recommended was reviewed and members' questions were answered. It was noted that approval of the plan is the first step in the process with

implementation steps to follow, which include; detailed designs; a development application to the Niagara Escarpment Commission; coordination with ward councillor and City staff regarding enhancements to the controlled pedestrian crossing and enforcement of municipal parking restrictions as well as creating a marketing/information piece for visitors.

**CA 2515 MOVED BY: Cortney Oliver
 SECONDED BY: Jamie Freeman**

THAT the Conservation Advisory Board recommends to the Board of Directors;

THAT the Tiffany Falls Visitor Use Management Plan be approved; and further

THAT staff be directed to implement Visitor Use Management Strategy #5 as recommended in Section 9.1 of the Plan as well as it's associated Action Items outlined in Section 9.2.

CARRIED

10. Staff Reports/Memorandums

Reports for Recommendation

10.1. HCA's Planning and Regulations Policies Update

Mike Stone provided an overview of the report and answered members' questions. He indicated that the update is needed to reflect recent legislative changes to the Conservation Authorities Act that took effect April 1, 2024, and to support implementation of HCA's new Shoreline Management Plan.

Keeping these policies current is essential to the effective delivery of HCA's planning and regulatory programs and staff are seeking direction to circulate the draft for public and stakeholder review.

**CA 2516 MOVED BY: Noah Stegman
 SECONDED BY: Haley McRae**

THAT the Conservation Advisory Board recommends to the Board of Directors;

THAT the *Policies for Land Use Planning & Regulation in the Watersheds of the Hamilton Conservation Authority (Draft, June 2025)* be received as information;

THAT staff be directed to make the Draft policy document available for public and stakeholder review and comment; and further

THAT the final version of the policy document based on the public input received then be returned to the Board for adoption.

CARRIED

10.2. HCA Conservation Areas Program – Proposed Visitor Engagement Opportunities

Brandon Good reviewed the report and answered members' questions. He indicated that the program outlines a five-year, phased program to expand visitor experiences at Conservation Areas, with the goal of connecting more people to nature through engaging, educational, and healthy outdoor activities.

**CA 2517 MOVED BY: Jamie Freeman
 SECONDED BY: Elise Copps**

THAT the Conservation Advisory Board recommends to the Board of Directors;

THAT the HCA Conservation Area Program – Visitor Engagement Opportunities report be received for information; and further

THAT HCA implement the Year 1 (2025) and Year 2 (2026) proposed new offerings as detailed in the report.

CARRIED

10.3 HCA Conservation Areas Program – Access and Amenities Review and Proposed Initiatives

Brandon provided a summary of the report and answered members' questions. He stated the review focused on identifying and addressing barriers: physical, cultural, and informational, to help make HCA's Conservation Areas more inclusive and welcoming. Two initiatives are recommended for implementation in 2025 as outlined in the motion. Additional initiatives identified are operational in nature and are being addressed through departmental workplans.

CA 2518 **MOVED BY: Jamie Freeman**
SECONDED BY: Noah Stegman

THAT the Conservation Advisory Board recommends to the Board of Directors;

THAT the Conservation Areas Access and Amenities Review report be received for information; and further

THAT HCA adopt the following two initiatives:

- 1. Expand participation in the Easter Seals Canada Access 2 Program to include all HCA Conservation Areas, promoting free entry for support persons of individuals with disabilities; and**
- 2. Partner with the Parks Prescription (PaRx) program for a one-year pilot, providing patients with a 30-day membership pass to HCA Conservation Areas, with a \$10 administrative fee for processing through the HCA membership system.**

CARRIED

11. New Business

There was none.

12. Next Meeting

The next meeting of the CAB is scheduled for Thursday, August 14, 2025 at 4:00 p.m.

13. Adjournment

On motion, the meeting was adjourned.



OFFICE OF THE MAYOR
CITY OF HAMILTON

VIA: Email

Brad Clark
Chair, Hamilton Conservation Authority
838 Mineral Springs Road
P. O. Box 81067
Ancaster, Ontario
L9G 4X1

October 8, 2025

Re: 2026 Budget Directive

Dear Chair Clark,

As we begin the development of the City of Hamilton's 2026 Budget, I want to thank you for your continued leadership and dedication to serving our community. The work you do every day helps ensure Hamiltonians receive the services, programs, and supports that make our city strong, inclusive, and forward-looking.

Yesterday, I issued my 2026 Mayoral Budget Directive, providing direction to City staff to prepare a Hold the Line tax budget targeting a maximum increase of 4.25%. This approach reflects the reality that many Hamiltonians are facing ongoing affordability pressures while our local economy continues to navigate the impacts of U.S. tariffs and broader economic uncertainty.

Our collective responsibility is clear: we must prioritize affordability while protecting the services Hamiltonians rely on. I have asked City staff to identify efficiencies, modernize processes, and explore new revenue opportunities, including potential partnerships and funding from other levels of government.

As important partners in this work, I encourage each Board and Agency to align your 2026 budget submissions with the same focus - looking critically at any large-scale budget items and adjusting requests to reflect the affordability and uncertainty challenges facing Hamiltonians. I also ask that you review your operations for opportunities to streamline, innovate, and find cost savings, while maintaining the high level of service Hamiltonians expect and deserve.

Together, through collaboration and a shared commitment to responsible stewardship, we can deliver a 2026 Budget that reflects Hamilton's values, protects our progress, and supports a strong, inclusive, and resilient community.

Thank you again for your leadership and partnership.

Sincerely,

A handwritten signature in black ink, appearing to read "Andrea Horwath". The signature is fluid and cursive, with a large initial "A" and "H".

Andrea Horwath
Mayor, City of Hamilton

CC:

Lisa Burnside, Chief Administrative Officer, Hamilton Conservation Authority



Mayoral Directive to Staff MDI-2025-01

Date: October 7, 2025

To: Marnie Cluckie, City Manager/CAO,
Mike Zegarac, General Manager, Finance & Corporate Services/City Treasurer

WHEREAS pursuant to subsection 284.16 of the *Municipal Act, 2001* and section 7 of O. Regulation 530/22, the mayor shall prepare a proposed budget for the City.

I, Andrea Horwath, Mayor of the City of Hamilton, direct the City Manager and the City Treasurer, to prepare the 2026 Budgets (Rate Supported and Tax Supported) for consideration by City Council, with the following directions:

- The ongoing economic uncertainty caused by U.S. tariffs, together with continued affordability challenges faced by Hamiltonians, makes it clear that the 2026 Budgets must respond to the needs of our community. Feedback from residents throughout the year, reinforced during Budget Engagement sessions, as well as input from members of Council and the priorities outlined in the 2026 Outlook report of September 11, 2025, underscore the need to prioritize affordability while maintaining critical infrastructure and addressing community safety and well-being.
- Staff are directed to prepare a proposed *Hold the Line* tax budget targeting a maximum increase of 4.25%, ensuring that critical infrastructure investments (like roads, transit, and water/wastewater), community safety and well-being priorities (like public safety initiatives, recreation centres and programming, parks, sports fields and housing), and the service levels Hamiltonians rely on, are not compromised.
- All items referred to the 2026 Budget process by Council, as well as Business Cases provided in the outlook, must be reconsidered within a *Hold the Line* fiscal framework. Hamiltonians are stretching every dollar - the City of Hamilton must do the same. Any requests outside this framework must demonstrate a clear and urgent need for inclusion in the 2026 budget.

- While the details of the annual budget preparation work undertaken by staff may include such considerations, it is important to set out specific expectations about the rigour of this exercise.
- The target should be achieved through measures including but not limited to:
 - Review and implementation of operational efficiencies and cost-saving measures that achieve a permanent cost reduction without negatively impacting service levels, for example:
 - Modernizing processes
 - Leveraging technology
 - Eliminating redundancies
 - Right-sizing staffing complements across the corporation including vacancies
 - New and expanded revenue streams including funding opportunities from other levels of government and outside agencies, with analysis and review of unsuccessful previous applications in order to improve the likelihood of success in future applications
 - Review of capital projects to identify savings, for example:
 - Applying surpluses from closed projects
 - Closing projects no longer required
 - Determining whether capital investments for future projects, and equipment and vehicle purchases, can be spread across future budgets to ease the impact in 2026 without jeopardizing completion or operationally required delivery dates
 - Prudent utilization of debt and reserves, while protecting the City's credit rating
- The 2026 Budget Process must integrate Operating, Capital, and Rate budgets into two annual budgets: Rate Supported and Tax Supported. This integration will provide clear information about how capital projects affect operating costs and will improve accountability and long-term planning.
- The 2026 Budget process must start earlier, give Council and the public more time and information to review, and follow a clear, accessible schedule that emphasizes public engagement and transparency.
- Staff must expand budget engagement activities to ensure broad community input, including in-person sessions, a survey, and online tools, increasing accessibility for Hamiltonians to share their priorities.

I am committed to working collaboratively with Council to finalize the 2026 budgets through the prescribed process that maximizes the impact of our city's resources while addressing the economic challenges facing Hamiltonians. Together with City staff, we will implement measurable initiatives that prioritize exceptional customer service and directly benefit Hamiltonians. This approach will strengthen trust, deliver tangible results, and uphold our commitment to fiscal responsibility.

Proactive Planning for the 2027 budget:

In April 2026, the City Manager, together with the General Manager of Finance and Corporate Services, are to issue written direction to staff to begin a critical review of all program lines to assess their ongoing public value and ensure that every program and service reflects responsible stewardship of public funds, and is delivered in the most modern, effective and efficient way possible by leveraging technology, innovation and up-to-date processes. A copy of the direction from the City Manager and General Manager of Finance and Corporate Services, is to be provided to the Mayor's Office, and shall confirm that pre-budget efficiency and sustainable cost-saving measures for the 2027 budget have begun.

In addition, staff are to strengthen the 2027 budget process by delivering information and decision points earlier, and by establishing a streamlined, transparent process that increases meaningful public engagement.



Andrea Horwath
Mayor, City of Hamilton

c.c. Matthew Trennum, City Clerk

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Report to: Conservation Advisory Board

Approved for Circulation By: Lisa Burnside, CAO

Reviewed By: T. Scott Peck, MCIP, RPP, Deputy CAO/Director, Watershed Management Services

Prepared By: Mike Stone, MCIP, RPP, Senior Manager, Watershed Planning, Stewardship & Ecological Services

Meeting Date: October 16, 2025

Subject: HCA's Planning and Regulations Policies Update

Recommendation:

THAT the Conservation Advisory Board recommends to the Board of Directors;

THAT the Policies for Land Use Planning and Development Regulation in the Watersheds of the Hamilton Conservation Authority (September 2025) be adopted.

Executive Summary:

A review and update of HCA's *Planning & Regulation Policies and Guidelines* (October 2011) has been completed to address legislative and regulatory changes to the *Conservation Authorities Act* that came into effect on April 1, 2024. Updates to HCA's policies were also required to support the implementation of HCA's new Shoreline Management Plan (2025). Ensuring HCA's policies are kept up to date is critical to the successful implementation of HCA's planning and regulations programs.

A draft of the policy document was made available for public and stakeholder review and comment from July 4th to August 15th. Minor edits and changes to the policy document were made based on comments received from the City of Hamilton and internal staff discussions.

Staff Comment / Discussion:

HCA's Planning & Regulation Policies and Guidelines

The Hamilton Conservation Authority's (HCA) *Planning & Regulation Policies and Guidelines* were developed to support and guide the implementation of HCA's planning and regulation programs. The policy document provides HCA staff with direction when reviewing and commenting on permit applications under the *Conservation Authorities Act*, as well as applications for development under the *Planning Act*, *Niagara Escarpment Planning and Development Act*; and *Environmental Assessment Act*.

HCA's current planning and regulation policies document is from 2011. There have been periodic updates to the policy manual since 2011 to address specific issues. This has included minor updates to the wetland policies in 2014, updated policies for the placement and movement of soil and other fill materials in 2016, and amendments to the natural heritage policies in 2021 to address the use of natural heritage offsetting in the case of a Minister's Zoning Order.

Legislative and Regulatory Changes

The provincial government initiated a review of the legislative and regulatory framework within which land use planning occurs in 2014. This review has included numerous amendments to the *Planning Act* and updates to the Provincial Policy Statement and provincial plans, as well as changes to the *Conservation Authorities Act* and regulations.

On April 1, 2024, a number of significant changes and amendments to the *Conservation Authorities Act* took effect governing how conservation authorities regulate and permit development activities. A report regarding these changes was presented to the Board of Directors at their March 7, 2024 meeting, where the Board supported a recommendation that staff be directed to produce or update existing HCA documents, policies and procedures as may be required to ensure compliance with the new regulations and legislative changes.

An update of HCA's planning and regulation policies is required to comply with and implement the legislative and regulatory framework.

Shoreline Management Plan

A new Shoreline Management Plan (SMP) for the HCA was approved by the Board of Directors in February 2025. The SMP provides the HCA with updated coastal hazard mapping of its shoreline based on the latest technical information and data, and makes management recommendations on a reach specific basis to assist the HCA in administering its regulation of development on the shoreline. Updates to the planning and regulation policies are required to support implementation of the SMP.

Summary of Key Proposed Policy Changes

HCA's planning and regulations policies have been updated to reflect legislative and regulatory changes to the *Conservation Authorities Act*, and to address HCA's new Shoreline Management Plan. Updates have also been made based on staff experiences applying and implementing the 2011 policies. The updated policy document is included as Attachment A.

Notwithstanding recent legislative and regulatory changes to the *Conservation Authorities Act*, conservation authorities continue to regulate development activities in watercourses, wetlands and hazard prone areas such as river valleys and shorelines, and permits continue to be required for development activities in such areas in most cases. As a result, many of the HCA's existing policies regarding development in regulated areas remain unchanged, or have received only minor or administrative updates.

Key policy updates and changes to the document include:

General Updates and Changes

- New document title and general restructuring
- Updated summary of the legislative and policy framework that guides land use planning and regulation of development
- Addition of a summary description of the major HCA watersheds
- Separation of land use planning policies (Section 4) and regulatory policies (Section 5)
- Removal of all references to *Ontario Regulation 161/06, HCA's Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*
- Removal of numerous appendices that are no longer relevant or necessary

Land Use Planning Policies

- Expanded policy direction for land use planning to support HCA's involvement in municipal plan input and municipal plan review matters
- Policy direction reflects current Provincial Planning Statement (2024)
- Provide for consideration of water resource systems and natural heritage systems and features where they support the control, management or mitigation of natural hazards
- Allow consideration of stormwater management facilities to control Regional storm event flows

Regulatory Policies

- Updated description of regulated areas, regulated activities and permit considerations ('tests') based on the new regulations

- General policy updates to address new permit tests which require that:
 - (a) the activity is not likely to affect the control of flooding, erosion, dynamic beaches or unstable soil or bedrock; or
 - (b) the activity is not likely to create conditions or circumstances that, in the event of a natural hazard, might jeopardize the health or safety of persons or result in the damage or destruction of property.
- Removal of policies that provide for the consideration of natural heritage features, except where they may support the control, management or mitigation of natural hazards
- Update shoreline policies to reflect a new 100-year flood level and erosion rate based on the Shoreline Management Plan
- Greater flexibility for minor additions, replacement structures and accessory structures where existing development is affected by hazards
- Additional policy direction regarding criteria to be met to achieve safe access
- Additional policy direction regarding floodplain spill areas
- Revised policy direction for wetlands based on loss of natural heritage considerations

Summary of Consultation

Ontario Regulation 41/24, Prohibited Activities, Exemptions and Permits, requires a conservation authority to consult with stakeholders and the public during policy review and update processes, as a conservation authority considers advisable. A draft of the policy document was made available for public and stakeholder review and comment from July 4th to August 15th. The policy document was made available on HCA's web-based public engagement platform, and was circulated directly to the following agencies:

- City of Hamilton (Planning & Economic Development and Public Works)
- County of Wellington (Planning) and Township of Puslinch
- West End Home Builders Association
- Hamilton-Oshawa Port Authority
- Hamilton Harbour Remedial Action Plan Office
- Royal Botanical Gardens
- Conservation Ontario and Greater Golden Horseshoe area Conservation Authorities

The City of Hamilton was the only agency to provide comments. There were no comments received from the other agencies that were circulated directly, or from the general public. City staff from Planning & Economic Development and from Public Works (Environmental Services) provided minor comments and points of clarification. The City's comments did raise questions regarding the potential for impacts to wetlands, use of MZOs, and application of offsetting/ compensation, and related conflicts with City Official Plan natural heritage policies.

In general, there were relatively few substantive changes made to the policy document as a result of consultation. The comments received from the City, as well as further internal staff discussion, resulted in a number of minor corrections and clarifications to the policies and organization of the document. More noteworthy changes included the following:

- Background provided in Section 2 (watersheds characterization) and Section 3 (legislative/policy framework) shortened, and Table 1 added to summarize key legislation and policy
- Maintenance of a maximum 50-year design life for shoreline protection structures to help limit the impact of the new shoreline erosion rate identified in the SMP
- Strengthening of policies for accessory structures in the riverine erosion hazard
- Addition of policies for development within 30 m of wetlands
- Requirement to apply HCA's Natural Heritage Offsetting Guidelines (2023) where wetlands may be impacted as a result of development approved in accordance with the planning and regulation policies, an environmental assessment study and/or a mandatory HCA permit issued under a Minister's Zoning Order

Strategic Plan Linkage:

The initiative refers directly to the HCA Strategic Plan 2025 – 2029:

- **Strategic Priority Area – Water Resources Management**
 - Initiative – Update planning and regulatory policy based on the recommendations of the 2024 Shoreline Management Plan, and amendments to the Conservation Authorities Act and associated regulatory changes.

Agency Comments:

Not Applicable

Legal / Financial Implications:

Updates to HCA's *Planning & Regulation Policies and Guidelines* are required to comply with and implement the legislative and regulatory changes to the *Conservation Authorities Act* that came into effect on April 1, 2024.

Related Reports and Appendices:

Attachment A – *Policies for Land Use Planning and Development Regulation in the Watersheds of the Hamilton Conservation Authority (September 2025)*

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Attachment A

Healthy Watersheds, Healthy Communities

Policies for Land Use Planning and Development Regulation in the Watersheds of the Hamilton Conservation Authority

September 2025



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1 INTRODUCTION

The Hamilton Conservation Authority (HCA) is a watershed-based organization established under the provisions of the *Conservation Authorities Act*. Since 1958 the HCA has dedicated itself to the conservation and management of watershed lands and water resources for the benefit of people, communities and the environment.

The HCA undertakes programs on a watershed basis to further the conservation and management of natural resources. This includes programs to protect people and property from risks associated with natural hazards, manage water resources, monitor and conserve the natural environment, and provide recreational and educational opportunities. The HCA works collaboratively with a variety of agencies and groups in implementing its programs, and in support of its vision for a healthy watershed.

HCA's *Policies for Land Use Planning and Development Regulation* outline the policies that will be used to guide the HCA in administering and implementing its programs and services related to municipal land use planning and regulation of development.

1.1 How to Read this Document

The HCA may become involved in land use planning matters, regulation of development, and natural hazard management in a number of different roles and capacities. Therefore, not all of the policies contained in the document will be applicable in all cases. However, the policies should not be read in isolation of one another. Rather, they should be reviewed and considered in their entirety, and the appropriate range of policies should be applied to each situation. The policies are intended to be complimentary in nature, and there are clear linkages across policy areas and sections in the document. While specific policies sometimes refer to other policies for ease of use, these cross-references do not take away from the need to read the document as a whole. There is no implied priority in the order in which the policies appear.

This document consists of the following major sections:

Section 1 provides a general introduction and outlines the purpose of the document, and explains how to read and interpret the policies it contains.

Section 2 provides some background and characterization of the HCA watersheds, including summary descriptions of its major subwatersheds.

Section 3 summarizes the legislative and regulatory framework within which HCA operates and administers its various programs and services related to land use planning, regulation of development and management of natural hazards.

Section 4 outlines policies to guide HCA's involvement in municipal plan input and municipal plan review matters under the *Planning Act* and other legislation where HCA may comment on land use planning matters.

Section 5 defines the policies HCA will apply to its administration of the development regulations outlined in the *Conservation Authorities Act (CA Act)* and *Ontario Regulation 41/24*. These policies will be applied to the review of development permit applications received under the CA Act and regulations.

Section 6 provides a glossary of defined terms. Italicized terms in the document have a corresponding definition included in the glossary. Other terms should be interpreted based on normal use and definition or meaning of the word.

The document also includes a number of Figures to support the content included in Sections 1 to 6.

1.2 Approval and Amendments

This policy document will be reviewed periodically and updated as required to ensure consistency with applicable legislation and regulations. Amendments to the policies contained in this document will require HCA Board of Directors approval, and may require public consultation depending on the scope of changes. Minor editorial and other housekeeping amendments to this document that do not impact overall policy direction or objectives will not require Board approval or public consultation. Technical guidelines that may be developed to clarify and support implementation of the policies outlined in this document will require Board approval.

2 THE HAMILTON CONSERVATION AUTHORITY AND ITS WATERSHEDS

2.1 A Brief History of the HCA

The origins of the conservation movement and conservation authorities in Ontario dates to the early 1900s. It was during this period that some individuals and organizations began to take notice of deteriorating environmental conditions, including pollution, deforestation, flooding and soil erosion. These conditions were the result of over a hundred years of settlement in Ontario and an associated legacy of poor land and natural resource management practices in some regions. The conservation movement that began during this period would eventually lead to a number of important conservation milestones, including passing of the *Conservation Authorities Act* in 1946.

Growth and development in the Townships of Puslinch, Flamborough, Beverly, Ancaster and Dundas in the 1950s eventually led to concern among residents over conservation issues, including summer creek flows, flooding, reforestation and recreation. These communities petitioned the province under the *Conservation Authorities Act* to establish a watershed unit charged with the management of water resources. That request was approved, and the Spencer Creek Conservation Authority was founded on May 8, 1958, and held its first meeting on June 20, 1958. The Spencer Creek watershed included an area of approximately 25,000 ha extending from the Township of Puslinch to Hamilton Harbour.

In an effort to temper growth with some greater consideration for the environment, the City of Hamilton and parts of the surrounding communities of Stoney Creek, Saltfleet, Binbrook, and Glanford decided to join the Spencer Creek Conservation Authority in 1966, which resulted in the creation of the Hamilton Region Conservation Authority. In 2000, with the amalgamation of municipalities in the Hamilton region, the name of the conservation authority was changed to the Hamilton Conservation Authority (HCA) for administrative purposes, but remains Hamilton Region Conservation Authority in law.

Today, the HCA watersheds cover an area of approximately 57,000 ha (570 sq km), that includes portions of the Town of Grimsby, the City of Hamilton, and the Township of Puslinch in Wellington County (Figure 1). Within the watersheds under its jurisdiction, HCA administers programs and services to further the conservation and management of natural resources. This includes programs to manage water resources, protect people and property from natural hazards, monitor and conserve the natural environment, and provide recreational and educational opportunities. The HCA works collaboratively with a variety of agencies and groups in implementing its programs and services, and in support of its vision for a healthy watershed for everyone.

In support of its mandate, the HCA owns and manages approximately 4,700 ha of land. This includes large areas of conservation land that support important natural heritage features and ecological and hydrological functions, and which provide for passive recreational use. The HCA also operates a number of Conservation Areas with facilities and infrastructure that provide for a wide range of recreational uses, educational programming and events.

The HCA is governed by a Board of Directors, which consists of 10 members appointed by the City of Hamilton, 7 elected officials and 3 citizen appointments, and 1 member from the Township of Puslinch. Funding for HCA's programs comes primarily from municipal levy and revenues that are self-generated.

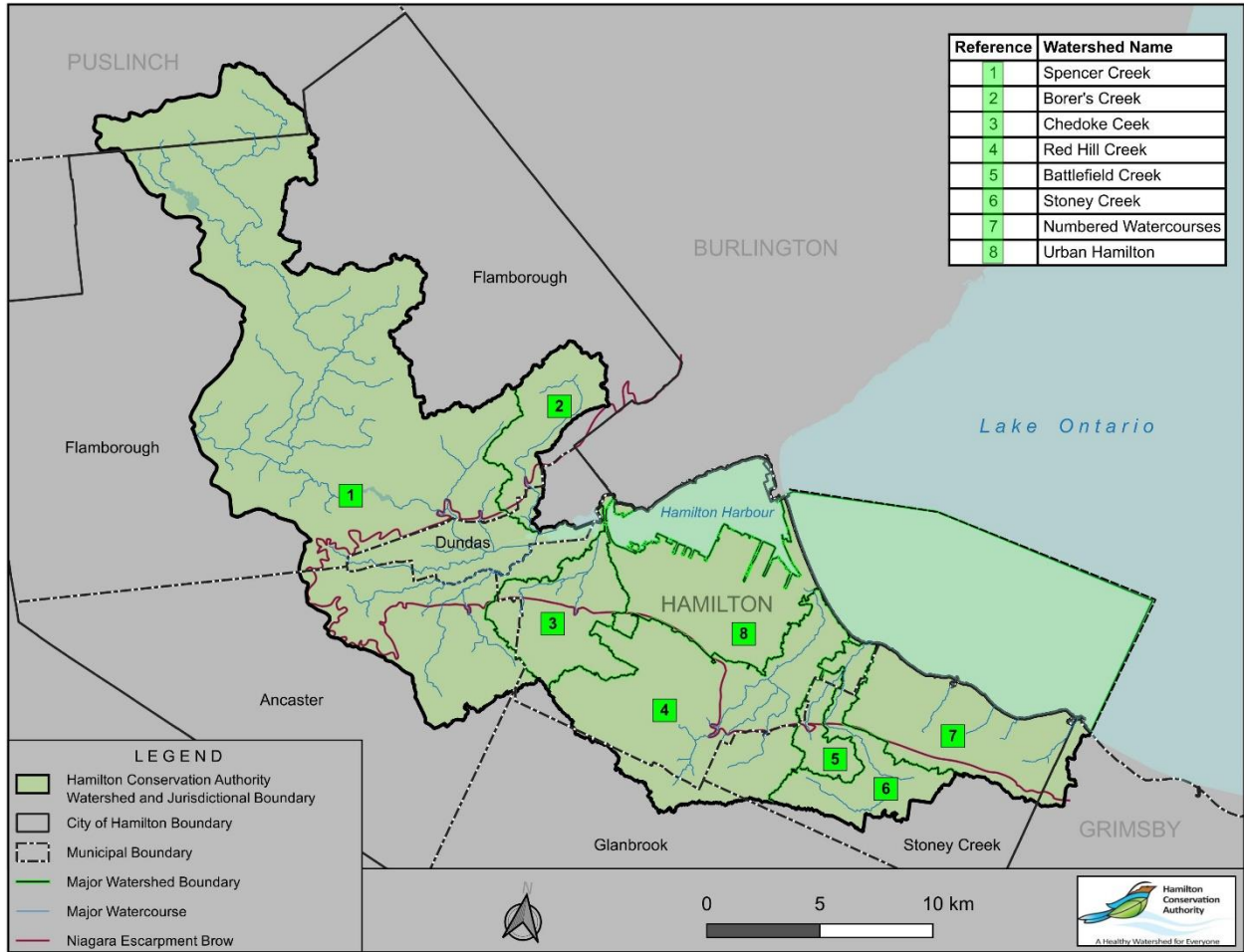


Figure 1: The Hamilton Conservation Authority watersheds

2.2 Overview of the HCA Watersheds

The Hamilton Conservation Authority (HCA) watersheds are located at the western end of Lake Ontario within the Treaty Lands and Territory of the Mississaugas of the Credit First Nation and traditional territory of the Haudenosaunee.

The major watersheds include Spencer Creek, Borers Creek, Chedoke Creek, Redhill Creek, Stoney Creek, Battlefield Creek and the Stoney Creek Number Watercourses, as well as portions of the Hamilton Harbour and Lake Ontario shoreline (Figure 1). These watersheds cover an area of approximately 57,000 ha (570 km²), encompassing the majority of the City of Hamilton and portions of the Town of Grimsby and Township of Puslinch, with a population of over 600,000 residents.

The major watercourse systems within these watersheds drain from above the Niagara Escarpment, through southern Puslinch Township and the former municipalities of Flamborough, Dundas, Ancaster, Glanbrook, Stoney Creek and Hamilton, and ultimately to Hamilton Harbour and Lake Ontario. The watersheds are comprised of a mix of urban, rural, agricultural and natural lands.

The physical landscapes of the HCA watersheds are diverse, shaped by glacial activity of the past. The watersheds have varied geologic conditions and physiographic features, including clay, sand and limestone plains, exposed bedrock, karst, moraines, cliff faces, talus slopes, beaches and shoreline. Prominent landform features include the Niagara Escarpment, Dundas Valley and Red Hill Valley systems, as well as Cootes Paradise Marsh, Hamilton Harbour and Lake Ontario.

These varied landscape conditions support a diverse natural heritage and rich biodiversity. The Great Lakes-St. Lawrence Forest region is represented in the upper watersheds, and the deciduous forest region (often referred to as the Carolinian forest), in the central and lower watersheds. These areas are among the most biologically diverse in Ontario, and support a number of rare species and a wide variety of ecosystem types, including wetland, forest, meadow, prairie and alvar.

Forest cover across the HCA watersheds is approximately 19%, while wetlands cover approximately 8% of the watershed area, although forest and wetland coverage varies considerably on a subwatershed basis. In areas where agricultural and urban land uses dominate, smaller, more fragmented and disturbed areas of woodlot, plantation, and old field habitats are widespread.

The following sections provide a summary overview of the major watersheds within HCA's jurisdiction. A characterization of the watersheds is helpful towards understanding the present-day landscape within which land use planning and development regulation occurs.

2.2.1 Spencer Creek

The Spencer Creek watershed is the largest watershed within the jurisdiction of the HCA at 23,700 ha (237 km²), representing close to half of HCA's entire jurisdictional area. The Spencer Creek watershed outlets directly into Cootes Paradise Marsh, and is comprised of a number of subwatersheds, including Ancaster Creek, Flamborough Creek, Fletcher Creek, Logie's Creek, Lower Spencer Creek, Middle Spencer Creek, Spring Creek, Sulphur Creek, Sydenham Creek, Tiffany Creek, Upper Spencer Creek, West Spencer Creek, and Westover Creek.

In the upper part of the Spencer Creek watershed, the Upper Spencer Creek and Fletcher Creek subwatersheds form their headwaters in the rural lands and wetlands in the Township of Puslinch and the City of Hamilton. This portion of the watershed is characterized by drumlins, moraines, poorly drained organic soils, till and limestone plains (the Flamborough Plain). These features support a varied landcover that includes large organic coniferous swamps, fens, shrub thickets, deciduous forests and a small number of alvar communities. Groundwater discharge in these headwater areas plays an important role in regulating stream temperatures and supporting cold and cool water habitat for more sensitive fish species.

The Beverly Swamp encompasses close to 2,500 ha and is one of the largest remaining tracts of lowland swamp forest in southern Ontario. The Beverly Swamp and Fletcher Creek Swamp wetland complexes comprise a significant portion of the upper watershed, and play important hydrological functions storing water, maintaining downstream flows, recharging groundwater and improving water quality. Groundwater recharge areas are generally concentrated in areas above the Niagara Escarpment, with significant portions of Flamborough and the Spencer Creek watershed identified as significant groundwater recharge areas.

Moving south from the upper watershed, the Flamborough Creek, Westover Creek and West Spencer Creek subwatersheds occupy predominantly rural and agricultural lands above the Niagara Escarpment. The Ancaster, Tiffany, Spring, Sulphur, Logie's, Sydenham and Middle Spencer Creek subwatersheds also have their headwaters in rural areas draining from above the Niagara Escarpment through a glacial valley, into the Lower Spencer Creek subwatershed and urbanized areas below the escarpment.

The lower portion of the Spencer Creek watershed is characterized by sand plains, moraines and escarpment. The Dundas Valley is the largest deciduous forest located in the watershed, and supports Carolinian forests, meadows, significant geological formations and a diversity of rare plants, birds and wildlife. It is connected through narrow corridors to Cootes Paradise marsh, which is the largest coastal wetland in western Lake Ontario.

Significant aggregate resources are found within the Spencer Creek watershed, with quarries operating within both the Middle Spencer and Logie's Creek subwatersheds.

There are two large dams located in the Spencer Creek watershed, Christie Dam located at Christie Lake Conservation Area and Valens Dam at Valens Lake Conservation Area. Both of these dams are managed by the Hamilton Conservation Authority to help regulate water flows and mitigate the potential for flooding within the Spencer Creek system.

2.2.2 Borer's Creek

The Borer's Creek watershed is the smallest watershed at 1,950 ha (19.5 km²), or close to 4% of HCA's jurisdictional area. The Borer's Creek watershed is characterized by areas of sand plain and moraine, which support a number of significant natural areas. The headwaters of Borer's Creek originate in the Parkside Drive Wetland Environmentally Significant Area then flow west from the community of Waterdown in the City of Hamilton through commercial, industrial, rural and agricultural lands, before flowing over the Niagara Escarpment and outletting directly to Cootes Paradise Marsh south of York Road in the Town of Dundas.

The Borer's Creek watershed houses five municipally designated Environmentally Significant Areas, including the Parkside Drive Wetland, Millgrove South Woodlot, Waterdown North Wetlands, Borer's Falls – Rock Chapel, and Cootes Paradise. The wetlands, woodlots and successional areas contained within these ESA's support a diversity of flora and fauna, and provide riparian corridors and connections to the Cootes Paradise wetland below the Escarpment, which is the largest remaining shoreline marsh at the western end of Lake Ontario.

2.2.3 Chedoke Creek

The Chedoke Creek watershed is 2,440 ha (24.4 km²), or 4% of the HCA jurisdictional area. This watershed drains from an urban area of Hamilton located above the Niagara Escarpment at the western end of the Lincoln. M. Alexander Parkway. The headwaters of the Chedoke Creek watershed are mainly enclosed within the City of Hamilton stormwater and sewer system, except for tributaries of Chedoke Creek that occur within the Iroquoia Heights Conservation Area Environmentally Significant Area.

Watercourses are open as they spill over the Niagara Escarpment, and then re-enter the municipal piped system located in the urban areas of Hamilton below the escarpment. Chedoke Creek flows in an open concrete-lined channel along Highway 403, before outletting to the south shore of Cootes Paradise Marsh.

This area has been intensively developed, and the majority of this warm water system is a direct result of stormwater input. Observable channels are present in the three municipally designated Environmentally Significant Areas within the watershed, including Iroquoia Heights Conservation Area, Hamilton Escarpment, and Cootes Paradise.

2.2.4 Red Hill Creek

The Red Hill Creek watershed is the second largest watershed within the jurisdiction of the HCA at 6,800 ha (68 km²), or 12% of the HCA watershed. It is comprised of 8 subwatersheds, including Hannon Creek, Lower Davis Creek, Lower Greenhill, Montgomery Creek, Red Hill Valley, Upper Davis Creek, Upper Greenhill and Upper Ottawa.

The Lincoln M. Alexander Parkway, Red Hill Valley Parkway and Queen Elizabeth Way are major transportation corridors within this watershed. The Niagara Escarpment and its associated valley lands, such as the Felker's Falls Escarpment Valley Environmentally Significant Area, as well as successional meadows found throughout, form the majority of natural areas within the watershed.

The Red Hill Valley extends approximately eight kilometres between the Niagara Escarpment and Lake Ontario. The valley today is comprised of a natural corridor and Red Hill Creek, which was re-aligned to accommodate the Red Hill Valley Parkway.

The Eramosa Karst is located within the Upper Davis Creek subwatershed, and features significant karst geological features, such as caves, sinking streams, springs, and dry valleys. It is considered to be the best example of karst topography found in Ontario, and is designated as a provincially significant Earth Science Area of Natural and Scientific Interest (ANSI).

The Red Hill Creek watershed is predominantly urbanized, with some agricultural, commercial and industrial land use in the Hannon Creek subwatershed. All of the subwatersheds originate above the Niagara Escarpment. Flow from the Escarpment is funneled into the Red Hill Valley and associated Red Hill Creek Escarpment Valley Environmentally Significant Area corridor. Red Hill Creek flows through the valley into Windermere Basin and outlets to the east end of the Hamilton Harbour.

2.2.5 Stoney Creek and Battlefield Creek

The Stoney-Battlefield Creek watershed comprises 2,730 ha (27.3 km²) or 5% of the HCA jurisdictional area. As its name suggests, it is comprised of two subwatersheds, Stoney Creek and Battlefield Creek, with both creek systems having their headwaters originating in rural agricultural lands above the Niagara Escarpment in the east end of the City of Hamilton. The two subwatersheds converge just south of Barton Street East within the Stoney Creek Ravine Environmentally Significant Area, in the former Town of Stoney Creek.

Land use within the watershed below the Niagara Escarpment has long been urban and industrial. With early urbanization resulting in creek channelization, poor stormwater infrastructure, and development within floodplain areas, this watershed has been prone to flooding and erosion and the stability and function of the watercourses has been impacted over time.

Three Environmentally Significant Areas occur in the watershed, including Stoney Creek Ravine, the Felker's Falls Escarpment Valley, and the Devil's Punchbowl Escarpment, all of which are associated with the Escarpment and its associated valleys. The Devil's Punchbowl is a large gorge cut from the last ice age where visitors can view over 40 million years of geological history on the gorge walls.

In 2022, the HCA began work to establish and construct a number of wetlands in the new Saltfleet Conservation Area to help alleviate flooding in the Battlefield Creek subwatershed and to restore and enhance natural areas along the Niagara Escarpment.

2.2.6 Stoney Creek Numbered Watercourses

The Stoney Creek Numbered Watercourses watershed is 3,900 ha (39 km²) in area, representing 7% of the HCA jurisdictional area, and is comprised of numerous subwatersheds that outlet to the southwestern shore of Lake Ontario in the community of Stoney Creek, in the City of Hamilton. The subwatersheds are identified by watercourse (WC) number (i.e. WC 1, 2, 2.1, etc.)

The headwaters of the watershed begin in the predominantly rural concessions that traverse the top of the Niagara Escarpment south of the community of Stoney Creek. At the toe of the Escarpment, agricultural lands still persist and many of the watercourses were historically channelized and moved to roadsides to promote agricultural drainage. Residential development has steadily encroached along Highway 8 and Barton Street as they cross through Stoney Creek, where a number of watercourses have been enclosed in the City of Hamilton piped system. The numbered watercourses flow through commercial and industrial lands to the north of Barton Street, before crossing the Queen Elizabeth Way highway and through urban areas associated with the Lake Ontario shoreline. All of the subwatersheds outlet directly to Lake Ontario.

This watershed has two remnant natural areas that have been recognized as Environmentally Significant Areas. Fifty Creek Valley ESA which occurs along the riparian corridor of WC 12 north of the QEW and within Fifty Point Conservation Area. The Devil's Punchbowl Escarpment ESA is a ribbon of natural area along the Niagara Escarpment that runs through the majority of this watershed and is home to remnant natural communities.

2.2.7 Urban Hamilton

The Urban Hamilton watershed is the third largest watershed at 5,880 ha (58.8 km²), representing 10% (including Hamilton Harbour in its entirety) of the HCA jurisdictional area. As its name implies, the watershed consists of the urban core of the City of Hamilton, as well as Hamilton Harbour.

This watershed is comprised of three subwatersheds. The Urban Core subwatershed drains the urban core of Hamilton and a small portion of the Niagara Escarpment along the Claremont and Sherman Access Roads. The Beach Strip subwatershed, which drains the peninsula of land that occurs south of the Burlington Canal, and the Hamilton

Harbour subwatershed, which traces the Hamilton Harbour shoreline, extending to encircle the Woodland Cemetery and the Royal Botanical Garden's Rock Garden.

The watershed contains a portion of the Hamilton Escarpment Environmentally Significant Area, and lands surrounding the Hamilton Harbour are part of the Cootes Paradise and Hamilton Harbour Environmentally Significant Areas. Cootes Paradise wetland is the largest remaining shoreline marsh in the western end of Lake Ontario, and while the Urban Hamilton watershed is highly urbanized, these Environmentally Significant Areas provide important ecological linkages connecting Cootes Paradise to upland terrestrial habitats.

The Iroquois Plain, which extends from the base of the Niagara Escarpment to Hamilton Harbour and Lake Ontario, marks the area of former glacial Lake Iroquois. Former beaches of Lake Iroquois now form barrier bars, including the Burlington Barrier Bar (commonly referred to today as the Beach Strip) which separates Hamilton Harbour from Lake Ontario, and the Hamilton Barrier Bar which separates Cootes Paradise from Hamilton Harbour.

The northern section of the Lake Ontario shoreline is composed of a dynamic beach which supports a natural beach and dune system. A large portion of Hamilton Harbour is developed as a major deep-water industrial port, with inner areas of the Harbour comprised of municipal parkland and recreational facilities. Historic landfilling and dredging operations have significantly changed the internal configuration of the harbour, with the southern and eastern shorelines consisting almost entirely of fill to support industrial development. Hamilton Harbour contains the only large deep water and littoral aquatic system in the watershed. Although these communities are degraded, they remain locally significant. Hamilton Harbour is identified as an Area of Concern and has a Remedial Action Plan in place.

2.3 Watershed Threats, Impacts and Challenges

The terrestrial environment throughout many of the major watersheds is dominated by agricultural and urban land uses. Vegetation is diverse, despite the conversion of most forested land and wetlands to urban and suburban areas, road networks, and agriculture. However, remaining natural areas continue to be threatened by habitat loss, invasive species, pollution and climate change.

Habitat loss is the biggest threat to the natural heritage of HCA's watersheds. This loss is related primarily to continuing growth and development pressures. With respect to wetlands, which are among the most important habitat types, the Hamilton region has seen 78% of its wetlands lost since pre-settlement (Ducks Unlimited, 2010). Loss of wetland and forest habitat types continues to be an issue across the HCA watersheds.

Invasive species are plants, animals, aquatic life, and micro-organisms that outcompete native species when introduced outside of their natural environment, and which threaten ecosystems, economy, and society. Invasive species can be difficult to control, and require considerable resources to manage. The impact of invasive species in the HCA

watersheds includes the creation of monocultures as habitats dominated by one invasive species, loss of forest canopy and declining forest health, as well as lack of wetland establishment due to invasive fish species.

Pollution can have a variety of impacts on natural systems including creating toxic environments that can decrease biodiversity. Nutrients such as phosphorus are impacting HCA's watersheds and the Hamilton Harbour. Road salt that washes into local waterways is also having an impact, and can result in high levels of chlorides which are toxic to fish, amphibians and macroinvertebrates.

Climate change is increasingly disrupting natural habitats, impacting the ability of various plants and animals to adapt to changing conditions (Government of Canada, 2022).

HCA is working cooperatively with other conservation organizations, groups and municipalities to address these threats and challenges. HCA administers programs and services which are contributing to the monitoring and management of watershed impacts. This includes programs for the acquisition of environmentally significant lands, ecological and water quality monitoring, invasive species management, stewardship of private lands, and land use planning and regulation of development.

3 LEGISLATIVE AND POLICY FRAMEWORK

The legislative and policy framework for conservation, natural resource management and land use planning in Ontario is complex. There are numerous statutes, regulations, policies and plans that guide conservation and planning work. There are also many agencies and organizations that play a role in land use planning, the management of natural resources and the conservation of the environment. This includes federal, provincial and municipal governments, as well as a diverse range of conservation, business and industry organizations, and private landowners.

This section provides an overview of the *Conservation Authorities Act* and its associated enabling provisions and regulations that provide the authority for the programs and services administered by the HCA. This section also looks at other selected important laws, policies and plans from provincial and municipal jurisdictions that are applicable to conservation, resource management and land use planning. The section concludes with a summary overview of the various roles and responsibilities that HCA (and other conservation authorities) play related to the implementation of this provincial legislative and policy framework.

Having a general understanding of some of the statutes, regulations, plans and policies that govern land use planning and natural resource management provides useful context for HCA's role in land use planning and regulation of development.

3.1 Conservation Authorities Act

The *Conservation Authorities Act* (CA Act) was first passed in 1946. The CA Act was developed in response to growing concerns over deteriorating environmental conditions across Ontario, including severe flooding and erosion problems. The CA Act sought to provide a basis for a provincial program of conservation, restoration and the wise use and management of Ontario's natural resources, including water, soils, forests and wildlife.

Today, the CA Act continues to provide the legislative basis for the formation of a conservation authority and determination of its jurisdiction and objects. It includes provisions to identify a conservation authority's membership and governance, to define its powers and authorities, to allow for the passing of regulations related to its authorities, and to provide certain enforcement powers.

Conservation authorities are corporate bodies established by the province at the request of two or more municipalities within a shared watershed in accordance with the requirements of the CA Act. A conservation authority is governed by the CA Act and by a Board of Directors whose members are appointed by participating municipalities based on representation criteria that are defined in the CA Act.

The purpose of the CA Act is to provide for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario. The CA Act further describes the objects

of a conservation authority, which are to provide, in the area over which it has jurisdiction, a variety of mandatory programs and services as defined in the act and associated regulations. This includes, programs and services to manage risks related to natural hazards, monitor water resources, and conserve and manage lands owned or controlled by the authority; an Authority shall also fulfill any duties and responsibilities as a source protection authority under the *Clean Water Act*.

The CA Act also provides that a conservation authority may enter into agreements to provide additional programs and services on behalf of a municipality situated within its area of jurisdiction, or to provide any other program or service it may deem advisable to further the purposes of the Act.

The CA Act enables conservation authorities with broad powers for the purpose of accomplishing their objects. This includes the ability to study and investigate the watershed to assist in developing programs and services, to acquire and dispose of land, to develop and use lands acquired for purposes not inconsistent with its objects, to collaborate and enter into agreements, and to create reservoirs, construct dams and control the flow of surface waters in order to prevent or reduce the adverse effects of flooding.

Section 21.1 of the CA Act requires conservation authorities to provide programs and services related to the risk of natural hazards, the conservation and management of lands owned or controlled by the authority, the authority's responsibilities as a source protection authority under the *Clean Water Act*, and other programs and services as prescribed by regulations created under the CA Act.

Ontario Regulation 686/21, Mandatory Programs and Services, (O. Reg. 686/21) under the CA Act further details the responsibilities of conservation authorities to manage risks related to natural hazards. This includes responsibilities related to reviewing and providing comments for plans of development under the *Planning Act, Aggregate Resources Act, Drainage Act, Environmental Assessment Act* and *Niagara Escarpment Planning and Development Act*, as well as responsibilities for administering and enforcing the regulations of the CA Act.

Section 21.1.1 further enables conservation authorities to enter into agreements with municipalities within their jurisdiction to provide municipal programs and services under a memorandum of agreement. Section 21.1.2 provides that a conservation authority may provide any program or service that it determines are advisable to further the purposes of the CA Act.

In accordance with these powers and the provisions of the CA Act more generally, conservation authorities have been given a broad mandate to work at the watershed level to conserve, restore and responsibly manage Ontario's water, land, and natural resources.

3.1.1 Conservation Authority Regulation of Development

The CA Act first empowered conservation authorities to establish development control regulations in 1956, for the purpose of prohibiting filling in floodplains. The regulations were broadened in 1960 to regulate the placing or dumping of fill in defined areas where, in the opinion of a conservation authority, the control of flooding, pollution or the conservation of land may be affected. Further amendments to the CA Act in 1968 expanded the regulations to prohibit or control construction and alteration to waterways, in addition to filling.

In 1998, the *Conservation Authorities Act* was amended to ensure that regulations under the CA Act were consistent across the province, and complementary to the current provincial environmental and natural hazard policies of the time. These changes led to the replacement of the earlier “Fill, Construction and Alteration to Waterways” Regulation, with the “Development, Interference with Wetlands and Alterations to Shorelines and Watercourses” Regulation (*Ontario Regulation 97/04*), which was passed in 2004.

Ontario Regulation 97/04 outlined the content that each conservation authority’s “Development, Interference with Wetlands and Alterations to Shorelines and Watercourses” Regulation must contain. The regulation required all conservation authorities to regulate Great Lakes shorelines, interconnecting channels, inland lakes and wetlands, in addition to the areas and features each conservation authority historically regulated. In 2006, individual regulations were passed for each Conservation Authority to be consistent with *Ontario Regulation 97/04*, including Ontario Regulation 161/06, HCA’s *Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*.

Between 2017 and 2024, amendments were made to the CA Act, including amendments impacting the regulation of development. The changes made by the government during this time were intended to streamline regulatory requirements to focus on natural hazards and public safety. Changes that came into effect on April 1, 2024 revoked *Ontario Regulation 161/06* and individual conservation authority development regulations. These regulations were replaced by *Ontario Regulation 41/24, Prohibited Activities, Exemptions and Permits (O. Reg. 41/24)*, a single regulation to address matters related to CA regulation of development.

Earlier amendments to sections 28 and 30.1 of the CA Act addressing regulation of development activities, permitting and enforcement also came into effect on April 1, 2024. The CA Act and *O. Reg. 41/24* must be reviewed in conjunction to understand how conservation authorities administer the regulation of development activities.

The changes implemented April 1, 2024 removed the consideration of natural heritage matters (previous ‘conservation of land’ and ‘pollution’ tests under *Ontario Regulation 97/04*) from permitting decisions. However, the CA Act continues to provide for the regulation of development activities in and adjacent to watercourses, wetlands and

hazard prone areas such as river valleys and shorelines, and permits continue to be required for development activities in such areas in most cases.

Under section 28.1 of the CA Act, a conservation authority may grant permission for development and other activities in a regulated area where it is of the opinion the activity is not likely to affect the control of flooding, erosion, dynamic beaches or unstable soil or bedrock, or create conditions that in the event of a natural hazard might jeopardize the health or safety of persons, or result in the damage or destruction of property.

The Minister of Natural Resources has certain powers under the *Conservation Authorities Act* that may at times supersede the power granted to conservation authorities. Where a conservation authority refuses a permit or attaches conditions to a permit that an applicant objects to, the applicant may request a review of the decision by the Minister. The Minister may also issue orders to make a permitting decision in place of a conservation authority. The circumstances under which the Minister may issue an order to make a permitting decision in place of a conservation authority or undertake a review of a conservation authority permitting decision are more specifically described in *Ontario Regulation 474/24, Minister's Reviews under Sections 28.1, 28.1.2 of the Act and Minister's Orders under Section 28.1.1 of the Act*.

Section 47 of the *Planning Act* enables the Minister of Municipal Affairs and Housing to issue zoning orders. When a conservation authority receives a permit application for a project authorized through a zoning order, Section 28.1.2 of the CA Act generally requires that the permit be granted if the project is not to be carried out in the Greenbelt Area. A conservation authority may impose conditions on such permits to mitigate hazard impacts, and may also enter into an agreement with the permit holder that sets out requirements to be satisfied in order to compensate for ecological impacts and any other impacts that may result from the development project.

The provisions of the CA Act and regulations that provide for the regulation of certain development activities are intended to help in the achievement of the broad goals and objectives of the conservation authorities, including in particular those related to the protection of people and property from natural hazards.

3.2 Other Legislation

There are a number of other important statutes that impact land use planning and the regulation of development, and the role of conservation authorities in these processes. In particular, O. Reg. 686/21 under the CA Act, prescribes a number of Acts under which conservation authorities have responsibilities related to reviewing and providing comments on development proposals. This includes the *Planning Act, Aggregate Resources Act, Drainage Act, Environmental Assessment Act* and *Niagara Escarpment Planning and Development Act*. A summary of each of these Acts and their relevance to the work of conservation authorities is provided in Table 1.

Table 1: Summary of land use planning and conservation legislation, policies and plans

| Legislation/Policy/Plan | Primary Purpose | Role of HCA |
|---|--|---|
| <i>Federal</i> | | |
| Impact Assessment Act | The <i>Impact Assessment Act</i> governs federal environmental assessments in Canada. The <i>Act</i> applies to projects undertaken on federal lands, as well as designated projects such as the construction, operation, decommissioning and abandonment of mines, renewable energy facilities, hazardous waste facilities, etc. | Conservation authorities may provide comments regarding potential natural hazard risks on proposals subject to the <i>Act</i> . |
| Hamilton Harbour Remedial Action Plan (HHRAP) | The HHRAP identifies the environmental concerns and impacts (impairments) to Hamilton Harbour, as well as their causes and goals and criteria for restoring beneficial use impairments, remedial actions to be taken and the agencies/authorities responsible for implementing them. | HCA participates in the collaborative governance structure of the HHRAP, and supports its implementation through various programs and activities, such as its watershed ecological and water quality monitoring programs. |
| <i>Provincial</i> | | |
| Conservation Authorities Act (CA Act) | <p>The purpose of the <i>CA Act</i> is to provide for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources in watersheds in Ontario.</p> <p>The <i>Act</i> provides the legislative basis for the formation of a conservation authority and the determination of its jurisdiction and programs and services.</p> | <p>Conservation authorities may provide a variety of programs and services under the <i>Act</i>, including related to natural hazards, the monitoring of water resources, and management of land owned or controlled by the Authority.</p> <p>Conservation authorities have responsibilities related to reviewing and providing comments on natural hazards for plans of development under the <i>Planning Act</i>, <i>Aggregate Resources Act</i>, <i>Drainage Act</i>, <i>Environmental Assessment Act</i> and <i>Niagara Escarpment Planning and Development Act</i>. The <i>Act</i> also provides Authority's with responsibilities for regulating development and enforcing these regulations.</p> |
| Planning Act | The <i>Planning Act</i> is the principal statute that guides Ontario's land use planning system, setting out the rules for land use planning and decision making. | The <i>Act</i> requires that municipalities notify relevant public agencies, including conservation authorities, of planning proposals so these agencies can offer comments. |

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|---|---|--|
| | The key purposes of the <i>Act</i> include promoting sustainable economic development in a healthy natural environment, and integrating matters of provincial interest into municipal planning decisions. The <i>Act</i> provides municipalities with a variety of tools for facilitating land use planning and development. | Conservation authorities provide comments related to natural hazards on land use planning applications made under the <i>Planning Act</i> . |
| Provincial Planning Statement (PPS) | The Provincial Planning Statement was created under the <i>Planning Act</i> to provide direction to municipalities regarding land use planning policies in areas of provincial interest. | Conservation authorities review and comment on development applications under the <i>Planning Act</i> to help ensure that decisions made under the <i>Act</i> are consistent with the natural hazard policies of the PPS. The PPS directs municipalities to collaborate with conservation authorities to identify hazardous lands and hazardous sites, and to manage development in these areas. The PPS also encourages municipalities to collaborate with local Conservation Authorities in undertaking watershed planning. |
| Greenbelt Act | The <i>Greenbelt Act</i> was enacted to protect natural heritage and water resource systems, preserve agricultural land as a source of food and employment, and to control urbanization in Southern Ontario. Planning decisions made under the <i>Planning Act</i> must conform to the policies of the Greenbelt Plan. | The Greenbelt Plan mandates that key natural heritage features and key hydrologic features must be shown in Official Plans, and that the delineation of these features can be undertaken by municipalities and conservation authorities. |
| Niagara Escarpment Planning and Development Act (NEPDA) | The <i>NEPDA</i> was enacted to maintain the Niagara Escarpment and land in its vicinity as a continuous natural environment, and to ensure only development compatible with that natural environment occurs. The NEPDA allows the Minister to make regulations designating any area or areas of land within the Niagara Escarpment Planning Area as a Development Control Area. | Development proposed within an area designated as a Development Control Area will require a development permit from the Niagara Escarpment Commission (NEC). Conservation authorities support the NEC development permit application review and approval process. A conservation authority may review development permit applications for the purpose of commenting on risks related to natural hazards. |

| | | |
|--|--|---|
| <p>Ontario Environmental Assessment Act (EA Act)</p> | <p>The <i>EA Act</i> sets up a process for reviewing the environmental impact of certain activities and projects. Proponents of projects (undertakings) subject to the <i>Act</i> must demonstrate that alternatives to the undertaking and alternative methods of implementing the undertaking have been considered, and that the chosen approach is environmentally preferable and needed.</p> | <p><i>Ontario Regulation 686/21</i> under the <i>CA Act</i> enables conservation authorities to review proposals subject to the <i>EA Act</i> for the purpose of commenting on any risks related to natural hazards that may arise from a proposal.</p> |
| <p>Drainage Act</p> | <p>The <i>Drainage Act</i> provides a process for one or more landowners to obtain a legal drainage outlet for an 'area requiring drainage'. The establishment of a municipal drain is a communal project, benefiting and paid for by those property owners whose lands are served by the drain.</p> | <p>Municipal drains are often regulated by conservation authorities as watercourses. For certain municipal drain and repair activities, a protocol has been developed to fulfill permission requirements under Section 28 of the <i>Conservation Authorities Act</i> without the full permitting process.</p> |
| <p>Aggregate Resources Act (ARA)</p> | <p>The <i>Aggregate Resources Act</i> governs the management of aggregate resources in Ontario. This includes provisions for the government to control and regulate aggregate operations on designated private and Crown lands, to minimize adverse impacts on the environment, and to require the rehabilitation of land after the excavation of aggregate resources.</p> | <p><i>Ontario Regulation 686/21</i> under the <i>CA Act</i> enables conservation authorities to review to review proposals subject to the <i>ARA</i> for the purpose of commenting on any risks related to natural hazards that may arise from an aggregate resource extraction operation.</p> |
| <p><i>Municipal</i></p> | | |
| <p>Municipal Official Plans, Zoning By-laws, Secondary Plans, and other land use plans</p> | <p>Municipal Official Plans, Zoning By-laws, Secondary Plans, and other land use plans inform land use planning and development within municipalities.</p> | <p>Conservation authorities may provide input to the development and implementation of these plans and policies, including the identification of lands affected by natural hazards and developing policies for managing land use change and development in areas affected by natural hazards.</p> |

3.3 City of Hamilton Official Plan

Official Plans (OPs) are policy documents created by municipalities that inform land use planning and development within their communities. When a municipality develops an OP, they must consult the public and with Indigenous communities. OPs must conform to any policy statements issued under the *Planning Act*, as well as provincial plans, and may require approval from the Province to take effect. Municipalities are expected to update and amend their OPs over time to ensure that policies are aligned with direction from the Province and reflect the current needs of the community.

The City of Hamilton has two Official Plans that apply to different areas within Hamilton, but the plans are complementary and both are designed to serve the City's vision of being a strong, vibrant, healthy, and diverse community. The Urban Hamilton Official Plan (UHOP) defines the City's urban boundary, and guides land use planning and development within it. The Rural Hamilton Official Plan (RHOP) applies to the rural areas in the City, and generally directs non-farm and non-resource-based growth to rural settlement areas with boundaries that are not to be expanded. The plans encourage residential intensification and generally direct growth towards existing built-up areas. The UHOP and RHOP identify a City-wide Natural Heritage System that is comprised of provincially and locally significant natural areas and features, and the linkages between them. The City NHS seeks to protect and enhance biodiversity and ecological functions, while also contributing to the character of the City and quality of life for its residents.

Both plans direct hazard lands to be placed in a separate zoning classification under the Zoning By-law. With some exceptions, the UHOP prohibits development and site alteration within hazard lands, which include both hazardous lands and hazardous sites as identified and mapped by conservation authorities within the City. The plans require that development proposals within conservation authority regulated areas are only approved by the City if they are permitted by the applicable conservation authority.

The Official Plans also include Special Policy Areas (SPAs), Area Specific Policies (ASPs), and Site Specific Policies (SSPs). SPAs are areas spanning multiple parcels of land where additional studies are required to determine land uses. ASPs are policies that apply to specific areas where unique consideration is needed. ASPs include policies specific to the Dundas Two Zone Floodplain Area. Whereas a one-zone system is used to identify and manage floodplain areas for the rest of the City, the two-zone system for the Dundas Two Zone Floodplain Area categorizes portions of the floodplain into a floodway and a flood fringe. Through these policies, some development activities that would be prohibited in the floodway can be permitted in the flood fringe. SSPs are policies that apply to specific parcels of land. Some SSPs require additional clearance of activities from conservation authorities (e.g. drainage diversions across watersheds).

3.4 Township of Puslinch

The Township of Puslinch is a lower-tier municipality in the County of Wellington. For lower-tier municipalities, the adoption of their own Official Plans is discretionary and not mandated by the *Planning Act*. In the case of Puslinch, the Township has not adopted its own OP, and relies on the policies set out in the County of Wellington OP. In addition to the general policies of the County of Wellington OP, the OP also provides local area specific policies for the Township of Puslinch in order to provide direction regarding what types of developments should be permitted in different areas of Puslinch.

3.5 Hamilton Harbour Remedial Action Plan

Hamilton Harbour is located at the western end of Lake Ontario, bounded by the City of Burlington to the north and City of Hamilton to the south. It supports Ontario's largest port, the Port of Hamilton, and significant commercial and industrial land use, as well as municipal parkland and recreational uses. Cootes Paradise Marsh, the largest coastal wetland on the Great Lakes system, is located at the western end of the harbour. A number of major watersheds drain to Hamilton Harbour, including Red Hill Creek, Spencer Creek and Grindstone Creek.

Hamilton Harbour is identified as an Area of Concern (AOC) under the Great Lakes Water Quality Agreement (GLWQA). AOC are locations on the Great Lakes system where water quality and ecosystem health have been degraded as a result of human activities. Conditions in Hamilton Harbour have been impacted by a 150-year history of industrial and urban development, and related discharges of industrial and municipal waste water and stormwater.

The GLWQA provides for the establishment of Remedial Action Plans (RAP) for AOCs. RAPs are developed locally under a partnership framework in order to guide restoration efforts. The Hamilton Harbour Remedial Action Plan (HHRAP) was developed between 1987 and 1992, and identifies the environmental concerns and impacts (impairments) to the harbour and their causes, goals and criteria for restoring beneficial use impairments (BUI), remedial actions to be taken and the agencies/authorities responsible for implementing them, and a monitoring and evaluation plan for tracking progress.

The federal and provincial governments, through the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA), share responsibility for implementing the HHRAP. Implementation is also supported by municipal government, non-governmental organizations, business and industry, academia, Indigenous communities and the public. These groups work through the Bay Area Implementation Team (BAIT) and various technical committees to oversee implementation of the HHRAP and track progress. HCA participates in the collaborative governance structure of the HHRAP, and supports its implementation through various programs and activities, such as its watershed ecological and water quality monitoring programs.

3.6 Description of HCA Roles and Responsibilities

The purpose of the *Conservation Authorities Act* (CA Act) is to provide for the organization and delivery of programs and services that further the conservation, restoration, development and management of natural resources Ontario. The CA Act provides for the establishment of individual conservation authorities to undertake programs and services to meet these purposes on a watershed basis. The fundamental role for conservation authorities focuses on natural hazard management. In this capacity, a conservation authority may undertake a variety of roles and activities related to land use planning and regulation of development activities, including the following:

- i. Resource Management Agencies – The CA Act provides conservation authorities with a broad mandate to undertake a variety of programs and services on a watershed basis to further the conservation and management of natural resources within their areas of jurisdiction. A conservation authority develops its programs and services to reflect local resource management needs within their jurisdiction, which are approved by the CA Board of Directors and may be funded from a variety of sources including municipal levies, fees for services, provincial and federal grants, and self-generated revenue.
- ii. Regulatory Authorities – Part VI of the CA Act and *O. Reg. 41/24* made under the CA Act provide for the regulation of certain types of activities in and adjacent to river and stream valleys, wetlands, shorelines of inland lakes and the Great Lakes-St. Lawrence River System and other hazardous lands. A conservation authority may issue permits for prohibited activities where it is of the opinion certain criteria, as laid out in the CA Act, are satisfied. *O. Reg. 686/21* made under the CA Act requires that a conservation authority provide programs and services to ensure its regulatory duties and responsibilities to administer Part VI of the CA Act are met.
- iii. Delegated Provincial Interest in Plan Review – As outlined in the Conservation Ontario/Ministry of Natural Resources (*MNR*)/Ministry of Municipal Affairs and Housing (*MMAH*) Memorandum of Understanding (*MOU*) on *CA Delegated Responsibilities*, conservation authorities have been delegated responsibilities to represent the provincial interest in natural hazards in land use planning matters. Under *O. Reg. 686/21*, section 7, a conservation authority, whether acting on behalf of the MNR or in its capacity as a public body under the *Planning Act*, shall provide programs and services for the purposes of helping to ensure that the decisions made under the *Planning Act* are consistent with the natural hazard policies of any policy statements issued under that Act.
- iv. Public Bodies – Pursuant to the *Planning Act*, conservation authorities are considered ‘public bodies’, and as such are to be notified of certain municipal policy documents and planning applications. Conservation authorities may comment as per their Board approved policies as local resource management agencies to the municipality or planning approval authority on these documents and applications, and retain certain appeal rights for decisions made under the *Planning Act*.

- v. Service Providers – Individual conservation authorities may enter into agreements with ministries and agencies of government, as well as municipal councils, local boards and other organizations and individuals to further the objects of conservation authority and the purposes of the CA Act.
- vi. Landowners – Many conservation authorities are landowners, and as such, may become involved in land use planning and development processes under the *Planning Act*, either as an adjacent landowner or as a proponent. Under *O. Reg. 686*, section 9(1) a conservation authority shall provide programs and services to enable the authority, in its capacity as an owner of land, to make applications or comment on matters under the *Planning Act*.

4 POLICIES FOR LAND USE PLANNING

Land use planning is the process by which decisions are made on how land is to be used and resources allocated within a region or community. Land use planning typically seeks to balance community growth and development with social objectives, management of natural resources, and conservation of the environment.

Ontario has a policy-led land use planning system, governed by the *Planning Act* and policy statements issued under the Act. The *Provincial Planning Statement* (PPS) defines policies which provide for growth and development while also protecting resources of provincial interest, public health and safety, and the quality of the natural and built environment. The PPS supports an integrated, balanced and long-term approach to planning to achieve its economic, social and environmental objectives.

Municipal planning authorities are responsible for undertaking land use planning that implements the provincial policy framework. Conservation authorities play an important role supporting municipalities in the implementation of the policy-led land use planning system. This includes collaborating on watershed planning, providing input to municipal official plans and reviewing development proposals to help in managing risks to public health and safety that may result from natural hazards.

4.1 Land Use Planning Review (Plan Input and Plan Review)

Historically, most land use planning decisions were made by the province. However, in the 1990s, in an effort to promote greater local decision making the province began transferring approval authority for certain planning matters to municipalities. At this time, the province also delegated responsibility to conservation authorities to represent the provincial interest in natural hazard policy matters. While the province retains a significant role in land use planning through the development of the policy-led framework, most land use planning decisions are now made by local municipal planning authorities.

Through the enactment of *Ontario Regulation 686/21* under the *Conservation Authorities Act*, the province identified the programs and services that are mandatory for a conservation authority to provide. This includes a range of programs and services related to managing risks associated with natural hazards, confirming that conservation authorities continue to have delegated responsibility for addressing the provincial interest in natural hazard matters and for ensuring that decisions under the *Planning Act* are consistent with the natural hazard policies of the PPS and conform with any natural hazards policies included in any applicable provincial plan.

In this regard, the HCA continues to support its local planning authorities and municipal land use planning processes through programs and services that provide mapping and information related to the identification of natural hazards, input to municipal official plans on natural hazard policy development, and technical review and advisory comments on natural hazard matters for development applications submitted under the *Planning Act*.

HCA also provides a similar review and commenting function regarding risks from natural hazards that may arise from proposals made under other legislation, including the *Aggregate Resources Act*, *Environmental Assessment Act*, and *Niagara Escarpment Planning and Development Act*.

In carrying out its land use planning review functions and responsibilities HCA has the following objectives:

- Provide information and mapping to identify areas of natural hazards
- Promote appropriate land use designation and zoning of hazardous lands and wetlands
- Collaborate on the development and implementation of watershed planning
- Support the development of policies and guidelines that provide for the management of risks and impacts associated with natural hazards, and which protect hydrological and ecological features and functions (watercourses, wetlands, etc.) that play a role in regulating and mitigating natural hazards
- Promote the consideration of watershed-scale impacts and watershed health in land use planning decisions
- Ensure that land use planning decisions provide for the protection of public health and safety and property from natural hazards

The policies set out in Section 4 will be applied to inform any requirements, comments and recommendations made by HCA through its land use planning input and review programs and services.

4.1.1 General Policies for Plan Input and Plan Review

HCA may review and comment on land use planning matters in a number of different capacities, including as the delegated authority for representing the provincial interest in natural hazards for applications and other matters under the *Planning Act*. HCA may also review and comment on natural hazard matters for proposals made under the *Aggregate Resources Act*, *Environmental Assessment Act*, and *Niagara Escarpment Planning and Development Act*.

HCA will work collaboratively with municipalities and other agencies and ministries, as required, to implement its legislated responsibilities to provide land use planning input and review comments on natural hazard matters for proposals submitted under these Acts. Comments and recommendations provided by HCA will consider and be consistent with the *Provincial Planning Statement* or any other provincial policy statements issued under the *Planning Act*, and conform with provincial plans where applicable.

The following general policies will be applied to HCA's consideration and comments on planning applications and other proposals, and must be considered in conjunction with the policies of Sections 4.2 to 4.5, as well as the policies of Section 5 as may be applicable.

- a) HCA will work cooperatively with municipalities, ministries, agencies and applicants, as applicable, on land use planning matters to ensure efficient review processes and to promote coordination of review processes and requirements where multiple statutory or regulatory approvals may be required.
- b) HCA will provide input to the development and maintenance of land use planning policy documents, plans and guidelines that are based on the most current information available regarding natural hazards and best practices for their management and mitigation of associated risks.
- c) HCA supports and will promote land use planning processes whereby proposals for *development* and other activities are first evaluated under the applicable policy documents and plans in order to establish the principle of the proposed land use and appropriateness of the activity, prior to making an application for any required regulatory approval or permit that would implement the proposal.
- d) HCA will encourage and participate in pre-consultation on proposals for *development* and other activities in order to identify HCA's interests and requirements.
- e) When commenting on planning applications HCA will include comments regarding the applicability and requirements of any applicable development regulations under the *Conservation Authorities Act*.
- f) HCA may recommend the completion of technical studies and plans (subwatershed study, hydrogeological study, floodplain impact assessment, karst assessment, etc.) to support a proposal for *development* or other activity in order to be able to assess its consistency with applicable policies. Study requirements are to be confirmed and scoped in consultation with the HCA and other applicable authorities, and must be completed by qualified professionals in accordance with accepted standards, practices and guidelines.
- g) HCA may reference existing available studies, including watershed plans, subwatershed plans, environmental assessments and other *comprehensive studies*, to help guide and inform its plan input and plan review comments.
- h) *Development* or any other activity which would be susceptible to natural hazards, or would cause or aggravate natural hazards, will generally not be supported unless natural hazards have been addressed in accordance with the policies of Section 4 and Section 5, as may be applicable.
- i) HCA comments on land use planning matters will recognize and consider, where appropriate, the interconnections between natural hazards, *water resource systems*, and *natural heritage systems*, and where such systems and their constituent features and functions may play a role in the control or mitigation of natural hazards.

- j) HCA comments on land use planning matters will recognize and consider, where appropriate, the potential *impacts of a changing climate* on the risks associated with natural hazards.
- k) HCA comments on land use planning matters will recognize and consider, where appropriate, the cumulative impacts of development on natural hazards at a watershed scale.
- l) HCA may support the transfer or dedication of *hazardous lands* or *hazardous sites* to public ownership through land use planning processes where deemed practical and to be of public benefit. Hazardous lands and sites will only be accepted by HCA through dedication in accordance with HCA's Land Securement Strategy.
- m) Where HCA is requested by a municipal planning authority or the province to support an appeal of a planning application under the *Planning Act* at the Ontario Land Tribunal, HCA will work to support the appeal as may be required and within its mandate, and subject to receiving authorization from the HCA Board of Directors.
- n) HCA may undertake an appeal to the Ontario Land Tribunal of a decision under the *Planning Act* as a public body in accordance with that Act, if it relates to a natural hazard matter and subject to receiving authorization from the HCA Board of Directors.

4.2 Watershed Planning Approach

Watershed planning provides a comprehensive and integrated framework for the characterization and assessment of watershed conditions and health. It takes an ecosystem-based approach to identifying hydrological and ecological systems, features and functions, and their interconnections, and establishes direction for the protection, enhancement, and restoration of water and other natural resources within a watershed.

The Provincial Planning Statement (PPS) recognizes the watershed as the ecologically meaningful scale for integrated and long-term planning, and as a foundation for considering cumulative impacts of development. The PPS supports municipalities undertaking watershed planning in collaboration with conservation authorities.

Planning authorities involved in watershed planning may develop watershed and subwatershed plans, which may address similar issues but differ in scope and objectives. Where a watershed plan provides direction for the management of water and other natural resources at the watershed scale, a subwatershed plan pertains to a smaller area within the larger watershed, and provides a greater level of detail related to the local context. Watershed planning may inform subwatershed planning, with resulting subwatershed plans refining the objectives and assessments of a watershed plan and tailoring direction to address local conditions and issues. Both watershed and subwatershed plans may address a variety of matters, including but not limited to:

- Water quality and quantity assessments and management;
- Identification of water resource and natural heritage features and systems;
- Development, servicing and infrastructure needs and objectives;
- Evaluation of growth and development scenarios and their related impacts;
- Establishment of targets and objectives for restoration and enhancement; and
- Define implementation strategies and monitoring requirements.

Watershed planning, used in conjunction with subwatershed planning and other land use planning processes and studies, can provide an effective means for supporting the achievement of local development, resource management and conservation goals and objectives, including the mitigation of risks to public health and safety associated with natural hazards.

4.2.1 Policies for Watershed and Subwatershed Planning

- a) HCA will promote using the *watershed* as the ecologically meaningful scale for integrated and long-term planning, and for providing a foundation for the consideration of cumulative impacts of *development*.
- b) HCA supports the development of watershed and subwatershed plans and related studies to help guide land use and infrastructure planning, the protection of *water resource systems*, and the identification of natural hazards and approaches to managing and mitigating associated risks to public health and safety.

- c) HCA will work collaboratively with municipalities in the development of a watershed and subwatershed planning work program, and in the completion of related studies and plans.
- d) HCA will support watershed and subwatershed planning through the provision of water resource and natural hazard information and data that has been collected or is available from existing HCA programs and resources.
- e) HCA will recommend the completion or update of watershed or subwatershed plans, as appropriate, prior to or in conjunction with any proposed urban boundary expansion application.
- f) Where undertaking watershed and subwatershed planning, HCA will support the evaluation of cumulative impacts resulting from development and consideration of the *impacts of a changing climate, on water resource systems, hazardous lands and hazardous sites*.
- g) In providing comments and recommendations on land use planning matters HCA may reference and rely on any applicable watershed plan, subwatershed plan, or related study or plan.

4.3 Natural Hazard Management

Ontario has a long history of settlement in areas prone to natural hazards, including areas adjacent to rivers, streams, valleys and shorelines of the Great Lakes. As a result of development in such areas, Ontario has experienced significant property damage, economic impacts, social disruption, and even loss of life, due to natural hazard occurrences. Development within areas affected by flooding and erosion, and other natural hazards, increases risks to people, property and public health and safety.

The Ministry of Natural Resources (MNR) is the provincial lead for natural hazard management in Ontario. They are responsible for the development of the overall provincial natural hazard management program, establishing policies, standards and guidelines, and coordinating responses to emergencies resulting from natural hazards. However, other levels of government and agencies, including municipalities and conservation authorities, play a central role in managing hazards and mitigating their associated risks and impacts. Municipalities and conservation authorities are responsible for implementing many aspects of hazard management, including the identification of areas affected by natural hazards within their jurisdiction, and the development of local land use planning and regulatory policies to limit hazard-related risks and impacts.

The province's current approach to managing flooding and other natural hazards adopts elements of both hazards-based and risk-based approaches. A hazards-based approach focuses on determining where hazards exist and then taking steps to prevent activities from occurring in those areas, such as limiting new development. A risk-based approach focuses on determining the risks posed by natural hazards, and then taking steps to reduce those risks to acceptable levels, such as the use of floodproofing or Special Policy Areas to address risks associated with development located in flood-prone areas (McNeil, 2019).

The core components, strategies and measures applied to the management of natural hazards generally fall into the following categories – prevention, protection and other mitigation measures, and emergency preparedness, response and recovery. While a broad range of strategies have been important to Ontario's overall approach to managing natural hazards, prevention measures have generally been viewed as the preferred approach and most cost-effective means of reducing risks and impacts, and protecting public health and safety.

Land use planning and the regulation of development in areas prone to natural hazards is a key component of a preventative approach. A central tenant of provincial natural hazard policy is that development shall generally be directed to areas outside of *hazardous lands* and *hazardous sites*. Planning authorities, through the land use planning tools and processes available under the *Planning Act*, can help to reduce the exposure of people and property to hazards by prohibiting or restricting development in areas affected by natural hazards.

4.3.1 Policies for Natural Hazard Management and Development

- a) HCA will work collaboratively with municipalities to identify *hazardous lands* and *hazardous sites*, and to ensure that these lands are designated and zoned appropriately in municipal planning documents.
- b) The limit and extent of *hazardous lands* and *hazardous sites* will be determined in accordance with applicable *provincial standards* and guidelines, as may be amended from time to time, and as generally outlined in Section 5.
- c) HCA will provide input to the development of municipal planning documents and policies, and other land use plans and policy documents as may be appropriate, to address the management of natural hazards and mitigation of their associated risks.
- d) HCA will work with municipalities to prepare for the *impacts of a changing climate* and consider how this may increase risks associated with natural hazards, affect the management of natural hazards, and impact land use planning and development.
- e) HCA will endeavour to ensure its comments on land use planning matters and *development* proposals are consistent with the natural hazard policies of the PPS, or any other policy statements issued under the *Planning Act*, and any other applicable provincial plans.
- f) HCA will generally seek to direct *development* away from areas potentially impacted by *hazardous lands* and *hazardous sites* wherever possible.
- g) HCA will not support *development* in *hazardous lands* and *hazardous sites* where the proposed use is:
 - i. an *institutional use* including hospitals, long-term care homes, retirement homes, preschools, school nurseries, day cares and schools;
 - ii. an *essential emergency service* such as that provided by fire, police, and ambulance stations and electrical substations; or
 - iii. uses associated with the disposal, manufacture, treatment or storage of *hazardous substances*.
- h) HCA will not support *development* within:
 - i. the *dynamic beach hazard*; or
 - ii. areas that would be rendered inaccessible to people and vehicles during times of *flooding hazards*, *erosion hazards* and/or *dynamic beach hazards*, unless it has been demonstrated that the site has *safe access* appropriate for the nature of the *development* and the natural hazard.
- i) Except as prohibited in policy 4.3.1(g) and 4.3.1(h), HCA may support limited development in areas affected by natural hazards in accordance with the policies of the PPS and Section 4 and Section 5, as may be applicable.

- j) HCA will support development proposals within a *Special Policy Area (SPA)* in accordance with the policies of the SPA.
- k) HCA will work collaboratively with municipal planning authorities and the province in the development of SPA, as may be required, and to periodically review and update existing SPA in accordance with applicable *provincial standards* and guidelines.
- l) Certain uses, such as public *infrastructure* and *conservation projects*, may be required at times to be located within *hazardous lands* and *hazardous sites*. HCA may support such uses where they have been reviewed and approved through a *comprehensive study* or site-specific study, as applicable based on the scale of the project and where the study has been supported by HCA.
- m) HCA may support *site alteration* or other modifications to *hazardous lands* and *hazardous sites* for the purpose of facilitating development where:
 - i. the activity will result in the mitigation or *remediation* of hazardous conditions, reduce risks to existing development, and improve public safety;
 - ii. the activity has been considered and approved through a *comprehensive study* or site-specific study, as applicable based on the scale of the project and where the study has been supported by HCA; and
 - iii. all other applicable policies in Section 4 and Section 5 have been satisfied.
- n) Where *development* or *site alteration* may be considered in *hazardous lands* and *hazardous sites* HCA will recommend the following be demonstrated:
 - i. risks to public health and safety are minor and can be mitigated in accordance with *provincial standards*, including *floodproofing standards*, *protection works standards* and *access standards*;
 - ii. *safe access* for people and vehicles would be available during a natural hazard emergency; and
 - iii. new hazards are not created and existing hazards are not aggravated.
- o) Further to policy 4.3.1(n), HCA will consider the regulatory policies of Section 5, and requirements of policy 5.2(c) in particular, when reviewing proposals for development in areas affected by natural hazards and in assessing risks to public health and safety and the potential for impacts.
- p) HCA comments on land use planning matters and *development* proposals will consider and recognize that the hydrological and ecological features and functions that comprise *water resource systems* and *natural heritage systems* may contribute to the control, management or mitigation of *hazardous lands* and *hazardous sites*. HCA will recommend that *water resource systems* and *natural heritage systems* and their constituent features and functions be protected where it would support the management of risks and impacts associated with natural hazards.

4.4 Water Resource Systems

Water resource systems consist of the *ground water features* and areas, *surface water features* (including shoreline areas), *natural heritage features and areas*, and *hydrologic functions*, which are necessary for the ecological and hydrological integrity of the *watershed* (PPS, 2024). *Water resource systems* are an integral part of broader *natural heritage systems*.

Watercourses and their associated valleys and riparian lands, headwater drainage features, wetlands, and Lake Ontario and its shoreline are key components of the *water resource system* within the watersheds of the HCA. These features play an important water management function, allowing for the movement, storage and release of water through the watersheds, and in supporting the functioning of natural processes such as flooding and erosion.

Hazardous lands and *hazardous sites* that may be associated with watercourses, valley systems, wetlands and shorelines should be recognized as part of water resource and natural heritage systems. The protection of these systems contributes to the management of natural hazards and mitigation of associated risks and impacts.

4.4.1 Policies for Water Resource Systems

- a) HCA recognizes the critical function that *water resource systems* play in the control, management and mitigation of *hazardous lands* and *hazardous sites*, and in the maintenance of watershed health.
- b) HCA will work with municipalities to identify, protect and restore *water resource systems* through the completion of watershed plans, subwatershed plans or other land use planning exercises as may be appropriate.
- c) HCA comments on land use planning matters and *development* proposals will recommend the protection of *water resource systems*, including *watercourses*, *valleylands*, and *wetlands*, where they contribute to the management of natural hazards or mitigation of associated risks and impacts.
- d) The stormwater management policies of Section 4.5 will also be considered when providing comments on *development* proposals and the potential for impacts on *water resource systems* and natural hazards.

4.5 Stormwater Management

Development can have a significant impact on the movement of water through the watershed, and on water resource and natural heritage systems and their associated features and hydrological and ecological functions. Land use change may result in increases in impervious surfaces (roads, sidewalks, buildings, rooftops, driveways, etc.) and volumes of surface runoff, and a corresponding decrease in the ability of the ground to absorb water (infiltration) and release water (evapotranspiration). These changes to the cycling and storage of water through the watershed can impact water quality and lead to increased potential for flooding and erosion.

Stormwater management is the process of controlling the quantity and quality of water runoff from impervious surfaces, from its source to its ultimate outlet. Stormwater management aims to minimize and mitigate the impacts of stormwater runoff to the greatest extent possible. When done effectively, it can contribute to the conservation of *water resource systems*, control of flooding and erosion, protection of property and public health and safety, and the development of resilient communities.

4.5.1 Policies for Stormwater Management

- a) HCA supports the use of stormwater management as part of land use planning and development processes to minimize impacts on *water resource systems*, mitigate the potential for increases in flooding and erosion, and protect public health and safety and property.
- b) HCA supports planning for stormwater management facilities and infrastructure in a coordinated and integrated manner with other land use planning and growth management exercises, and through the completion of a *comprehensive study*.
- c) HCA will provide information and input to municipal stormwater management planning exercises regarding watershed conditions and natural hazards, as may be required, and will recommend approaches that will:
 - i. prevent or minimize increases in stormwater volumes and erosion rates;
 - ii. protect *water resource systems* and water balance;
 - iii. mitigate risks from natural hazards, and protect public health and safety and property;
 - iv. address climate change considerations; and
 - v. consider cumulative impacts of stormwater from development at the *watershed* scale.
- d) HCA may support the development of stormwater management facilities that control Regional storm event flows, where such facilities have been:
 - i. considered and assessed through a *comprehensive study* that has been supported by HCA and the municipality; and
 - ii. designed in accordance with accepted engineering standards and practices to ensure public safety and mitigate risk associated with the potential for failure.

- e) HCA will work with municipalities, and other agencies as may be required, in the review of *development* proposals to ensure that stormwater management measures that are appropriate for the nature and scale of the development and watershed conditions are implemented.
- f) HCA comments on *development* proposals will consider the potential impacts to *water resource systems*, natural hazards, and public health and safety, and how stormwater management may be implemented to avoid, minimize or mitigate impacts.
- g) HCA comments on *development* proposals will seek to prevent increases in flooding and erosion resulting from stormwater.
- h) HCA comments regarding stormwater management will consider and reflect criteria, standards, guidelines and best management practices established by the province, municipality or conservation authorities, as may be applicable.
- i) HCA comments regarding stormwater management will seek to ensure conformity with criteria and targets established in any applicable watershed plan, subwatershed plan or other *comprehensive study*.
- j) HCA supports and will recommend the use of *low impact development* (LID) measures, *green infrastructure*, conveyance controls, and other sustainable technologies in a treatment train approach, as may be appropriate, to meet stormwater management criteria, promote protection of *water resource systems*, and mitigate potential impacts on natural hazards.
- k) HCA will generally not support stormwater management ponds, facilities or other infrastructure that are proposed to be located in *hazardous* lands or *hazardous* sites, on-line with a *watercourse*, or in or near *sensitive surface water features* or *sensitive groundwater features*.
- l) HCA may recommend the completion of studies, such as a hydrogeological study, water balance assessment, or floodplain and erosion impact assessments, to evaluate the potential impacts of a development and proposed stormwater management measures.
- m) When reviewing stormwater management plans, HCA will generally recommend that pre-development conditions be maintained to the greatest extent possible as part of site development (i.e. post- to pre-), including peak flows from frequent storm events (i.e. 2-year to 100-year), runoff volumes and water balance.

5 POLICIES FOR THE REGULATION OF DEVELOPMENT

In support of their mandate to protect people and property from risks associated with natural hazards, conservation authorities are empowered to regulate certain activities in hazard-prone areas. Part VI of the *Conservation Authorities Act* (CA Act) and *Ontario Regulation 41/24* set out the areas where certain activities are prohibited, and the conditions under which a conservation authority may issue a permit for a prohibited activity.

Section 21.1 of the CA Act and related *Ontario Regulation 686/21* requires that an Authority shall provide programs and services to manage risks related to natural hazards and to ensure that a conservation authority satisfies its duties, functions and responsibilities to administer and enforce the provisions of Parts VI and VII of the Act, and any regulations made under those parts as they relate to the regulation of development and other activities, and for ensuring compliance with the Act and regulations.

The development regulations under the CA Act are intended to help in the achievement of the broad goals and objectives of the conservation authorities and the provincial government as they relate to the protection of people and property from natural hazards. Conservation authority regulation of development is a key component of the province's prevention-first approach to natural hazard management. The regulation of development activity also provides for the protection and functioning of *water resource systems* and *natural heritage systems* and their constituent features and functions where they may support natural processes related to flooding and erosion and the management of natural hazards more generally.

5.1 Regulation of Development and Permitting

The policies outlined in Section 5 will guide HCA's administration of the development regulations of Part VI of the CA Act and associated *O. Reg. 41/24*, and establish the criteria and conditions to be satisfied in order for HCA to issue a permit for *development activity* or other activities that would change or interfere with a watercourse or wetland. The policies must be read and considered in their entirety to determine the full range of policies that may be applicable to a proposed development activity or interference.

In carrying out its regulatory functions and responsibilities under the *Conservation Authorities Act* HCA has the following objectives:

- Protect people and property from risks associated with natural hazards;
- Raise awareness regarding natural hazards and their associated risks;
- Manage natural hazards on a watershed basis, and in accordance with *provincial standards* and accepted best practices;
- Direct *development activity* to areas outside of *hazardous lands* wherever possible;
- Prevent *interference* with *watercourses* and *wetlands* to protect their *hydrologic functions* and contributions to the control of flooding and erosion; and

- Protect *water resource systems* and *natural heritage systems* where they contribute to the control, management or mitigation of risks and impacts associated with natural hazards

5.1.1 Regulated Areas

The areas over which conservation authorities have jurisdiction to prohibit certain activities and the conditions under which a permit may be issued for a prohibited activity are set out in Part VI of the CA Act. *O. Reg. 41/24* further defines the areas regulated by a conservation authority, permit application requirements, and identifies certain activities which are to be exempt from requiring a permit.

Under the CA Act and its regulations, HCA regulates *wetlands*, *watercourses*, river and stream valleys, the Lake Ontario shoreline, as well as other *hazardous lands* such as karst. More specifically, Section 28(1) of the CA Act establishes:

28 (1) No person shall carry on the following activities, or permit another person to carry on the following activities, in the area of jurisdiction of an authority:

1. Activities to straighten, change, divert or interfere in any way with the existing channel of a river, creek, stream or watercourse or to change or interfere in any way with a wetland.
2. Development activities in areas that are within the authority's area of jurisdiction and are,
 - i. hazardous lands,
 - ii. wetlands,
 - iii. river or stream valleys the limits of which shall be determined in accordance with the regulations,
 - iv. areas that are adjacent or close to the shoreline of the Great Lakes-St. Lawrence River System or to an inland lake and that may be affected by flooding, erosion or dynamic beach hazards, such areas to be further determined or specified in accordance with the regulations, or
 - v. other areas in which development should be prohibited or regulated, as may be determined by the regulations.

The extent of regulated areas identified above is in some cases further defined in *O. Reg. 41/24*. While the CA Act and *O. Reg. 41/24* provide direction on regulated areas, they do not define how natural hazard limits that may be associated with regulated features and areas are to be determined. Direction for the identification of hazards, such as flooding and erosion, is provided in a series of technical guides developed by the MNR in the late 1990s and early 2000s. Sections 5.3 to 5.7 describe how the regulated

area is determined for each feature type identified in the CA Act and *O. Reg. 41/24*, as well as how associated natural hazard limits are to be identified.

Associated with some regulated features are additional regulated areas, or ‘allowances’, that extend beyond the regulated feature or hazard limit. *Allowances* are identified in *O. Reg. 41/24*, and are measured from the outer boundary or limit of a regulated feature or hazard. In the case of river and stream valleys and the Lake Ontario shoreline, an allowance of 15 m is included in the regulated area beyond the identified flood or erosion hazard limits. Figures included throughout Section 5 identify how natural hazard limits and associated regulated areas and allowances are defined.

Allowances provide for the regulation of development adjacent to erosion and flooding hazards, which can protect against unforeseen circumstances or conditions that could have an adverse effect on natural processes and hazards. *Allowances* are also intended to account for variability in how hazard limits may be defined at a site-specific scale. They further provide opportunity to ensure that appropriate access to hazard-prone areas is maintained for emergency purposes and to allow for long-term maintenance of property and protection structures.

HCA maintains maps to identify regulated areas. Mapping is reviewed annually, or more frequently where significant changes are required as a result of new information. Mapping is available publicly. While the mapping is intended to provide a useful reference for identifying regulated areas, the description of the areas to be regulated included in the CA Act and *O. Reg. 41/24* prevails in the event of any mapping discrepancy or absence of mapping.

5.1.2 Regulated Activities

Section 28(1) of the CA Act establishes that certain activities are prohibited in areas regulated by a conservation authority. This includes development activities, which are defined in *O. Reg. 41/24* to include:

- (a) the construction, reconstruction, erection or placing of a building or structure of any kind,
- (b) any change to a building or structure that would have the effect of altering the use or potential use of the building or structure, increasing the size of the building or structure or increasing the number of dwelling units in the building or structure,
- (c) site grading, or
- (d) the temporary or permanent placing, dumping or removal of any material, originating on the site or elsewhere.

Section 28(1) also prohibits activities that would straighten, change, divert or interfere in any way with the existing channel of a river, creek, stream or watercourse or to change or interfere in any way with a wetland. While neither the CA Act or *O. Reg. 41/24* define ‘interfere in any way’, the Ministry of Natural Resources and Conservation Ontario

provided an interpretation in the 2008 *Draft Guidelines to Support Conservation Authority Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation*, where *interference*, or ‘interfere in any way’, may be considered as:

“any anthropogenic act or instance which hinders, disrupts, degrades or impedes in any way the natural features or hydrologic functions of a wetland or watercourse”

For the purposes of this policy document, the terms *development activity* and *interference* will be defined as outlined above and will be used to refer to prohibited activities.

5.1.3 Permits and Regulation Tests

Under Section 28.1 of the CA Act, a conservation authority may issue a permit to engage in activity that would otherwise be prohibited where it is of the opinion:

- (a) the activity is not likely to affect the control of flooding, erosion, dynamic beaches or unstable soil or bedrock; or
- (b) the activity is not likely to create conditions or circumstances that, in the event of a natural hazard, might jeopardize the health or safety of persons or result in the damage or destruction of property.

These criteria, which are sometimes referred to as ‘tests’, must be satisfied in order for a permit to be issued.

What constitutes the control of flooding, erosion, dynamic beaches or unstable soil or bedrock is not defined in the legislation or regulations. The policies defined in this Section 5 consider these ‘tests’ to broadly include any direct, indirect or cumulative impact or change resulting from a *development activity* or *interference* that would have the effect of creating or altering hazardous conditions, increasing risks related to or resulting from any natural hazard, or hindering the ability to manage or mitigate risks associated with any natural hazard.

The CA Act also provides for health, safety and property considerations in determining if a permit may be issued. These tests allow for the broad consideration of the potential for direct, indirect and cumulative impacts on individual and public health, social disruption, personal injury, loss of life and damage to property as a result of a *development activity* or *interference*. Factors such as age and mobility of persons, the proposed land use or activity, as well as the type, use and occupancy of a structure, will influence the determination of potential impacts and risks.

Access (ingress and egress) considerations are also important towards determining if a *development activity* or *interference* may impact the control of hazards, health and safety of persons, or the potential for property damage. The ability for property owners, building occupants and public and emergency services to safely access (enter and exit) a site during an emergency is a central consideration in determining if a permit for a *development activity* or *interference* may be issued. Access is also an important consideration to allow for the long-term maintenance and repair of features and structures that may be impacted by hazards. HCA's policies for providing access are outlined in Section 5.9

Both the control of hazards and health and safety tests must also consider the ability to meet protection works standards, floodproofing standards and access standards, as discussed further in Sections 5.3, 5.8 and 5.9.

Finally, *water resource systems* and *natural heritage systems* and their constituent features provide important hydrological and ecological functions that may contribute to the control of flooding, erosion, dynamic beaches and unstable soil or bedrock, and/or help to mitigate related hazards. For example, wetlands may provide a critical water attenuation function at both site specific and subwatershed scales. As a result, the policies outlined in this chapter provide for the consideration of water resource and natural heritage features, areas and systems and their related functions, where appropriate, in the determination of whether or not an activity may affect the control of flooding, erosion, dynamic beaches or unstable soil or bedrock.

5.1.4 Relationship to Land Use Planning Policies

As reviewed in Section 3 and Section 4, the province has a policy-led land use planning system under the *Planning Act* and PPS. Land use planning processes establish appropriate land use designations and zoning, and play a critical function in implementing the province's prevention-first approach to natural hazard management whereby development is generally to be directed to areas away from *hazardous lands* and *hazardous sites*.

Conservation authorities play an important role in supporting the land use planning system, and in implementing the policies of the PPS as they relate to natural hazards. The CA Act and regulations mandate conservation authorities to provide a land use planning review function in order to provide municipal planning authorities with information, comments and technical support to help ensure planning decisions are consistent with the natural hazard policies of the PPS and provincial plans. Conservation authorities play a similar role in providing natural hazard comments on proposals under other legislation, such as the *Environmental Assessment Act* and *Niagara Escarpment Planning and Development Act*. The policies set out in Section 4 direct HCA's input to land use planning matters.

Regulation of development under the CA Act is intended to complement the *Planning Act* and PPS, as well as other legislation, and support the implementation of the province's natural hazard program. While land use planning establishes the principle of

development, permits issued under the CA Act are an implementation instrument used to confirm the appropriateness of a proposed development or other activity from a natural hazard perspective and to identify any site-specific requirements prior to an activity taking place. The policies set out in Section 5 direct HCA's input to the review of permit applications under the CA Act.

When commenting on a municipal land use planning application or application under other legislative review processes, HCA will include comments regarding the applicability and requirements of the development regulations under the CA Act. In some cases, a regulatory permit application may proceed in conjunction with the municipal plan review process; in other cases, a permit application may not be received for months or years after a planning approval. In any case, it is important that development applicants understand regulatory requirements during the land use planning process in order to ensure these requirements can be reasonably met at the time of a CA Act permit application, and to allow for efficient coordination of applications where appropriate.

Past planning decisions that may have been made without plan review input from HCA, or that were based on dated or incomplete technical information regarding natural hazards, will not bind HCA to issue a permit. In such situations, HCA will work with the municipality, or other approval agency, and the development applicant to review the proposed activity in relation to current information, policies and standards, to determine if alternative approaches may be available to address site constraints and meet current regulatory requirements.

It is important to note that a municipal planning authority may not issue a building permit for development in an area regulated by a conservation authority until a permit has been issued, where required, under the CA Act. Conversely, in the case of development permit application reviews under the *Niagara Escarpment Planning and Development Act*, a conservation authority may not issue a permit within an area of NEC development control unless a development permit has been issued by the NEC or the activity is exempt under the *Niagara Escarpment Planning and Development Act*.

5.2 General Policies

The following policies will be applied to any proposed *development activity, interference* or other prohibited activity within the areas of jurisdiction of the HCA. These policies must be considered in conjunction with the policies contained in Sections 5.3 to 5.9, and the policies of Section 4 as may be applicable, which may contain more specific policy direction applicable to the proposed *development activity or interference*.

- a) *Development activities and interference* within regulated areas are prohibited except in accordance with the policies of Sections 5.2 to 5.9.
- b) *Development activities and interference* may be permitted in regulated areas where the activity is not likely to affect control of flooding, erosion, dynamic beaches or unstable soil or bedrock, or create conditions or circumstances that, in the event of a natural hazard, might jeopardize the health or safety of persons or result in the damage or destruction of property.
- c) Further to 5.2(b), in considering if an activity is not likely to affect the control of hazards, or create conditions that would jeopardize health, safety or property, the following must be demonstrated:
 - i. no changes to the limits or extent of existing *hazardous lands*, and no new hazards are created;
 - ii. susceptibility to natural hazards is not increased for any existing or proposed development;
 - iii. no adverse impacts on slope stability;
 - iv. no *adverse hydraulic and fluvial impacts*;
 - v. no changes to the frequency, duration or extent of flooding or erosion;
 - vi. flood conveyance and flood storage conditions are maintained;
 - vii. risks to the health and safety of persons or the public are not increased;
 - viii. potential for damage or destruction of property is not increased;
 - ix. *safe access* and *access allowances* are provided;
 - x. no adverse impacts to natural coastal processes associated with the Lake Ontario shoreline;
 - xi. no adverse impacts to the *hydrologic functions*, fluvial processes or hydraulics of *watercourses*;
 - xii. no adverse impacts to the *hydrologic functions* or conditions of *wetlands*;
 - xiii. no *negative impacts* to *water resource systems*;
 - xiv. no *negative impacts* to *natural heritage features and areas* that contribute to the control, regulation or mitigation of natural hazards;
 - xv. *development activities and interference* are carried out in accordance with provincial *floodproofing standards, protection works standards and access standards*;
 - xvi. *development activities and interference* are carried out in accordance with accepted design, engineering and construction best practices and standards; and
 - xvii. mitigation measures and restoration work appropriate for the scale of the *development activity or interference* and site conditions will be implemented;

- d) Notwithstanding policy 5.2(b) and (c), HCA will not support *development activity* in *hazardous lands* where the proposed use is:
 - i. an *institutional use* including hospitals, long-term care homes, retirement homes, preschools, school nurseries, day cares and schools;
 - ii. an *essential emergency service* such as that provided by fire, police, and ambulance stations and electrical substations; or
 - iii. uses associated with the disposal, manufacture, treatment or storage of *hazardous substances*.

- e) *Safe access* (ingress and egress) and *access allowances* must be provided for any development within a regulated area. Access must be in accordance with provincial *access standards* and meet the requirements of Section 5.9.

- f) Where the policies of Sections 5.3 – 5.9 require that the feasibility of locating *development activity* to an area outside of any *hazardous lands* or *wetlands* be examined, that the development be setback from regulated features and hazards to the greatest extent possible, and otherwise be located in the area of least hazard susceptibility and risk, HCA will consider the following in applying these requirements:
 - i. availability of land or areas for the proposed *development activity* that are located outside of *hazardous lands* and *wetlands*;
 - ii. ability to locate the *development activity* outside all hazard limits and *wetlands*;
 - iii. if the proposal maximizes use of property depth and width to avoid locating within *hazardous lands* or *wetlands*;
 - iv. if reasonable changes to the size, scale and/or design of a building or structure could be made to avoid or minimize encroachment on *hazardous lands* or *wetlands*;
 - v. if minor variances would allow for the development to be located outside of *hazardous lands* or *wetlands*;
 - vi. severity of hazardous conditions, including flood depths and velocities, and susceptibility to erosion hazards;
 - vii. ability to incorporate protection works or *floodproofing* measures; and
 - viii. availability of *safe access* and *access allowances*.

- g) *Development activity* and *interference* shall generally not be permitted within regulated areas for the purpose of creating a new building lot, establishing additional developable area or facilitating new development.

- h) Notwithstanding policy 5.2(g), such activities may be considered where the following are demonstrated:
 - i. the activity will result in the mitigation or *remediation* of hazardous conditions, reduce risks to existing development, and improve public safety;
 - ii. the activity has been considered and approved through a *comprehensive study* or site-specific study, as applicable based on the scale of the project and where the study has been supported by HCA; and
 - iii. all other applicable policies in Section 4 and Section 5 have been satisfied.

- i) The completion of technical studies and plans (geotechnical assessment, hydraulic modelling, floodplain impact assessment, erosion and sediment control plan, etc.), monitoring programs and/or site visits may be required to support a proposal for *development activity* or *interference* in order to identify features, determine natural hazard limits, evaluate potential impacts, or to identify appropriate design, mitigation or remedial measures. Study and monitoring requirements are to be determined and scoped in consultation with the HCA and must be completed in accordance with accepted standards, practices and guidelines to the satisfaction of the HCA.
- j) HCA may require peer review of any technical study or plan completed in support of a proposal for *development activity* or *interference* in order to confirm that appropriate study methods, assessments, findings and recommendations have been provided. Peer reviews are to be completed at the applicant's expense.
- k) As-built drawings, surveys or other reports may be required as a condition of a permit to ensure that any building, structure, or other *development activity* is constructed and completed in accordance with plans approved through the permit. As-built drawings, surveys and reports will be prepared by a qualified professional.
- l) HCA will not permit *development activity* or *interference*, as may be permitted by the policies of Sections 5.2 – 5.9, where an associated existing building or structure was established illegally or without all required approvals and permits.
- m) HCA may attach conditions to a permit to be issued where it is of the opinion the conditions are required to:
 - i. assist in preventing or mitigating any effects on the control of flooding, erosion, dynamic beaches or unstable soil or bedrock;
 - ii. assist in preventing or mitigating any effects on human health or safety or any damage or destruction of property in the event of a natural hazard; or
 - iii. support the administration or implementation of the permit, including conditions related to reporting, notification, monitoring and compliance with the permit.
- n) Where a zoning order has been made by the Minister of Municipal Affairs and Housing, and HCA is required to issue a permit for a development project within the area affected by the order to comply with Section 28.1.2 of the *Conservation Authorities Act*, HCA will issue a permit subject to the following:
 - i. confirmation the development is not located within the Greenbelt Area;
 - ii. attaching conditions to the permit as may be required in accordance with policy 5.2(m);
 - iii. entering into an agreement with the permit holder that sets out requirements to be satisfied in order to compensate for any ecological or other impacts that may result from the development project; and
 - iv. where compensation requirements are developed in accordance with HCA's *Natural Heritage Offsetting Guidelines*.

5.3 Lake Ontario Shoreline

The Lake Ontario shoreline is a dynamic area, subject to constant change as a result of naturally occurring processes and forces of erosion, sediment transport and deposition, wind, waves, and water level fluctuations. As a result of these conditions, areas that lie along the Lake Ontario shoreline, including Hamilton Harbour, may be subject to hazardous conditions resulting from flooding, erosion and dynamic beaches.

The northern half of the Lake Ontario shoreline within the HCA watershed consists of a continuous stretch of dynamic beach. This area is largely in public ownership, and is composed of parkland connected by a trail system. The southern half of the Lake Ontario shoreline, along with the Hamilton Harbour shoreline, is predominantly privately owned and developed. The shoreline in these areas has also largely been hardened, with a wide variety of erosion protection structures in place. Interest in property re-development and infilling along sections of the shoreline has created challenges in managing the risks to public safety and property damage, and resulted in impacts to coastal processes and shoreline ecosystems.

The provincial legislative and regulatory framework recognizes there are significant risks associated with development in shoreline areas. As a result, the overall objective of both provincial and HCA policy is focused on prevention, and to generally direct development to areas outside of shoreline hazard areas. In considering proposals for *development activity* on the shoreline, it is necessary to consider and account for the combined landward limits of the flooding, erosion and dynamic beach hazards in order to mitigate, to the greatest extent possible, the potential effects of these hazards on property and public safety, to ensure existing hazardous conditions are not aggravated, and to provide for the maintenance of coastal processes and conservation of sensitive ecosystems.

The hazards associated with Lake Ontario shoreline are discussed further in the following sections, including how regulation limits for the shoreline are defined, how the related hazards are identified, and the policies to be applied for managing development and other activities in these areas.

5.3.1 Defining Shoreline Regulation Limits

Under *O. Reg. 41/24*, the regulated limits of Great Lakes shorelines are defined as follows:

2. (2) For the purposes of subparagraph 2 iv of subsection 28 (1) of the Act, areas adjacent or close to the shoreline of the Great Lakes-St. Lawrence River System or to inland lakes that may be affected by flooding, erosion or dynamic beaches include,

(a) the area starting from the furthest offshore extent of the Authority's boundary to the furthest of the following distances:

(i) the 100-year flood level, plus the appropriate allowance for wave uprush, and, if necessary, for other water-related hazards, including ship generated waves, ice piling and ice jamming;

(ii) the predicted long-term stable slope projected from the existing stable toe of the slope or from the predicted location of the toe of the slope as that location may have shifted as a result of shoreline erosion over a 100-year period; and

(iii) where a dynamic beach is associated with the waterfront lands, an allowance of 30 metres inland to accommodate dynamic beach movement; and

(b) the area that is an additional 15 metres allowance inland from the area described in clause (a).

Figures 2 to 4 illustrate how the regulated area associated with the shoreline is defined.

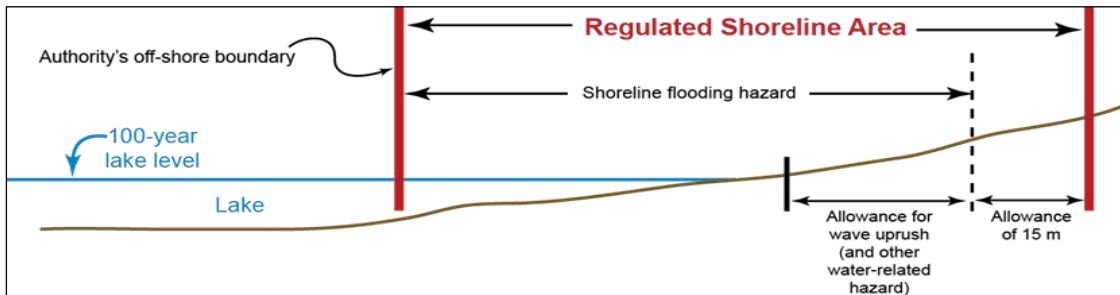


Figure 2: Lake Ontario shoreline flooding hazard regulated area

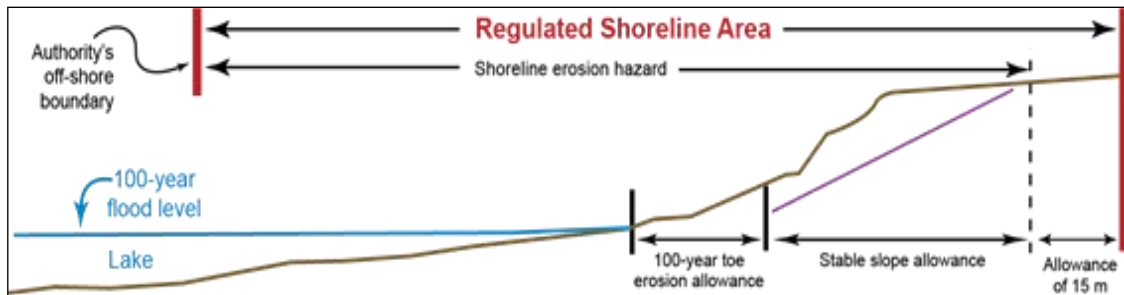


Figure 3: Lake Ontario shoreline erosion hazard regulated area

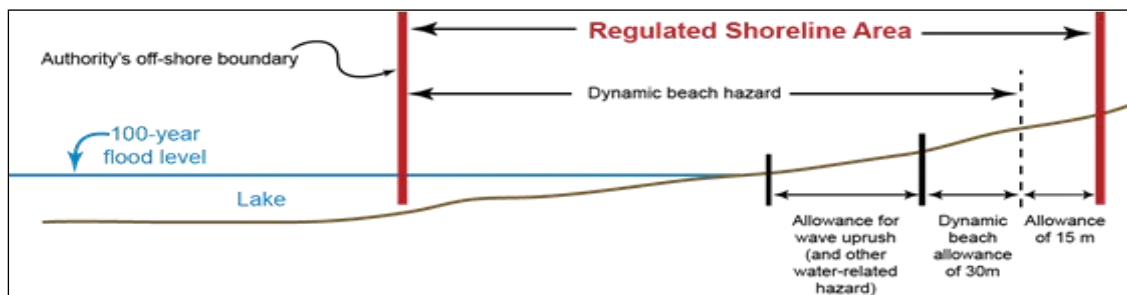


Figure 4: Lake Ontario shoreline dynamic beach hazard regulated

Based on the above, the regulation limit associated with the Lake Ontario Shoreline is the furthest landward extent of the aggregate of the *flooding hazard*, *erosion hazard*, and *dynamic beach hazard*, plus an additional allowance of 15 m (Figure 2). Flooding, erosion and dynamic beach hazard limits associated with regulated shoreline areas are delineated based on standards and criteria established by the Ministry of Natural Resources in *Understanding Natural Hazards* (2001) and in the *Great Lakes-St. Lawrence River System Technical Guide* (2001). How each of these components is determined is described more specifically in the following sections.

5.3.2 Lake Ontario Shoreline Hazards

HCA completed a *Shoreline Management Plan* (SMP) in 2025, which identifies shoreline hazard limits for the Lake Ontario shoreline within the HCA watershed. Hazard determination and mapping was based on standards and criteria established in the provincial technical guidelines, and in consideration of current data, information and assessment undertaken through the shoreline study. This included technical assessment to establish long-term recession (erosion) rates and to update statistical analysis of lake levels. Numerical modelling tools were used to evaluate spatial variability in storm surge and nearshore wave conditions in the lake and harbour. Based on the outputs from the data collection and technical analysis, updated mapping was produced for the flooding, erosion, and dynamic beach hazards.

5.3.2.1 Identifying the Shoreline Flooding Hazard

The Lake Ontario shoreline is subject to water level fluctuations as a result of both human intervention and natural processes. As part of the *Great Lakes-St. Lawrence River system*, lake levels in Lake Ontario are subject to regulation under the *Lake Ontario – St. Lawrence River Plan 2014* (Plan 2014, IJC, 2014), with outflow from Lake Ontario being influenced by the operation of the Moses-Saunders Power Dam in Cornwall. However, water levels in Lake Ontario are primarily influenced by natural factors like rainfall, snowmelt, evaporation, wind, waves and storms. These factors influence both seasonal and shorter-term changes in water levels.

Storms, wind and waves can have a short-term, temporary, but significant impact on shoreline flooding, pushing water farther inland than under normal water level conditions. Along irregular shorelines, or where there are shoreline protection structures, groynes, or other structures, the effect of waves hitting vertical surfaces and sending spray inland and the potential for strong waves to overtop breakwalls, bluffs and other shoreline structures may also occur.

As a result, the Lake Ontario *flooding hazard* considers the *100-year flood level*, as well as *wave effects* and *other water-related hazards*, such as wave uprush, ship generated waves and ice, that may magnify flooding conditions.

The *flooding hazard* limit for Lake Ontario is therefore based on the combined influence of the following, as conceptually shown in Figure 5 and described in more detail below:

- i. The *100-year flood level*;
- ii. The extent of *wave uprush*; and
- iii. The extent of *other water-related hazards*.

The *100-year flood level* is defined as the water level reached through a combination of static lake level and local storm surge, that has a combined probability of occurrence of 1% in any given year. Historically, the identification of 100-year flood levels for most Great Lakes shorelines was based on work completed by the Ministry of Natural Resources in the 1980's, and published in a report titled *Great Lakes System Flood Levels and Water Related Hazards* (MNR, 1989).

HCA's *Shoreline Management Plan (2025)* reviewed and updated this earlier work, including an analysis of mean monthly lake levels between 1900 and 2021 and measured storm surge events from 1971 to 2021. Based on this assessment, the SMP identifies the *100-year flood level* for Lake Ontario and Hamilton Harbour as 76.2 m (International Great Lakes Datum (IGLD85)). Where topographic surveys are completed in other datums, a conversion may be required to identify the 100-year flood level in that datum. For example, where the Canadian Geodetic Vertical Datum (CGVD28) is used, the 100-year flood level becomes 76.11 m, and under CGVD2013 it is 75.68 m.

To identify the extent of *wave uprush*, or the horizontal distance landward from the waterline that may be impacted by waves and other water related hazards, HCA's SMP undertook an analysis and modelling of nearshore wave conditions. Based on this assessment, the SMP identifies wave uprush as a horizontal distance, which varies based on conditions across different sections (reaches) of the shoreline, and ranges from 10 m to 30 m.

The SMP identifies and maps the *floodings hazard limit* for the shoreline based on the *100-year flood level* contour of 76.2 m plus an additional horizontal distance of 10 m to 30 m measured landward from this contour line to account for *wave uprush* and *other water-related hazards*.

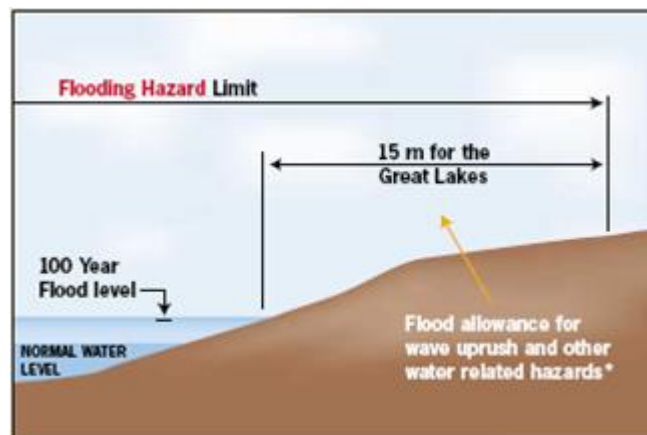


Figure 5: Lake Ontario shoreline flooding hazard limit

5.3.2.2 Identifying the Shoreline Erosion Hazard

Water level fluctuations, waves, wind and ice exert erosive forces on the shoreline, and result in shoreline recession over time. The erodibility of the shoreline is influenced by a number of factors, including geology, soils, vegetation cover, shoreline orientation and the presence or absence of shoreline protection structures. Erosion of the shoreline generally occurs slowly over the long-term, but may also result from significant storm events that can result in large losses of land over a very short period.

The Lake Ontario shoreline within the HCA watershed includes areas of natural shoreline, beach and bluffs, but is otherwise largely developed with hardened shoreline protection measures in place. The shoreline within HCA's watershed is generally considered to be highly erosive, especially on the lake bottom at the toe of existing shoreline protection structures (SMP, 2025).

The *erosion hazard* limit for the shoreline is based on the combined influence of the following, as shown in Figure 6:

- i. *Stable slope allowance*; and
- ii. 100-year erosion allowance (100 times the average annual recession rate) or 30m erosion allowance, whichever is greater.

HCA's SMP examined long-term shoreline change to identify average annual recession rates. This included assessment of orthophotographs, historical recession measurements, and consideration of recession rates from adjacent Lake Ontario shoreline areas beyond the HCA watershed. Based on this work, the SMP identifies a long-term average annual recession rate of 0.5 m/yr. Within the Hamilton Harbour, a rate of 0.1 m/yr is identified. Recession rates at the dynamic beach areas identified between Confederation Beach Park and the navigation channel, Newport Yacht Club and Fifty Point were generally considered to be dynamically stable.

The SMP applied a stable slope allowance of 3(H):1(V). A site specific assessment of the shoreline slope by a qualified geotechnical engineer may allow for a reduction in the stable slope allowance that has been identified in the SMP.

The SMP identifies and maps the *erosion hazard limit* for the shoreline based on a 3:1 *stable slope allowance* and 100-year erosion allowance of 50 m for most of the Lake Ontario shoreline (0.5 m/yr x 100 years) and 10 m for the Hamilton Harbour shoreline (0.1m/yr x 100 years).

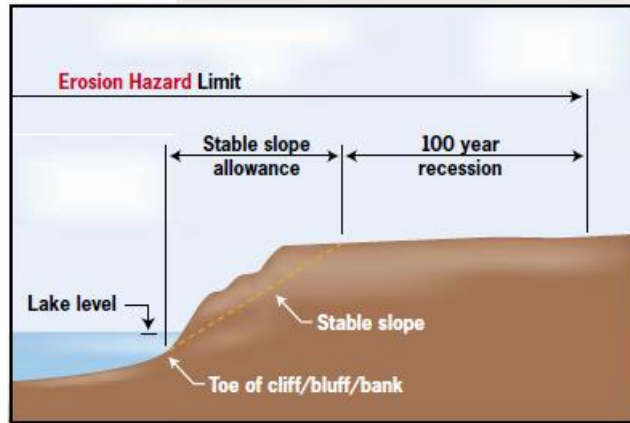


Figure 6: Lake Ontario shoreline erosion hazard limit

5.3.2.3 Identifying the Shoreline Dynamic Beach Hazard

A beach is an area of accumulation of eroded material (sediment, sand, gravel, cobble, rock, etc.) that has been transported from elsewhere and deposited by currents and waves on the shoreline. Beaches that are unstable and subject to continuous change as a result of erosion and accretion from wind, waves and water level changes are sometimes referred to as dynamic beaches. In dynamic beach areas, elevations can change dramatically due to build up or loss of beach materials. Changes may occur over a range of time scales, from hours or days, to years and decades.

When beach elevations change, so does the location of the *flooding hazard* limit. This is an important consideration in determining the dynamic beach hazard limit. In times of low lake levels, near shore areas that are submerged under normal or high lake levels may become exposed, making it seem that the landward extent of the dynamic beach has changed, and thereby introducing potential for *development activity*. Historic information about the farthest landward extent of flooding will be an important consideration for the long-term management of *dynamic beach hazards* (MNR, 2001).

The *dynamic beach hazard* limit is determined in accordance with the following, as shown in Figure 7:

- i. The *flooding hazard* limit (100-year flood level plus an allowance for wave uprush and other water-related hazards); and
- ii. A 30 m *dynamic beach* allowance.

HCA's SMP examined changes in shoreline and beach positions at Hamilton Beach, Fifty Point Beach and Newport Yacht Club Beach using historical orthophotographs. Based on this assessment, each of these areas is identified as a dynamic beach, but with recession rates considered dynamically stable in recent years.

The SMP identifies and maps the *dynamic beach hazard limit* for these areas based on a 30 m setback from the *flooding hazard limit*, unless the beach material extent was less

than 30 m due to an engineered walkway, road or a transition to non-beach material (e.g. residential backyard, parking lot). In these cases, the dynamic beach allowance was mapped as the lakeward edge of the engineered structure or transition area.

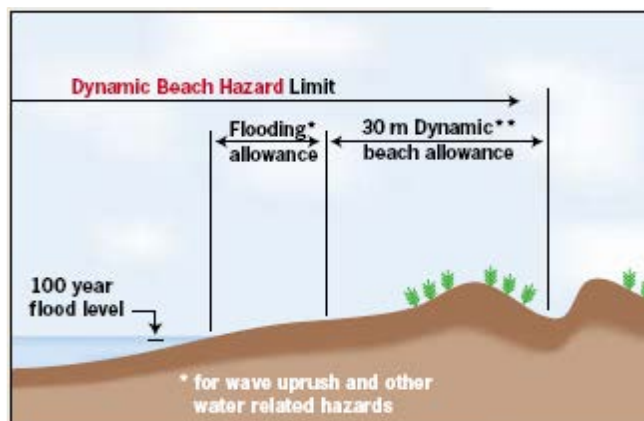


Figure 7: Lake Ontario shoreline dynamic beach hazard limit

5.3.3 Policies for Development on the Lake Ontario Shoreline

5.3.3.1 General Policies

- a) *Development activities* within the shoreline *erosion hazard*, *flooding hazard* or *dynamic beach hazard*, or the associated regulated *allowance*, are prohibited, except in accordance with the policies of Sections 5.3.3.1 to 5.3.3.5, and the general policies of Section 5.2.
- b) Erosion, flooding and dynamic beach hazard limits must be identified as part of any proposal for development along the shoreline.
- c) The HCA will reference and rely on the HCA *Shoreline Management Plan (2025)* to identify hazard limits. The completion of additional studies such as a coastal hazard assessment or geotechnical assessment may be required to confirm or refine shoreline hazard limits, or to evaluate the potential impacts of any proposed development. Study requirements are to be determined and scoped in consultation with the HCA.
- d) *Safe access* and an *access allowance* must be provided as part of any proposed *development activity* in accordance with the requirements of Section 5.9.
- e) HCA will work cooperatively with watershed municipalities and other agencies as appropriate, and where opportunities or needs arise, to develop comprehensive shoreline management plans, strategies and policies to manage shoreline related hazards, to mitigate associated risks, and to promote the protection and restoration of *water resource systems* and associated natural coastal process.

5.3.3.2 Shoreline Protection Works (Protection Works Standard)

Protection works include both structural and non-structural works, as well as landform modifications, that are designed and constructed to address the impacts of flooding and other water related hazards, to slow the landward retreat of shorelines subject to erosion, and/or to address dynamic beach hazards. While protection works cannot provide total protection from shoreline hazards, where designed and constructed in accordance with accepted engineering standards and in an environmentally sound manner, they can be effective in reducing risks and lessening the potential for damages from shoreline hazards.

The *Great Lakes-St. Lawrence River System Technical Guide* (2001) provides guidance on *protection works standards*, and how such structures may be applied in the consideration of development limits in areas affected by shoreline hazards. More specifically, the 100-year erosion allowance component of the *erosion hazard* may be reduced by the presence of shoreline protection works. A reduction in the erosion allowance does not change the extent of the *erosion hazard* limit, but rather identifies the area within the *erosion hazard* where it may be deemed safe for some types of development to be permitted. For the purposes of the shoreline policies, the area of reduced erosion allowance as a result of shoreline protection works is referred to as the *mitigated erosion hazard*.

HCA's SMP documented significant use of structural protection measures along most reaches of the shoreline. The SMP notes that rates of damage and failure of shoreline structures on the Great Lakes are high given harsh conditions and lack of regular maintenance. In the case of the Lake Ontario shoreline within the HCA watershed, ongoing lakebed downcutting (vertical erosion) at the shoreline is also a significant factor in considering the life expectancy of protection structures. The SMP recommends structural protection measures only be considered where required to protect existing developments that are at high risk, where non-structural or nature-based solutions are not feasible, and where environmental and downdrift impacts have been appropriately addressed and incorporated into the design of the protection works.

In consideration of the above, the following policies will apply to the use of shoreline protection structures.

- a) Shoreline protection works may be proposed to conserve areas of natural shoreline, to protect existing development, and to facilitate new development. Protection works may include both structural and non-structural measures, and may involve the construction of a new protection structure or the maintenance or repair of an existing structure.
- b) Where protection of the shoreline is required, first priority should be given to the consideration of non-structural and nature-based structures and measures. Such measures may be appropriate where there is limited development, where natural areas are present, and/or where there is relatively low exposure to wind and waves.

- c) Structural approaches to shoreline protection will generally only be considered where such actions are required to protect existing development that is at risk from flooding or erosion, or where non-structural or nature-based solutions are not feasible, and where adverse impacts on shoreline coastal processes can be appropriately addressed through the design of the protection works.
- d) Where shoreline protection works are proposed they must meet the following requirements:
- i. the purpose of the proposed works must be clearly defined;
 - ii. ownership of the land where the protection works are proposed, must be clearly established by the applicant;
 - iii. be designed by a qualified coastal engineer, according to accepted coastal engineering principles and standards;
 - iv. be designed to address applicable shoreline hazards, and withstand scour, wave impact, overtopping, flank erosion, and other forces as appropriate;
 - v. have a professional geotechnical engineer assess slope stability where a stable slope allowance greater than 3:1 is proposed;
 - vi. be designed in consideration of and to be integrated with adjacent shoreline properties and conditions;
 - vii. not aggravate existing hazards or create new hazards for the subject property or adjacent properties, or have an adverse impact natural shoreline coastal processes;
 - viii. be designed to incorporate an *access allowance* in accordance with the requirements of Section 5.9; and
 - ix. the general policies of Section 5.2 are met.
- e) The construction of shoreline protection works must be supervised by a qualified coastal engineer. Upon completion of the protection works, the applicant must provide an as-built survey of the constructed structure and a corresponding report from the supervising coastal engineer confirming if the shoreline protection works have been constructed in accordance with the approved design. Where deviations are identified, the report shall discuss their impact on the structural stability of the protection works and make recommendations as may be required to address these.
- f) Where *development activity* is proposed within shoreline hazard limits, a reduction in the 100-year erosion allowance may be considered where shoreline protection works are in place. The amount that the erosion allowance may be reduced will be based on the determined design life of the shoreline protection works. Design life must be evaluated by a coastal engineer, based on the design, condition and age of the structure, and in consideration of site conditions and hazards.
- g) The maximum design life that will be accepted for shoreline protection works is 50 years, and in no case will a reduction in the erosion allowance greater than 25 m be accepted.

- h) HCA will encourage shoreline property owners to consult the Ministry of Natural Resources (MNR) and Department of Fisheries and Oceans (DFO) for all shoreline protection works to determine if other approvals or permits may be required.

5.3.3.3 New Development

- a) *Development activity* will not be permitted within the *dynamic beach hazard*.
- b) *Development activity* will not be permitted within the *stable slope allowance*, with the following exceptions:
- i. shoreline protection works;
 - ii. patios, staircases and boat ramps that are integrated with shoreline protection works designed by a coastal engineer and approved by HCA; and
 - iii. landscaping that does not include the construction of structures.
- c) Public *infrastructure* and *conservation projects* that have been reviewed and approved through a *comprehensive study* or site-specific study, as applicable based on the scale of the project and that has been supported by HCA, may be permitted within the shoreline *erosion hazard*, *flooding hazard* or *dynamic beach hazard* where it has been demonstrated:
- i. the feasibility of locating the development outside the shoreline hazards has been examined and no alternative exists;
 - ii. the development is setback from the shoreline hazards to the greatest extent possible, and otherwise located in the area of least hazard susceptibility and risk; and
 - iii. the general policies of Section 5.2 are met.
- d) Except as prohibited in 5.3.3.3(a) and (b), *development activity* within the shoreline *flooding hazard* or *erosion hazard* may be permitted where it has been demonstrated:
- i. the feasibility of locating the development outside the shoreline hazards has been examined and no alternative exists;
 - ii. the development is setback from the shoreline hazards to the greatest extent possible, and otherwise located in the area of least hazard susceptibility and risk;
 - iii. the hazards can be addressed in accordance with the shoreline *protection work standards* policies of Section 5.3.3.2;
 - iv. the development is located beyond the *mitigated erosion hazard*;
 - v. the development is floodproofed in accordance with the *floodproofing standards* of Section 5.8;
 - vi. *safe access* and a maintenance *access allowance* are provided in accordance with the requirements of Section 5.9; and
 - vii. the general policies of Section 5.2 are met.

5.3.3.4 Existing Development

- a) Where an existing building or structure is wholly or partially within the shoreline *flooding hazard* or *mitigated erosion hazard*, *minor additions* may be permitted where it has been demonstrated:
- i. no additional *dwelling units* are created;
 - ii. the feasibility of locating the *minor addition* outside the shoreline hazards has been examined and no alternative exists;
 - iii. the *minor addition* is setback from hazard limits to the greatest extent possible, and otherwise located in the area of least hazard susceptibility and risk;
 - iv. the *minor addition* does not encroach any further into the hazards than the existing structure;
 - v. the *minor addition* is setback a minimum of 12.5 m from the stable slope crest;
 - vi. the *erosion hazard* is mitigated in accordance with the shoreline *protection work standards* policies of Section 5.3.3.2;
 - vii. *floodproofing* measures are incorporated to the extent and level possible, based on site-specific conditions, in accordance with the floodproofing policies of Section 5.8;
 - viii. the *minor addition* shall not be more flood vulnerable than the existing structure, in that no openings on the *minor addition* are to be below the elevation of existing openings, nor shall the flood vulnerability of the existing building or structure be increased as the result of the addition;
 - ix. no basement is proposed, and any crawl space is designed to be non-habitable;
 - x. *safe access* and a maintenance *access allowance* are provided in accordance with the requirements of Section 5.9;
 - xi. subsequent requests for additions which will result in the cumulative exceedance of the maximum permitted allowance, as based on the original ground floor area, shall not be permitted.
- b) The *replacement* of an existing building or structure located wholly or partially within the shoreline *flooding hazard* or *mitigated erosion hazard*, other than those destroyed by flooding or erosion, may be permitted where it has been demonstrated:
- i. the feasibility of locating the *replacement structure* outside the shoreline hazards has been examined and no alternative exists;
 - ii. the *replacement structure* is setback from hazard limits to the greatest extent possible, and otherwise located in the area of least hazard susceptibility and risk;
 - iii. the *replacement structure* does not encroach any further into the hazards than the existing structure;
 - iv. the *replacement structure* is not located within the *stable slope allowance*;
 - v. the *erosion hazard* is mitigated in accordance with the shoreline *protection work standards* policies of Section 5.3.3.2;

- vi. *floodproofing* measures are incorporated to the extent and level possible, based on site-specific conditions, in accordance with the floodproofing policies of Section 5.8;
 - vii. the *replacement structure* shall not be more flood vulnerable than the existing structure; and
 - viii. *safe access* and a maintenance *access allowance* are provided in accordance with the requirements of Section 5.9.
- c) Both the *replacement* of an existing building or structure and a *minor addition* to the same building may be permitted where the policies of both 5.3.3.4(a) and (b) are met.
- d) *Accessory structures* less than or equal to 15 m² (160 sq. ft.) will not require approval from the HCA.
- e) *Accessory structures* greater than 15 m² (160 sq. ft.) but less than or equal to 46 m² (500 sq. ft.) may be permitted within the shoreline *flooding hazard* or *erosion hazard* where it has been demonstrated:
- i. the *accessory structure* cannot reasonably be located outside of the hazards;
 - ii. the *accessory structure* is not located within the *stable slope allowance*;
 - iii. the *accessory structure* is adequately protected from the shoreline hazards;
 - iv. *floodproofing* measures are incorporated to the extent and level possible, based on site-specific conditions, in accordance with the floodproofing policies of Section 5.8;
 - v. any mitigation of the *erosion hazard* that may be required is in accordance with the shoreline *protection work standards* policies of Section 5.3.3.2; and
 - vi. a maintenance *access allowance* is maintained in accordance with the requirements of Section 5.9.
- f) *Accessory structures* greater than 46 m² (500 sq. ft.) must meet the requirements of Section 5.3.3.3.
- g) Repairs, maintenance and renovations to an existing building or structure that do not alter the use or potential use, do not increase the size, do not increase the number of *dwelling units*, or increase risks associated with shoreline hazards may be permitted.

5.3.3.5 Policies for Development Within the Regulated Allowance

Development activity that is within the regulated *allowance* associated with the shoreline may be permitted where it is confirmed the development activity is located outside of the *flooding hazard*, *erosion hazard* and *dynamic beach hazard*, and the general policies of Section 5.2 are met.

5.4 River and Stream Valleys

River and stream valleys are dynamic systems, shaped by natural processes that include flooding and erosion. The degree and frequency with which physical change occurs in these systems depends on the interaction of a number of factors and system characteristics including watercourse channel configuration, flows and sediment transport and deposition, water recharge and discharge, as well as bedrock and soil types, vegetation communities, and the stability of watercourse banks and adjacent valley slopes.

River and stream valley systems provide important hydrological and ecological functions at local and broader landscape level scales, and are critical to supporting the health of our watersheds. However, the constant shaping and re-shaping of river and stream systems can also create hazardous conditions which may pose risks to human health and safety, or cause property damage.

The flooding and erosion hazards associated with river and stream valley systems are discussed further in the following sections, including how regulation limits for valley systems are defined, how their related hazards are identified, and the polices to be applied for managing development and other activities in these areas.

5.4.1 Defining River and Stream Valley Regulation Limits

Under *O. Reg. 41/24*, the regulated limits of river and stream valleys are defined as follows:

2. (1) For the purposes of subparagraph 2 iii of subsection 28 (1) of the Act, river or stream valleys include river or stream valleys that have depressional features associated with a river or stream, whether or not they contain a watercourse, the limits of which are determined as follows:

1. Where the river or stream valley is apparent and has stable slopes, the valley extends from the stable top of the bank, plus 15 metres, to a similar point on the opposite side.
2. Where the river or stream valley is apparent and has unstable slopes, the valley extends from the predicted long-term stable slope projected from the existing stable slope or, if the toe of the slope is unstable, from the predicted location of the toe of the slope as a result of stream erosion over a projected 100-year period, plus 15 metres, to a similar point on the opposite side.
3. Where the river or stream valley is not apparent, the valley extends,
 - (i) to the furthest of the following distances:

A. the distance from a point outside the edge of the maximum extent of the floodplain under the applicable flood event standard to a similar point on the opposite side, and

B. the distance from the predicted meander belt of a watercourse, expanded as required to convey the flood flows under the applicable flood event standard to a similar point on the opposite side, and

(ii) an additional 15-metre allowance on each side

The application of the regulation limit for rivers and stream systems is based on two simplified landforms, as explained in the *Technical Guides for River and Stream Systems* (MNR, 2002):

Apparent river and stream valleys (confined systems) are valleys in which the physical presence of a valley corridor containing a river or stream channel, which may or may not contain flowing water, is visibly discernible (i.e. valley walls are clearly definable) from the surrounding landscape by either field investigations, aerial photography and/or map interpretation. The location of the river or stream channel may be located at the base of the valley slope, in close proximity to the toe of the valley slope (i.e. within 15 m), or removed from the toe of the slope (i.e. greater than 15m).

Not Apparent river and stream valleys (unconfined systems) are valleys in which a river or stream is present but there is no discernible valley slope or bank that can be detected from the surrounding landscape. For the most part, unconfined systems are found in fairly flat or gently rolling landscapes and may be located within the headwater areas of drainage basins. The river or stream channels contain either perennial (i.e. year-round) or ephemeral (i.e. seasonal or intermittent) flow and range in channel configuration from seepage and natural channels to detectable channels.

Figures 8 to 12 illustrate how regulation limits are defined for both confined and unconfined systems.

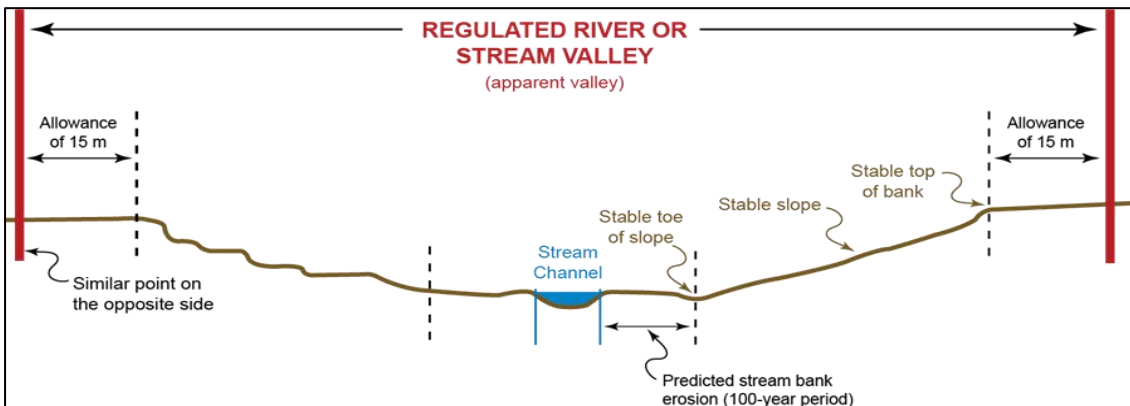


Figure 8: Confined river or stream valley where the valley slopes are stable

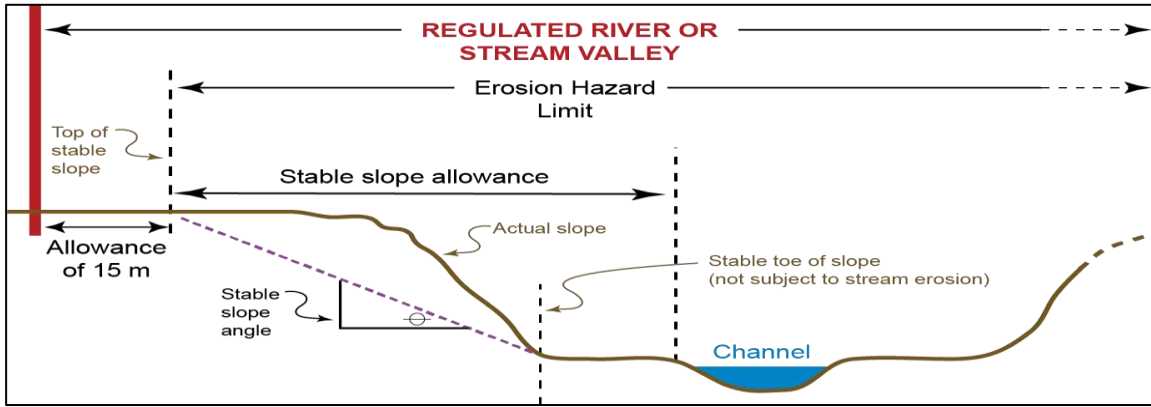


Figure 9: Confined river or stream valley associated with unstable slopes and stable toe

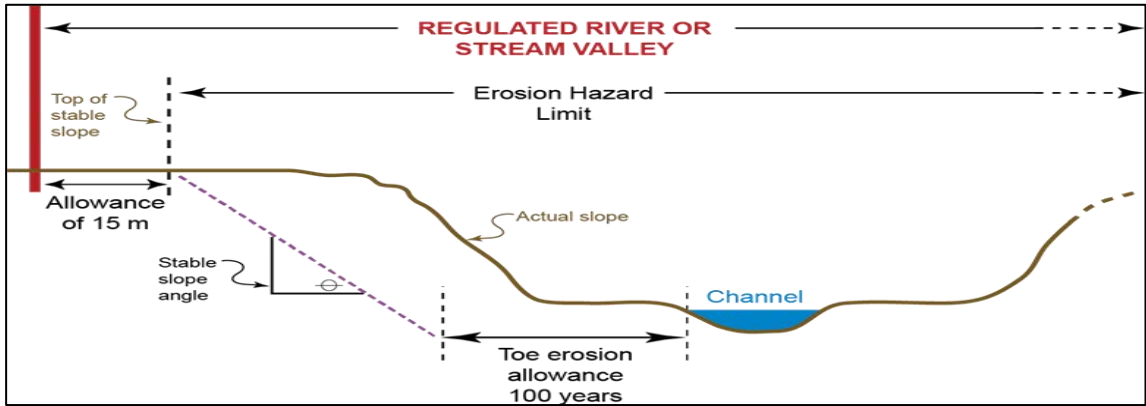


Figure 10: Confined river or stream valley with unstable slopes and active toe erosion

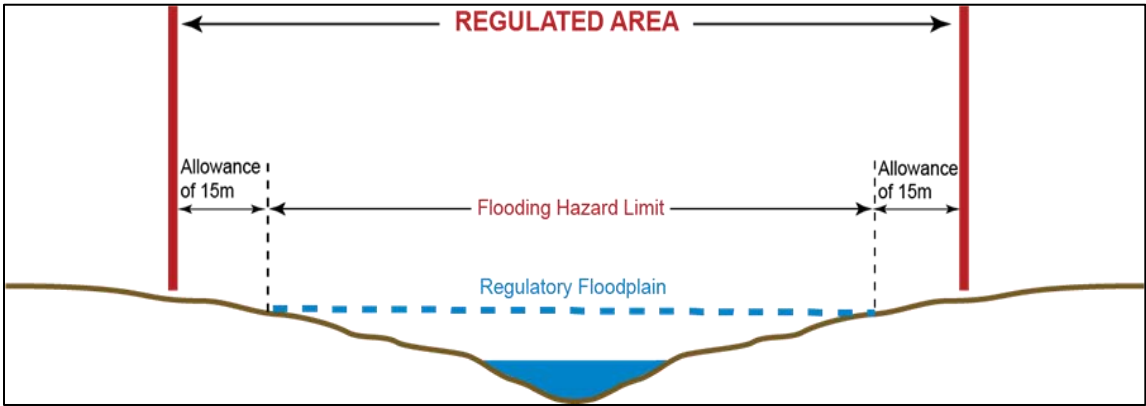


Figure 11: Unconfined river or stream valley (floodplain)

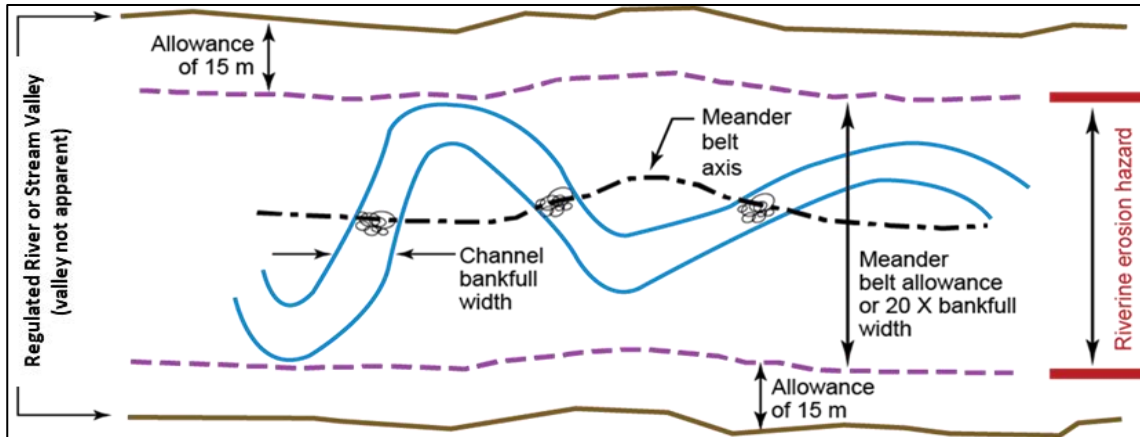


Figure 12: Unconfined river or stream valley (meander belt)

5.4.2 River and Stream Valleys – Erosion Hazards

Erosion involves the removal and transport of the earth's surface materials (rock and soil) by natural forces such as water, wind and ice. The flow of water over land and through river and stream valley systems can cause erosion of the ground surface, valley slopes, and of stream channels and banks. The rate and magnitude of erosion can vary considerably over time, and is dependent on a variety of factors, including flow volumes and velocities. Large storm events, heavy rainfall, ice movement and rapid snowmelt can increase the potential for erosion (MNR, 2001).

Erosion is a natural process, but can result in hazardous conditions where human activity or development comes into contact with erosional forces. Erosion can also be caused or aggravated by human activities, for example, by altering drainage patterns, developing on valley slopes or tablelands, and removing slope or riparian vegetation. *Erosion hazards* are defined as the loss of land, due to human or natural processes, that pose a threat to life and property. This can include the movement or failure of valley slopes, and the movement, scouring or undercutting of the banks of a watercourse.

5.4.2.1 Identifying the Erosion Hazard

The *erosion hazard* component of river and stream systems is intended to address both erosion potential of the bed and banks of a watercourse, as well as erosion or potential slope stability issues or failure of valley walls associated with watercourses. The *erosion hazard* limit for river and stream systems is determined by using the 100-year erosion rate (the average annual rate of recession extended over a hundred-year time span), and allowances for slope stability and access during emergencies.

Determination of the *erosion hazard* depends on the type of system present. In order to identify the *erosion hazard* limit, the following components must be taken into consideration. The specific components that would be utilized vary depending on whether the stream system is *confined* (located within an apparent valley) or *unconfined* (not located in an apparent valley), as described more specifically below. Different

reaches of a stream system may be classified differently where conditions change from upstream to downstream reaches, or from bank to bank within the same reach.

- a) A **toe erosion allowance** is the setback that helps to ensure safety if the toe (i.e. base) of the slope adjacent to a watercourse erodes, increasing the risk of slumping. River banks and valley slopes located in proximity to the outside of meanders or bends of a river or stream are particularly susceptible to erosion. A *toe erosion allowance* is generally only applied where *watercourses* are located within 15 m of the *toe of slope*. The *toe erosion allowance* is determined using one of the following methods:
- i. Using the values in Table 2, which details the minimum *toe erosion allowances* for specific soil types. If valid studies indicate that allowances should be greater than those indicated within the table, the greater of the two will be utilized; or
 - ii. The average annual recession rate, based on 25 years worth of accumulated erosion data, over a 100-year planning horizon; or
 - iii. A 15 m *toe erosion allowance* measured inland horizontally and perpendicular to the toe of the *watercourse* slope, where the soil type is not known; or
 - iv. As determined by a valid study, which is based on 25 years worth of accumulated erosion data.

Table 2: Minimum toe erosion allowance - where river is within 15 m of slope toe

| Type of material Native Soil Structure | Evidence of active erosion or where the bankfull flow velocity is greater than competent flow velocity | No evidence of active erosion | | |
|---|--|-------------------------------|-------|------|
| | | bankfull width | | |
| | | <5m | 5-30m | >30m |
| Hard rock (e.g. granite) | 0-2m | 0m | 0m | 1m |
| Soft rock (shale, limestone), cobbles, boulders | 2-5m | 0m | 1m | 2m |
| Clays, clay-silt, gravels | 5-8m | 1m | 2m | 4m |
| Sand, silt | 8-15m | 1-2m | 5m | 7m |

- b) A **stable slope allowance** is the setback that helps to ensure safety if slope failure or slumping occurs. The stability of slopes can be affected by a variety of factors, including soil composition, slope steepness, increases in loading (weight) from the placement of buildings, changes in drainage patterns, presence of groundwater, loss of vegetation, and erosion of the *toe of slope*. Signs that a slope may be unstable can include the presence of bare slopes, outward tilting of trees, toe erosion at the base of the slope, the presence of fill material, an easily erodible soil type, slumping, gullyng or other visible erosion processes, or an angle greater than 3(H):1(V). The *stable slope allowance* identifies the *stable top of slope*, and is determined according to the following:

- i. A horizontal allowance measured landward from the *toe of slope* (or *toe erosion allowance* where applicable) equivalent to three times the height of the slope (i.e. 3:1); or
 - ii. As determined by a valid study, using accepted geotechnical principles.
- c) A ***meander belt allowance*** is the setback that helps to ensure safety where river and stream meandering (movement) may occur. Rivers and streams are dynamic systems, and may change form over time as a result of the changes in flow, the movement of sediment, etc. The *meander belt allowance* identifies the maximum extent that the channel of a watercourse is expected to migrate (move) over time, and the area required to allow the natural processes of a river or stream (flow, flooding, erosion) to continue unimpeded over time. The *meander belt allowance* is determined based on one of the following:
 - i. Analyzing the bankfull channel width of the largest amplitude meander. The *meander belt allowance* is then defined as 20 times the bankfull channel width of the reach, centred on the meander belt axis. When determining the meander belt for relatively straight reaches, the meander belt should be centred on the mid-line of the channel (Figure 12); or
 - ii. As determined by a valid study, using accepted fluvial geomorphological principles.
- d) An ***erosion access allowance*** (or *access allowance*) is the setback that helps to ensure that people and vehicles have safe ingress and egress (entry and exit) during an emergency as a result of an erosion hazard (e.g. slope failure), and to provide access for machinery and equipment for the maintenance and repair of areas affected by erosion hazards. The *erosion access allowance* is based on the following:
 - i. A minimum 5 m *erosion access allowance*, as described further in Section 5.9.

5.4.2.1.1 Erosion Hazard Limit for Confined Systems

Confined systems are those where the *watercourse* is located within a valley corridor, either with or without a *flood plain*, and is confined by valley walls. The *watercourse* may be located at the toe of the *valley slope*, in close proximity to the toe of the *valley slope* (less than 15 m) or removed from the toe of the *valley slope* (more than 15 m). The *watercourse* can contain perennial, intermittent or ephemeral flows and may range in channel configuration, from seepage and natural springs to detectable channels (MNR, 2001). Within the HCA's watershed, all valleys greater than or equal to 3 m in height are considered confined systems. As shown in Figures 13 and 14, the *erosion hazard* limit for *confined systems* shall be the combined influence of:

- i. a *toe erosion allowance*;
- ii. a *stable slope allowance*; and
- iii. an *erosion access allowance*.

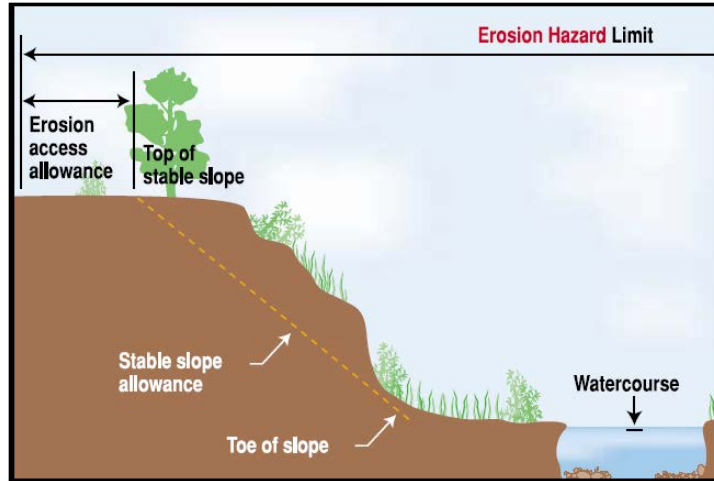


Figure 13: Erosion hazard limit for a confined system (toe of slope greater than 15 m from watercourse)

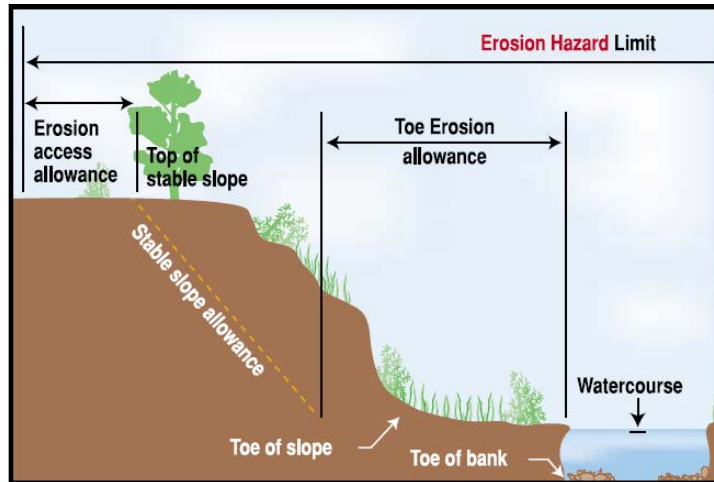


Figure 14: Erosion hazard limit for a confined system (toe of slope less than 15 m from watercourse)

5.4.2.1.2 Erosion Hazard Limit for Unconfined Systems

Unconfined systems are those systems where the *watercourse* is not located within a valley corridor with discernable slopes, but relatively flat to gently rolling plains and is not confined by valley walls. The *watercourse* can contain perennial, intermittent or ephemeral flows and may range in channel configuration, from seepage and natural springs to detectable channels. As shown in Figure 15, the *erosion hazard* limit for *unconfined river and stream systems* shall be the combined influence of:

- i. the *flooding hazard* limit;
- ii. the *meander belt allowance*; and
- iii. an *erosion access allowance*.

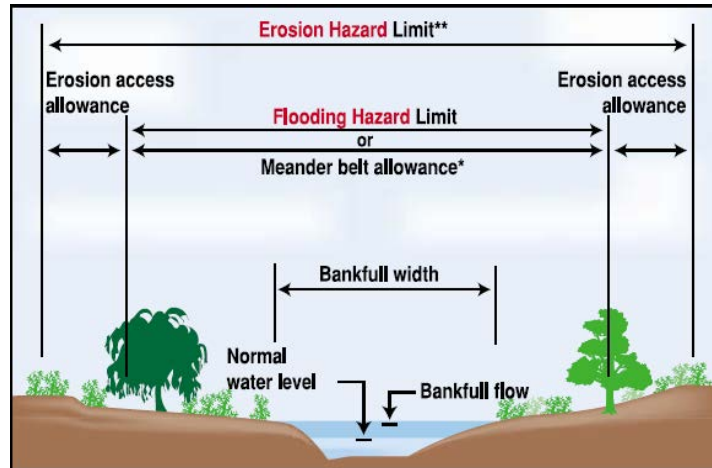


Figure 15: Erosion hazard limit for an unconfined system

5.4.3 Policies for Development Within the Erosion Hazard

The HCA watershed contains numerous river and stream (*watercourse*) valley systems. Historic and on-going development pressures in some of these areas require that erosion hazard limits be appropriately identified and considered. The provincial policy framework directs development away from areas of natural hazards where there is an unacceptable risk to public health or safety or of property damage, and so as to not create new or aggravate existing hazards, or to cause negative impacts to natural river valley systems. Generally, development is to be directed away from lands affected by erosion hazards, as described more specifically in the policies included in this section.

5.4.3.1 General Policies

- a) *Development activities* within the *erosion hazard* or associated regulated *allowance* of a river or stream valley are prohibited, except in accordance with the policies of sections 5.4.3.1 to 5.4.3.4, and the general policies of Section 5.2.
- b) The *erosion hazard* limit must be identified as part of any proposal for *development activity* within or adjacent to a river or stream valley. Where a site-specific study is not completed or required by HCA to identify the *erosion hazard*, HCA will apply the following, as may be applicable:
 - i. 3:1 *stable slope allowance*;
 - ii. 15 m *toe erosion allowance*;
 - iii. 20x bankfull width *meander belt allowance*; and
 - iv. 5 m *erosion access allowance*.
- c) HCA may require that the physical *top of slope* and *stable top of slope* be confirmed in the field and surveyed in support of any proposal for *development activity* within or adjacent to a *confined system*. HCA staff may require a site visit for this purpose. When identifying river or stream valley limits, HCA will evaluate *disconnected features* on a case by case.

- d) *Safe access* and an *erosion access allowance* must be provided as part of any proposed *development activity* in accordance with the requirements of Section 5.9.

5.4.3.2 New Development

- a) Public *infrastructure* and *conservation projects* that have been reviewed and approved through a *comprehensive study* or site-specific study, as applicable based on the scale of the project and that has been supported by HCA, may be permitted within the *erosion hazard* where it has been demonstrated:
- i. the feasibility of locating the development outside the *erosion hazard* has been examined and no alternative exists;
 - ii. the development is setback from the *erosion hazard* to the greatest extent possible, and otherwise located in the area of least hazard susceptibility and risk; and
 - iii. the general policies of Section 5.2 are met.
- b) Stream bank and slope stabilization, and erosion control works to protect existing development may be permitted subject to the *watercourse* policies of Section 5.5, and the general policies of Section 5.2.
- c) Limited *development activity* may be permitted within an *erosion access allowance* where it is demonstrated:
- i. there will be no adverse impacts on the valley slope and associated *erosion hazard*;
 - ii. the overall function of the *access allowance* is maintained over the long-term in accordance with Section 5.9; and
 - iii. the general policies of Section 5.2 are met.
- d) Where regulated river or stream valleys contain lands that are not subject to erosion or flooding hazards, such isolated plateaus or tablelands within a valley, *development activity* may be permitted where it is demonstrated:
- i. the *development activity* is located outside of *hazardous lands* and there will be no adverse impacts on natural hazards;
 - ii. *safe access* and an *access allowance* are provided in accordance with the requirements of Section 5.9; and
 - iii. the general policies of Section 5.2 are met.

5.4.3.3 Existing Development

- a) A *minor addition* to an existing building or structure within the *erosion hazard* may be permitted where it has been demonstrated:
- i. the *minor addition* does not establish additional *dwelling units*;
 - ii. the feasibility of locating the *minor addition* outside the erosion hazard has been examined and no alternative exists;
 - iii. the *minor addition* is setback from the erosion hazard to the greatest extent possible, and otherwise located in the area of least hazard susceptibility and risk;

- iv. the *minor addition* does not encroach any further into the *erosion hazard* than the existing structure;
 - v. the existing building or structure or *minor addition* is not located on an unstable slope or bank;
 - vi. there will be no adverse impact on slope or bank stability;
 - vii. appropriate engineering design and structural measures for site conditions are incorporated into the design and construction of the *minor addition*;
 - viii. *safe access* and an *erosion access allowance* are provided in accordance with the requirements of Section 5.9; and
 - ix. subsequent requests for additions which will result in the cumulative exceedance of the maximum permitted allowance, as based on the *original ground floor area*, shall not be permitted.
- b) The *replacement* of an existing building or structure within the *erosion hazard*, other than those destroyed by flooding or erosion, may be permitted where it has been demonstrated:
- i. the feasibility of locating the *replacement structure* outside the erosion hazard has been examined and no alternative exists;
 - ii. the *replacement structure* is setback from the *erosion hazard* to the greatest extent possible, and otherwise located in the area of least hazard susceptibility and risk;
 - iii. the *replacement structure* does not encroach any further into the *erosion hazard* than the existing building or structure;
 - iv. the *replacement structure* is not located on an unstable slope or bank;
 - v. there will be no adverse impact on slope or bank stability;
 - vi. appropriate engineering design and structural measures for site conditions are incorporated into the design and construction of the building; and
 - vii. *safe access* and an *erosion access allowance* are provided in accordance with the requirements of Section 5.9.
- c) Both the *replacement* of an existing building or structure and a *minor addition* to the same building or structure may be permitted where the policies of both 5.4.3.3(a) and (b) are met.
- d) *Accessory structures* less than or equal to 15 m² (160 sq. ft.) will not require approval from the HCA.
- e) *Accessory structures* greater than 15 m² (160 sq. ft.) must meet the requirements of Section 5.4.3.2.
- f) Repairs, maintenance and renovations to any building or structure that do not alter the use or potential use, do not increase the size, do not increase the number of *dwelling units*, or increase risks associated with *erosion hazards* may be permitted.

5.4.3.4 Policies for Development Within the Regulated Allowance

- a) *Development activity* that is within the regulated allowance of a river or stream valley may be permitted where it is confirmed the *development activity* is located outside of the *erosion hazard* and the general policies of Section 5.2 are met.

5.4.4 River and Stream Valleys – Flooding Hazards

Flooding is the inundation or submergence of normally dry land under water as a result of a waterbody overflowing its limits. Flooding of river and stream systems is a natural occurrence, and may occur during the spring freshet or as a result of storm events. Flooding is often naturally contained within river and stream valley corridors, and provides important hydrological and ecological functions such as nutrient transport and soil enhancement, habitat creation and groundwater recharge.

Historically, development has occurred in flood prone areas because of the availability of water for power, transportation, waste assimilation, and domestic and industrial consumption. Flooding in developed areas has the potential to create hazardous conditions, and can cause significant property damage and risk to public health and safety. The potential for flooding to occur may be aggravated by human activities and development, for example, as a result of increases in impervious area and greater overland runoff which results in more water reaching river and stream systems more quickly.

The *flooding hazard* limit, or *floodplain*, for a river or stream is defined as the area adjacent to the watercourse which would be inundated by the flood resulting from a specified flood event standard. In Ontario, either storm centred events, observed events, or a flood frequency-based event may be used to determine the extent of the *flooding hazard* limit. Most conservation authorities regulate one of the following storm events, Hurricane Hazel, the Timmins storm, 100-year storm or 200-year storm.

Development is generally to be directed to areas outside of the flooding hazards. The principal objective of the flooding hazard policies outlined in this section is to prevent and minimize the potential for property damage and risk to public health and safety as a result of flooding.

5.4.4.1 Identifying the Flooding Hazard

The *flooding hazard* limit (or '*regulatory floodplain*') for watercourses within most of the HCA watersheds is defined based on the *Hurricane Hazel* flood event standard (the *Regional Storm*), with the exception of the numbered watercourses in Stoney Creek where the 100-year flood frequency event is used to determine the floodplain. The applicable flood event standard may be referred to as the *regulatory storm*. HCA does not regulate flooding that may result from smaller or more frequent storms, or from localized drainage and flooding issues that may be associated with municipal infrastructure.

Within Ontario there are three main policy approaches to floodplain management, the One Zone Areas, Two Zone Areas and Special Policy Areas. Each of these are described in more detail below. The HCA manages *regulatory floodplain* lands in all watersheds based on the *one zone area*, with the exception of the Dundas *Special Policy Areas* (SPAs), which utilize the *floodway* and *flood fringe* management approach, and are treated as *two zone areas*. The HCA watersheds also contain a number of *floodplain spill areas*, which are managed differently than one zone areas.

5.4.4.1.1 One Zone Areas

Under the *one zone area* approach, the *floodplain* is defined as a single zone based on the adopted flood event standard (or *regulatory flood*). Where the *one zone area* approach is applied, the entire *floodplain* or the entire *flooding hazard* limit defines the *floodway* (Figure 16). New development within one zone areas is generally prohibited or significantly restricted. The one zone approach is the most effective way of minimizing threats to public health and safety and property damage. The *one zone area* is the preferred approach for the management of *flooding hazards* within river and stream systems as it provides the most cost-effective means of minimizing potential threats to life and risks of property damage and social disruption.

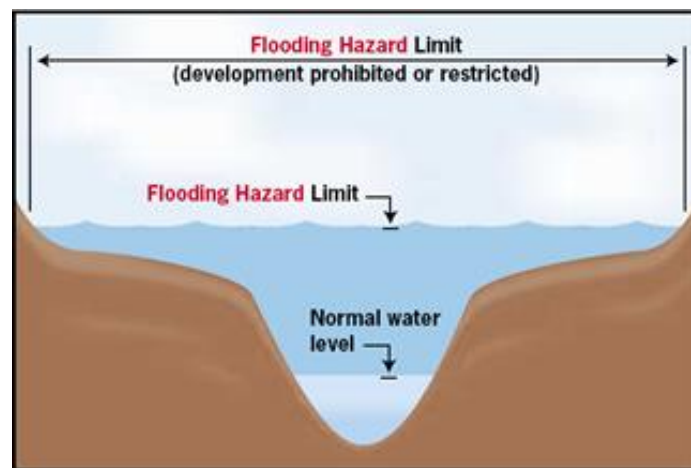


Figure 16: Flooding hazard limit for one zone areas

5.4.4.1.2 Two Zone Areas

Where a municipality and conservation authority, in consultation with the Province, determine and demonstrate that a one zone approach is too restrictive for an existing urban or built-up area, selective application of the *two zone area* approach may be considered. The *two zone area* approach divides the *floodplain* into two areas, the *floodway* and *flood fringe* (Figure 17). The *floodway* refers to the inner portion of the *floodplain* where the majority of the flow is conveyed. The *floodway* represents the area required for the safe passage of flood flows and/or the area where flood depths and/or velocities are considered to pose a threat to public health and safety and property

damage. The *flood fringe* is the portion of the *floodplain* where development may be permitted subject to certain policies and procedures, including meeting floodproofing and access standards. Some factors taken into account when determining the more hazardous areas of *floodplains* include depth of water, velocity of flow, combined depth and velocity, vehicle access and structural integrity (MNR and Watershed Science Centre, 2001).

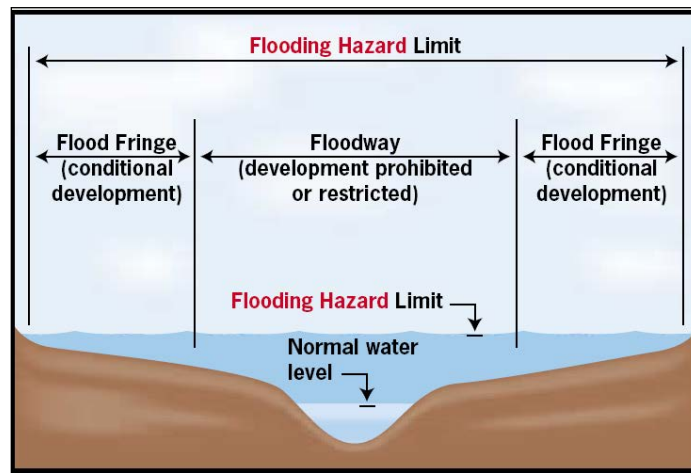


Figure 17: Flooding hazard limit for two zone areas

5.4.4.1.3 Special Policy Areas

The *Special Policy Area (SPA)* concept may be applied in exceptional circumstances where one zone or two zone approaches have been demonstrated to be too stringent, and would likely cause significant social and economic hardships to a community. The SPA approach has generally been limited to those communities or neighbourhoods that were historically built within flood prone areas prior to provincial floodplain policies being in effect. The SPA approach is intended to provide for the continued viability of existing land uses in such communities, while also ensuring sufficient protection against hazards. A SPA is generally not intended to allow for new or intensified development if a community has feasible opportunities for growth outside the floodplain.

Where a SPA is applied, the municipality, conservation authority, and the Province of Ontario (MNR and MMAH) must agree to relax provincial floodproofing and technical standards and accept a higher level of risk for development in flood prone areas. The suitability of applying the SPA approach would be reviewed on the basis of technical criteria and procedures established by the Province.

5.4.4.1.4 Floodplain Spill Areas

Floodplain spill areas are locations where flood waters may leave the normal floodplain of a watercourse and “spill” into surrounding lands, rejoining the watercourse and its

floodplain at a distance downstream. In some cases, a spill area may flow to another watershed. *Floodplain spill areas* may occur naturally, or as a result of barriers to the passage of flood flows through a watercourse system, such as bridges and culverts.

Given these characteristics, the limit and depth of *floodplain spill areas* is often difficult to determine. Regulatory floodplain maps may highlight spill areas using general notation or directional arrows to indicate the approximate location and direction of a spill. With new and emerging modelling and mapping tools and technologies, it is possible to more accurately define spill areas in some cases.

Floodplain spill areas are considered hazardous lands and part of the flooding hazard. These areas may be regulated by conservation authorities, and require regulatory approval where development is proposed.

5.4.5 Policies for Development Within the Flooding Hazard

5.4.5.1 General Policies

- a) *Floodplains* within the HCA watershed are managed as *one zone areas*, with the exception of floodplain lands in portions of the Town of Dundas which are identified as a *Special Policy Area*.
- b) *Development activities* within the *flooding hazard* or associated regulated *allowance* of a river or stream valley are prohibited, except in accordance with the policies of Sections 5.4.5.1 to 5.4.5.7, and the general policies of Section 5.2.
- c) The *flooding hazard* limit must be identified as part of any development proposal within or adjacent to a river or stream valley or *watercourse*.
- d) Where the *flooding hazard* limit has not been identified, or existing available information regarding the extent of the *flooding hazard* limit is insufficient, HCA may require an applicant for *development activity* to undertake an assessment to identify or confirm the *flooding hazard*.

5.4.5.2 New Development

- a) Public *infrastructure* and *conservation projects* that have been reviewed and approved through a *comprehensive study* or site-specific study, as applicable based on the scale of the project and that has been supported by HCA, may be permitted within the *flooding hazard* where it has been demonstrated:
 - i. the feasibility of locating the development outside the *flooding hazard* has been examined and no alternative exists;
 - ii. the development is setback from the *flooding hazard* to the greatest extent possible, and otherwise located in the area of least hazard susceptibility and risk; and
 - iii. the general policies of Section 5.2 are met.

- b) *Agricultural uses* may be permitted where it has been demonstrated:
 - i. the feasibility of locating the development beyond the *flooding hazard* has been examined and no alternative exists;
 - ii. the development is setback from the *flooding hazard* to the greatest extent possible, and otherwise located in the area of least hazard susceptibility and risk;
 - iii. the development does not include buildings or structures for housing or habitable space;
 - iv. the development does not include buildings or structures for livestock or other animals;
 - v. the development is not an *agricultural-related use*; and
 - vi. the general policies of Section 5.2 are met.

- c) Stream bank and slope stabilization, erosion control works, and *floodproofing* measures to protect existing development may be permitted subject to the *watercourse* policies of Section 5.5, *floodproofing* policies of Section 5.8, and the general policies of Section 5.2.

- d) Construction or alteration of a driveway or access through the *regulatory floodplain* in order to provide access to lands outside of the *regulatory floodplain* may be permitted where it has been demonstrated:
 - i. *safe access* can be achieved in accordance with the requirements of Section 5.9;
 - ii. the applicable policies addressing *interference* with a *watercourse* or *wetland* have been satisfied; and
 - iii. the general policies of Section 5.2 are met.

5.4.5.3 Existing Development

- a) A *minor addition* to an existing building or structure in the *floodplain* may be permitted where it has been demonstrated:
 - i. the *minor addition* does not establish additional *dwelling units*;
 - ii. the feasibility of locating the *minor addition* outside the *flooding hazard* has been examined and no alternative exists;
 - iii. the *minor addition* is setback from the *flooding hazard* to the greatest extent possible, and otherwise located in the area of least hazard susceptibility and risk;
 - iv. *minor additions* must incorporate *floodproofing* measures to the extent and level possible, based on site-specific conditions, in accordance with the floodproofing policies of Section 5.8;
 - v. that where flood depths exceed 0.8 m, the structural integrity of the *minor addition* can be maintained through *floodproofing* measures;
 - vi. *minor additions* shall not be more flood vulnerable than the existing structure, in that no openings on the addition are to be below the elevation of existing openings, nor shall the flood vulnerability of the existing building or structure be increased as the result of the addition;

- vii. no basement is proposed, and any crawl space is designed to be non-habitable;
 - viii. *safe access* and an *erosion access allowance* are provided in accordance with the requirements of Section 5.9; and
 - ix. subsequent requests for additions which will result in the cumulative exceedance of the maximum permitted allowance, as based on the *original ground floor area*, shall not be permitted.
- b) The *replacement* of an existing building or structure within the *flooding hazard*, other than those destroyed by flooding or erosion, may be permitted where it has been demonstrated:
- i. the feasibility of locating the *replacement structure* outside the *flooding hazard* has been examined and no alternative exists;
 - ii. the *replacement structure* is setback from the *flooding hazard* to the greatest extent possible, and otherwise located in the area of least hazard susceptibility and risk;
 - iii. *replacement structures* must incorporate *floodproofing* measures to the extent and level possible, based on site-specific conditions, in accordance with the *floodproofing* policies of Section 5.8;
 - iv. *replacement structures* shall not be more flood vulnerable than the existing structure; and
 - v. *safe access* and an *erosion access allowance* are provided in accordance with the requirements of Section 5.9.
- c) Both the *replacement* of an existing building or structure and a *minor addition* to the same building or structure may be permitted where the policies of both 5.4.5.3(a) and (b) are met.
- d) *Accessory structures* less than or equal to 15 m² (160 sq. ft.) will not require approval from the HCA.
- e) *Accessory structures* greater than 15 m² (160 sq. ft.) but less than or equal to 46 m² (500 sq. ft.) in size, may be permitted within the *flooding hazard* where it has been demonstrated:
- i. the *accessory structure* cannot reasonably be located outside of the *flooding hazard*;
 - ii. the *regulatory floodplain* elevation is not increased and the existing stage/storage characteristics are maintained;
 - iii. there are no *adverse hydraulic and fluvial impacts*;
 - iv. the *accessory structure* is floodproofed to the level of the *regulatory floodplain* in accordance with the *floodproofing* policies of Section 5.8; and
 - v. an *erosion access allowance* is maintained in accordance with the requirements of Section 5.9.
- f) *Accessory structures* greater than 46 m² (500 sq. ft.) must meet the requirements of Section 5.4.5.2.

- g) Repairs, maintenance and renovations to any building or structure that do not alter the use or potential use, do not increase the size, do not increase the number of *dwelling units*, or increase risks associated with *flooding hazards* may be permitted.

5.4.5.4 Policies for Development Within the Regulated Allowance

- a) *Development activity* that is within the regulation *allowance* of a river or stream valley may be permitted where it is confirmed the development activity is located outside of the *flooding hazard* and the general policies of Section 5.2 are met.

5.4.5.5 Policies for Cut and Fill

Cut and fill is a technique that is used to balance flood storage losses resulting from the placement of *fill* within a *floodplain*. This is achieved by removing (cutting) a volume of earth at the appropriate elevation and location to offset areas within the *floodplain* to be filled. The suitability of cut and fill operations is extremely site-specific.

It should be recognized that in conducting a cut and fill, additional flood free lands are not obtained. A cut and fill will only serve to transfer floodwaters from one area to another as a result of the manipulation of the land's contours. HCA generally does not encourage cut and fill operations as it may alter the existing contours of the *floodplain* which can lead to potential safety risks for people and property. Any proposals for cut and fill operations within the *flooding hazard* must be in accordance with the following policies and general policies of Section 5.2.

- a) The amount of *fill* removed (cut) must be equal to or greater than the volume of *fill* proposed for placement within the *floodplain*.
- b) All excess *fill* material removed (cut) shall be required to be moved to an area that is outside of the *floodplain*.
- c) It is demonstrated there will be no *adverse hydraulic and fluvial impacts*, or adverse impacts to the *hydrologic functions* or conditions of *wetlands*.
- d) Proposals for cut and fill will require a plan prepared by professional engineer.
- e) Depending on the location and extent of the proposed works, a hydraulic analysis and/or geotechnical evaluation may be required to support the cut and fill plan and demonstrate no adverse impacts.

5.4.5.6 Policies for Floodplain Spill Areas

Development activity may be permitted in *floodplain spill areas* subject to the following policies.

- a) Where there is a land use planning process or *comprehensive study* associated with a proposed *development activity*, opportunities for *remediation* of the *floodplain spill area* must be examined and implemented to the extent feasible in accordance with policy 4.3.1(m).
- b) Where a *floodplain spill area* is not completely remediated, or there is no land use planning process, the following must be demonstrated before a *development activity* may be permitted:
 - i. the *development activity* is not prohibited by the policies of Section 4 or Section 5;
 - ii. the depth and velocity of the *floodplain spill area* has been determined or can be reasonably estimated based on existing available information;
 - iii. the *development activity* does not impede flood conveyance or storage, or increase flood depths or velocities;
 - iv. the *development activity* incorporates *floodproofing* measures to the extent and level possible, based on site-specific conditions, in accordance with the *floodproofing* policies of Section 5.8; and
 - v. *safe access* and an *erosion access allowance* are provided in accordance with the requirements of Section 5.9.

5.4.5.7 Policies for the Dundas Special Policy Areas

Due to historical development in flood prone areas associated with Spencer, Sydenham and Ann Creeks in the (former) Town of Dundas, the HCA and the Town underwent a technical assessment and Official Plan consolidation in October of 2000. This had the effect of creating four designated *Special Policy Areas* (SPA) within the former Town of Dundas which are managed as *two zone areas*.

A new Urban Hamilton Official Plan (UHOP) came into effect in 2013. The policies for the Dundas SPAs are included in Volume 3 of the UHOP, in Chapter B, Dundas Area Specific Policies, sections UD-1 to UD-3 for the Dundas Two Zone Floodplain Area. Where HCA receives an application for *development activity* within the Dundas SPAs, the following policies will be applied.

- a) When considering *development activity* within the Dundas SPAs, HCA will refer to, and require conformity with, the Dundas Two Zone Floodplain Area policies of the Urban Hamilton Official Plan, or any amendments, updates, or revisions thereto.
- b) Where the Dundas SPAs refer to the policies of the Hamilton Conservation Authority, HCA will rely on the policies of this plan as may be applicable, including the policies of Section 5.8 and 5.9 where *floodproofing* and *safe access* are required by the SPA.

5.5 Watercourses

Watercourses are vital to the health of watersheds. Rivers, streams, creeks and headwater drainage features provide important functions and benefits that support healthy ecosystems and communities, including habitat for a diversity of aquatic and terrestrial species, groundwater recharge, clean drinking water, irrigation for agriculture, electricity generation and recreation. Watercourses also play a critical role in the conveyance of water through watersheds and in protecting communities from flooding.

The structure and function of watercourses are influenced by channel morphology, sediment characteristics, soil types, bedrock conditions, as well as the nature and extent of vegetation in a watercourse and along its banks. Changes in these conditions can have a significant influence on other parts of the system. Similarly, changes in the volume, peaks and timing of flows can significantly impact watercourse morphology, sediment transport and riparian vegetation. The dynamic nature of watercourses may create hazardous conditions resulting from flooding and erosion.

5.5.1 Defining Watercourse Regulation Limits

For the purposes of Section 28 of the *Conservation Authorities Act* and the prohibition of certain activities in watercourses, *O. Reg. 41/24* defines a *watercourse* as a channel, having a bed and banks or sides, in which a flow of water regularly or continuously occurs.

The regulated area associated with a *watercourse* is defined based on the extent of its apparent valley limits, or in the case of a valley that is not apparent, the extent of its *flooding hazard* (floodplain) or *erosion hazard* (meander belt), plus an additional 15 m allowance, as described in more detail in Section 5.4.

5.5.2 Policies for Interference with Watercourses

- a) *Interference* in any way with the existing channel of a *watercourse* is prohibited, except in accordance with the policies of Section 5.5.2, and the general policies of Section 5.2.
- b) HCA may require a site visit and/or the completion of technical studies to confirm the presence, status or extent of a *watercourse* as part of any proposed *development activity* or *interference*.
- c) *Interference* with a *watercourse* for public *infrastructure* or *conservation projects* that have been reviewed and approved through a *comprehensive study* or site-specific study, as applicable based on the scale of the project and that has been supported by HCA, may be permitted where the general policies of Section 5.2 are met.
- d) Minor works and activities that may result in *interference* with a *watercourse*, such as roadside ditch maintenance, culvert cleanouts, etc., may be permitted where the general policies of Section 5.2 are met.

- e) *Interference* with a *watercourse*, including realignment, channelization, or enclosure, for the purpose of creating a new building lot, establishing additional developable area, or facilitating new development may be permitted where the following are demonstrated:
- i. the activity has been considered and approved through a *comprehensive study* or site-specific study, as applicable based on the scale of the project and that has been supported by HCA;
 - ii. alternatives have been considered that could reasonably maintain the *watercourse* in its current location and condition;
 - iii. the activity will result in mitigation or *remediation* of hazardous conditions, reduce risks to existing development, and improve public safety;
 - iv. there will be no *adverse hydraulic and fluvial impacts*;
 - v. there will be no adverse impacts on *water resource systems* or the *hydrologic functions* or conditions of *wetlands*;
 - vi. slope and bank stability issues are addressed; and
 - vii. natural channel design principles are considered and utilized to the maximum extent possible.
- f) *Watercourse* crossings may be permitted where it has been demonstrated:
- i. crossings are designed (i.e. type, location, size, alignment, etc.) to be compatible with site conditions and *watercourse* characteristics, and to minimize adverse impacts;
 - ii. crossings should generally be perpendicular to the *watercourse*;
 - iii. low flow conditions are maintained within the crossing;
 - iv. culverts have an open bottom where feasible, and where not feasible culverts are appropriately embedded into the *watercourse*;
 - v. there will be no *adverse hydraulic and fluvial impacts*;
 - vi. there will be no adverse impacts on *water resource systems* or the *hydrologic functions* or conditions of *wetlands*;
 - vii. slope and bank stability issues are addressed;
 - viii. mitigation measures and restoration work appropriate for the scale of the *interference* and site conditions are implemented; and
 - ix. low-level crossings for agricultural uses are designed and implemented in accordance with accepted best practices and standards.

5.6 Wetlands

Wetlands are among the most productive and biologically diverse habitats on earth. They provide critical ecological and *hydrologic functions*, ecosystem services, and socio-economic benefits. *Wetlands* retain water during periods of high-water levels or peak flows (i.e. spring freshet and storm events), allowing the water to be slowly released into watercourses, infiltrate into the ground, and for evapotranspiration. These processes provide natural flood attenuation and reduce the energy associated with flood waters, helping to mitigate the impacts of flooding and erosion.

Wetlands also release water during times of drought to maintain base flows in streams and creeks. Improvement of water quality, provision of habitat for a wide variety of plant and animal species, climate change mitigation and the provision of recreational opportunities are further benefits that *wetlands* support. The areas adjacent to *wetlands* also play an important role in supporting and maintaining the function of *wetlands*.

Development and other activities that may occur within or adjacent to *wetlands* have the potential to impact the condition and *hydrologic functions* of *wetlands*, and result in adverse impacts to flooding and erosion hazards. *Wetlands* may also contain unstable (organic) soils, which are considered *hazardous lands* and can present risks to public safety and property. The policies set out in this section are intended to protect, maintain and restore *wetlands* within the watershed.

5.6.1 Defining Wetland Regulation Limits

For the purposes of Section 28 of the *Conservation Authorities Act* and the prohibition of certain activities in *wetlands* or areas adjacent to *wetlands*, *O. Reg. 41/24* defines a *wetland* as land that:

- a) is seasonally or permanently covered by shallow water or has a water table close to or at its surface,
- b) directly contributes to the hydrological function of a watershed through connection with a surface watercourse,
- c) has hydric soils, the formation of which has been caused by the presence of abundant water, and
- d) has vegetation dominated by hydrophytic plants or water tolerant plants, the dominance of which has been favoured by the presence of abundant water.

The definition of *wetland* does not include periodically soaked or wet land used for agricultural purposes which no longer exhibits a *wetland* characteristic referred to in clause (c) or (d) of that definition.

The areas adjacent to *wetlands* are considered to be all lands within 30 m of *wetlands* and are referred to as 'other areas' under the *Conservation Authorities Act* and *O. Reg. 41/24*:

2. (3) For the purposes of subparagraph 28(1) 2.v. of the Act, no person shall carry out development activities in areas that are within an authority's area of jurisdiction and are within 30 metres of a wetland.

Figure 18 illustrates how regulation limits are defined for wetlands. The figure also summarizes how the criteria (tests) to allow for consideration of *development activity* and *interference* within and adjacent to wetlands are to be applied.

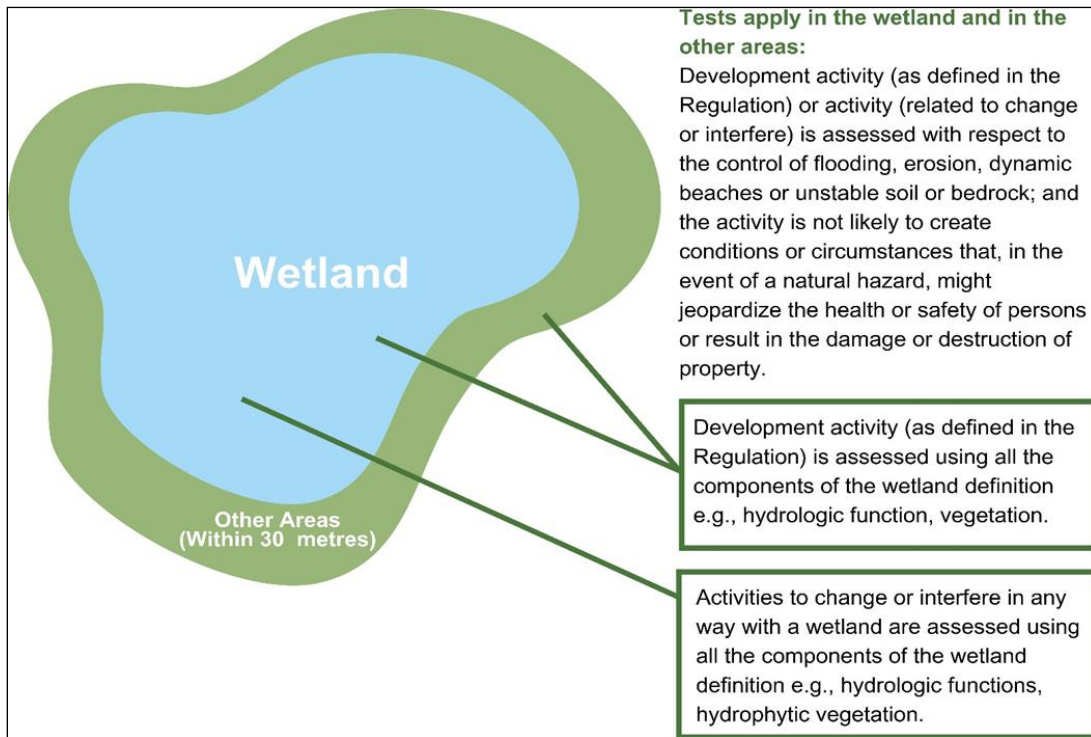


Figure 18: Regulation limits of wetlands and other areas

5.6.2 Policies for Development and Interference with Wetlands

5.6.2.1 General Policies

- a) *Development activity* within wetlands and within 30 m of wetlands, and *interference* within wetlands is prohibited, except in accordance with the policies of 5.6.2.1 to 5.6.2.3, and the general policies of Section 5.2.
- b) *Wetland* boundaries must be confirmed as part of any proposal for *development activity* or *interference* within a wetland or *development activity* within 30 m of a wetland, in consultation with the HCA. A site visit with HCA staff at a seasonally appropriate time, technical studies or assessments, and/or a survey may be required to confirm wetland boundaries.

- c) HCA may require the completion of studies, such as a hydrogeological study or feature-based water balance assessment, to evaluate potential impacts and identify mitigation measures for any proposed *development activity* or *interference* within a *wetland* or *development activity* within 30 m of a *wetland*. Study requirements are to be determined in consultation with HCA, and must be completed by a qualified professional.

5.6.2.2 Development and Interference within Wetlands

- a) *Development activity* and *interference* within *wetlands* may be permitted where it has been demonstrated that:
- i. the *wetland* is not located within the Greenbelt Area;
 - ii. the *development activity* or *interference* is not located within a *floodplain*;
 - iii. the feasibility of locating the *development activity* or *interference* outside the *wetland* has been examined and no alternative exists;
 - iv. the *hydrologic functions* and features of the *wetland* and its adjacent lands have been assessed, and there would be no adverse impacts on functions or features that support the control or mitigation of flooding or erosion hazards;
 - v. hazards related to unstable soils (organic soils) are addressed;
 - vi. mitigation measures will be implemented to minimize impacts on the *wetland*, and to restore or replace impacted *hydrologic functions* and features in accordance with HCA's *Natural Heritage Offsetting Guidelines*; and
 - vii. the general policies of Section 5.2 are addressed.
- b) Notwithstanding 5.6.2.2(a), peat extraction within a *wetland* will not be permitted.
- c) Public *infrastructure* and *conservation projects* that have been reviewed and approved through a *comprehensive study* or site-specific study, as applicable based on the scale of the project and that has been supported by HCA, may be permitted within *wetlands* where it has been demonstrated that:
- i. the feasibility of locating the development outside the *wetland* has been examined and no alternative exists;
 - ii. the development is setback from the *wetland* to the greatest extent possible, and otherwise located in the area of least hazard susceptibility, risk and impact;
 - iii. hazards related to unstable soils (organic soils) are addressed;
 - iv. mitigation measures will be implemented to minimize impacts on the *wetland*, and to restore or replace impacted *hydrologic functions* and features in accordance with HCA's *Natural Heritage Offsetting Guidelines*; and
 - v. the general policies of Section 5.2 are met.
- d) The *replacement* of existing buildings and structures within *wetlands*, other than those destroyed by flooding or erosion, may be permitted where it has been demonstrated that:
- i. the feasibility of locating the *replacement structure* outside of the *wetland* has been examined and no reasonable alternative exists;

- ii. the building or structure is replaced within the existing disturbed area, or is otherwise located in the area of least hazard susceptibility, risk and impact;
 - iii. hazards related to unstable soils (organic soils) are addressed; and
 - iv. mitigation measures will be implemented to minimize impacts on the *wetland*.
- e) *Interference* with a *wetland* by selective tree harvesting employing good forestry practices may be permitted where it is demonstrated there will be no adverse impacts on the *hydrologic functions* of the *wetland*.

5.6.2.3 Development within 30 m of a Wetland

- a) *Development activity* within 30 m of a *wetland* may be permitted where it has been demonstrated that:
- i. the *wetland* is not located within the Greenbelt Area;
 - ii. the feasibility of locating the *development activity* greater than 30 m from the *wetland* has been examined and no alternative exists;
 - iii. the *hydrologic functions* and features of the *wetland* and its adjacent lands have been assessed, and there would be no adverse impacts on functions or features that support the control or mitigation of flooding or erosion hazards;
 - iv. the *development activity* is setback from the *wetland* to the greatest extent possible, as determined by appropriate studies; and
 - v. mitigation measures will be implemented to minimize impacts on the *wetland*, and to restore or replace impacted *hydrologic functions* and features in accordance with HCA's *Natural Heritage Offsetting Guidelines*; and
 - vi. the general policies of Section 5.2 are met.
- b) Where buildings or structures already exist within 30 m of a *wetland*, *development activity* may be permitted where it has been demonstrated:
- i. the feasibility of locating the *development activity* greater than 30 m from the *wetland* has been examined and no alternative exists;
 - ii. further encroachment is minimized, and the development activity is setback from the *wetland* to the greatest extent possible, as determined by appropriate studies;
 - iii. mitigation measures will be implemented to minimize impacts on the *wetland's hydrologic functions*; and
 - iv. the general policies of Section 5.2 are met.

5.7 Hazardous Lands

Areas of land and water that are affected by naturally occurring processes or features associated with flooding and erosion, or unstable soils or bedrock may be considered *hazardous lands*. Development in such areas is generally considered unsafe, as it has the potential to put property and people at risk. While Sections 5.3 to 5.6 have covered flooding, erosion and dynamic beach hazards in detail, the focus of this section is on lands affected by unstable soils and bedrock, including karst.

Karst formations include features such as sinking streams, *sinkholes*, fissures, grikes, caves and springs. These features are created by water flowing over and through limestone, dolomite or other soluble rock. Karst formations have unique drainage patterns, where significant portions of the drainage network may be located beneath the surface. Within the HCA watersheds, karst formations are found in areas along and above the Niagara Escarpment, including the Eramosa Karst Area of Natural and Scientific Interest (ANSI) located in Stoney Creek.

Unstable soils include organic soils, which are comprised primarily of organic matter and have a high moisture content. Organic soils form by humification, which is the decomposition of vegetative and organic materials into humus. A wide variety of soils may be characterized as organic, with peat being one of the most common types. Peat is found within the watershed, typically occurring in association with wetlands.

Both karst formations and organic soils are considered *hazardous lands*. Karst formations may be subject to subsidence, collapse, erosion and flooding. Organic soils generally lack structure, and are therefore susceptible to erosion and compression, and unable to support structures. The decomposition of such soils can also create combustible methane gas. Due to the specific nature of unstable soil and bedrock it is often difficult to identify these hazards. The presence of unstable soils or bedrock may not be immediately obvious through surface inspection of a site.

When considering *development activity in hazardous lands* it is important to account for the full limits of such hazards in order to understand the potential impacts, and to be able to mitigate, to the greatest extent possible, associated risks to property and public health and safety. Further, the influence of *development activity* on the natural processes involved in the formation and maintenance of karst features and organic soils must also be considered.

5.7.1 Defining Hazardous Lands Regulation Limits

For the purposes of Section 28 of the *Conservation Authorities Act* and the prohibition of *development activity in hazardous lands*, O. Reg. 41/24 defines *hazardous lands* as land that could be unsafe for development because of naturally occurring processes associated with flooding, erosion, dynamic beaches or unstable soil or bedrock.

The regulated area associated with karst features or organic soils will be based on site specific studies undertaken to determine the full extent of features and their associated *hazardous lands*. In cases where existing available information regarding the extent of potentially hazardous features such as karst or organic soils is limited, the regulated area will be based on reasonable inferences of the potential for *hazardous lands* that may be associated with these features. In the case of the Eramosa Karst Area of Natural and Scientific Interest (ANSI) located in Stoney Creek, the regulated area has been identified as the ANSI boundary.

5.7.2 Identifying Hazardous Lands

Unlike river and stream systems or the Lake Ontario shoreline, *hazardous lands* do not have a single methodology or standard for identifying the hazard. As a result, the hazards associated with features such as karst and organic soils must be identified on a site-specific basis, in accordance with accepted best practices and approaches for investigation and assessment, including those recommended in the *Hazardous Sites Technical Guide* (MNR, 1996).

Within the HCA watersheds, there are known areas of karst that have been identified, including most significantly the Eramosa Karst ANSI. The Eramosa Karst ANSI is located above the escarpment in Stoney Creek, in the area of Upper Mount Albion Road and Rymal Road. This site contains provincially significant karst features, which were extensively studied and documented between 1999-2003 (Buck et al., 2003). Karst features have also been documented in the broader area surrounding the ANSI, including within the Upper Davis Creek and Upper Hannon Creek subwatersheds.

Organic peat soils are also present in the watershed. These typically occur in association with wetlands, with the extensive area of the Beverly Swamp specifically known to contain organic peat soils.

Given that organic soils and karst features are not always evident at the surface, site-specific studies may be required to confirm conditions and extent of the *hazardous lands* where development is proposed in an area that is known or suspected to contain unstable soil or bedrock.

5.7.3 Policies for Development Within Hazardous Lands

5.7.3.1 General Policies

- a) *Development activity* within *hazardous lands* will generally be prohibited, except in accordance with the policies of Section 5.7.3.1 to 5.7.3.3, and the general policies of Section 5.2.
- b) The limit of *hazardous lands* must be confirmed prior to any *development activity* within or adjacent to areas that are known or suspected to contain *hazardous lands*, such as karst or organic soils.

- c) The limit of the any *hazardous lands* will be established through the completion of site-specific studies, as may be required by HCA, and/or site inspections completed by a qualified professional in consultation with HCA staff.
- d) The HCA may require the completion of studies such as a karst assessment, geotechnical investigation or soil survey to determine the extent of *hazardous lands*, potential impacts of any proposed *development activity* on the hazards, and to identify appropriate mitigation measures. Study requirements are to be determined in consultation with the HCA and must be completed by qualified professionals based on accepted best practices, approaches and standards.
- e) When considering karst features, *hazardous lands* will include any identified or inferred karst features, the connections between them and, in the absence of a site-specific study to identify the full extent of *hazardous lands*, the additional lands within 50 m of any identified or inferred karst features.
- f) When considering organic soils, *hazardous lands* will include any identified areas which contain organic soils, have the potential to contain organic soils, and *wetlands*.

5.7.3.2 New Development

- a) *Development activity* may be permitted within *hazardous lands* where the following have been demonstrated:
 - i. the feasibility of locating the *development activity* outside the *hazardous lands* has been examined and no alternative exists;
 - ii. the *development activity* is setback from the *hazardous lands* to the greatest extent possible, and otherwise located in the area of least hazard susceptibility and risk;
 - iii. the hazards can be appropriately mitigated in accordance with *provincial standards* or other accepted best practices and approaches; and
 - iv. the general policies of Section 5.2 are met.

5.7.3.3 Unstable Bedrock (Karst) Specific Policies

In addition to the policies of Sections 5.7.3.1 and 5.7.3.2, the following policies apply to *hazardous lands* containing unstable bedrock (karst).

- a) *Development activity* will only be considered within *hazardous lands* containing unstable bedrock if the following are appropriately addressed in accordance with accepted best practices and standards:
 - i. site grading and drainage;
 - ii. stormwater management;
 - iii. utilities installation; and
 - iv. building design.

- b) Surface water run-off shall not directly enter a *sinkhole* or closed depression unless that is the natural drainage pattern. Drainage plans shall be designed to route surface water run-off through vegetative filters or other filtration measures before it enters such features.
- c) Stormwater management facilities and other water retaining structures shall not be located within depressions or areas containing karst.
- d) Utility installations and building foundations shall be designed in accordance with accepted best practices and standards to prevent potential subsidence and/or karst-forming processes.
- e) HCA may require that construction or other work associated with *development activity* be supervised by a qualified professional to ensure that measures and recommendations for the mitigation of karst-related hazards are implemented in accordance with approved studies and plans.
- f) In reviewing proposals for *development activity* within or adjacent to the Eramosa Karst ANSI, HCA shall consider the recommendations contained within the *Earth Science Inventory and Evaluation of the Eramosa Karst Areas of Natural and Scientific Interest* (2003).

5.8 Floodproofing Standards

The term *floodproofing* is used to describe the combination of measures that are incorporated into the design, construction and/or alteration of buildings, structures or properties to reduce the risks associated with *flooding hazards*. *Floodproofing* helps to alleviate the potential for damages to buildings and structures as a result of flooding, and to reduce risks to public safety and property.

Where *development activity* may be permitted in areas affected by *flooding hazards*, in accordance with the policies of Section 5, the following policies will be applied to ensure that *floodproofing* that is appropriate for the nature of the development, site conditions and potential hazards is provided.

5.8.1 General Policies

- a) The following criteria may be taken into consideration when determining *floodproofing* requirements on a site-specific basis:
 - i. the type of *development activity* proposed;
 - ii. the depth, velocity and combination of depth and velocity of flood waters;
 - iii. the duration of the flood;
 - iv. the rate of rise and fall of the flood waters; and
 - v. the type of flood warning system in place.
- b) In general, *dry passive floodproofing* is the preferred approach to *floodproofing* and should be applied wherever possible. *Dry passive floodproofing* will be required for any development that includes residential or habitable space.
- c) *Development activity* shall be floodproofed to the level of the *regulatory flood*, plus 0.3 m of freeboard where possible.
- d) *Floodproofing* must make use of materials, methods and design measures to ensure that structural integrity is maintained in the event of a flood, and that water damage will be minimized to the greatest extent possible.
- e) All mechanical and electrical systems must be designed and installed so that the heating, lighting, ventilation, air conditioning and other systems are not vulnerable to flood damage during the flood standard. Where flooding could interrupt key power supplies, it may be necessary to provide stand-by or backup systems, with power and controls located above the level of the flood standard.
- f) *Floodproofing* measures must be designed and approved by a qualified engineer based on site conditions and in consideration of the potential effects of applicable flood forces on the building or structure.

5.8.2 Dry Floodproofing

- a) Wherever possible, *dry floodproofing* measures should be passive rather than active.
- b) *Dry passive floodproofing* designs shall ensure that *fill*, columns or design modifications are used to the greatest extent possible in order to ensure that openings in buildings or structures will be elevated above the level of the *regulatory flood*, plus freeboard of 0.3 m where possible.
- c) Other *dry passive floodproofing* measures may be considered where the use of fill is not possible, and where such measures can be installed to be permanent and not require any further action to put the flood protection into effect.
- d) The use of *dry active floodproofing* measures will only be accepted in instances where it is not possible or practical to utilize dry passive approaches.

5.8.3 Wet Floodproofing

- a) *Wet floodproofing* shall only be considered for structures that are non-residential or non-habitable, and where the interior space that would be subject to flooding remains unfinished and would not be used for storage of *hazardous substances*.
- b) *Wet floodproofing* measures shall incorporate at least two openings below the level of the *regulatory flood* so that water is able to freely enter and exit the structure.

5.8.4 Additions and Replacement Structures

- a) *Minor additions* to an existing building or structure and *replacement structures* are the only developments that shall be permitted to be *floodproofed* to less than the *regulatory flood* level. In all instances they should incorporate *floodproofing* measures to the extent and level possible, based on site-specific conditions. At a minimum, the *minor addition* or *replacement structures* should not be more flood vulnerable than the existing structure, in that no openings on the *minor addition* or *replacement structures* are to be below the elevation of existing openings.

5.9 Access Standards

The ability of people, vehicles and emergency services (police, firefighters, ambulance, emergency response teams, etc.) to safely enter (ingress) and exit (egress) a site during or in response to a natural hazard event, such as a flooding or erosion event, is an important factor when considering development activities. Provincial *access standards* require that methods or procedures be available to ensure safe vehicular and pedestrian movement, and access for the maintenance and repair of protection works and property, during times of flooding and erosion hazards.

Where the policies of Sections 4 and 5 require that *safe access* and/or an *access allowance* be provided for a development or other activity affected by flooding or erosion, the following will be required.

5.9.1 Safe Access for New Development

- a) Access shall be provided that ensures vehicles, pedestrians and emergency services have access to (ingress) and from (egress) a site that is safe from risks associated with natural hazards.
- b) Access for pedestrians will generally be considered safe where the following are achieved at the subject site and along a public roadway, or other route acceptable to the HCA, that allows pedestrians to safely exit the area(s) affected by flooding or erosion:
 - i. flood depths do not exceed 0.8 m;
 - ii. flood velocities do not exceed 1.7 m/s;
 - iii. flood depth/velocity products do not exceed 0.4 m²/s; and
 - iv. access through areas susceptible to erosion hazards is not required.
- c) Access for private vehicles and emergency services vehicles (i.e. paramedics, ambulance, police) will generally be considered safe where the following are achieved at the subject site and along a public roadway, or other route acceptable to the HCA, that allows vehicles to safely enter and exit the areas affected by flooding or erosion:
 - i. flood depths do not exceed 0.3 m;
 - ii. flood velocities do not exceed 4.5 m/s; and
 - iii. access through areas susceptible to erosion hazards is not required.
- d) Access for diesel fire trucks will generally be considered safe where the flood depths do not exceed 1.2 m.
- e) *Safe access* will generally not be required for public *infrastructure, conservation projects, or accessory structures* that are approved in accordance with the policies of Section 5.

- f) In applying the criteria established in 5.9.1(b), (c) and/or (d) to confirm that safe access is provided, HCA must be satisfied that the level of ingress and egress available are appropriate for the nature of the proposed development, site conditions and potential hazards.
- g) Further to 5.9.1(f), HCA may consider alternative criteria to demonstrate *safe access* where an applicant provides confirmation from municipal emergency services that access is available that is appropriate for the nature of the proposed development, site conditions and hazards present, and that emergency services would be able to access the subject site during a natural hazard event.

5.9.2 Access Allowances

- a) An *access allowance* shall be provided that allows people, vehicles, machinery and equipment to safely access areas affected by natural hazards for the purpose of constructing, maintaining and repairing any protection works, structures and property that may be damaged or affected by natural hazards.
- b) A minimum *access allowance* of 5 m shall be provided wherever possible, and must include access from a municipal road, along one side yard of the property, to and along the *stable top of slope*, *stable toe of slope*, or *meander belt allowance* associated with a river or stream valley, watercourse or Lake Ontario shoreline, as applicable (see Figures 19 and 20).
- c) A reduction in the 5 m *access allowance* may be considered where it is demonstrated:
 - i. providing a 5 m *access allowance* is not feasible;
 - ii. the reduction in the *access allowance* would not constrain access over the long-term; and
 - iii. that the *access allowance* is appropriate for site conditions and hazards, and machinery and equipment that may be required to construct or maintain protection works, and to repair property or structures that may be damaged by natural hazards.
- d) *Access allowances* may be shared between adjacent property owners provided that the shared access is registered as an easement on property title.

5.9.3 Access for Existing Development

- a) Where there is existing development and the policies of Section 5 allow for *minor additions* and *replacement structures*, the following must be demonstrated to confirm *safe access* and *access allowances* are available:
 - i. where the criteria outlined in 5.9.1 and 5.9.2 are not met, opportunities to improve the existing access or establish an alternate access must be examined and implemented to the extent possible; and
 - ii. in no case shall access conditions for the *minor addition* or *replacement structure* be diminished or worse than existing conditions.

b) Notwithstanding 5.9.3(a), where the policies of Section 5 allow for both the *replacement* of an existing building or structure and a *minor addition* to the same building or structure, the access standards of Section 5.9.1 and 5.9.2 must be satisfied.

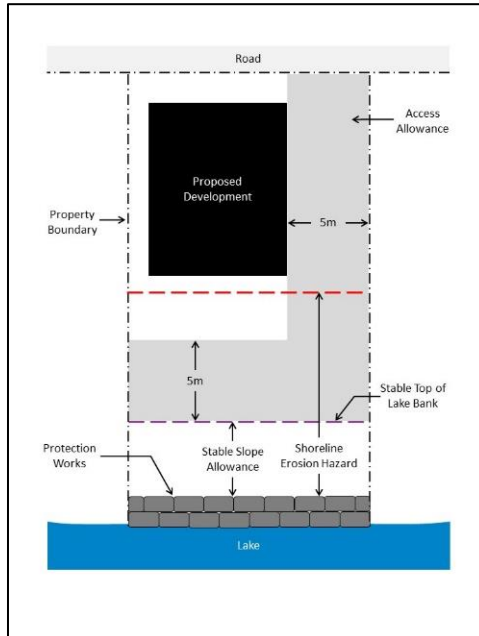


Figure 19: Shoreline Access Allowance

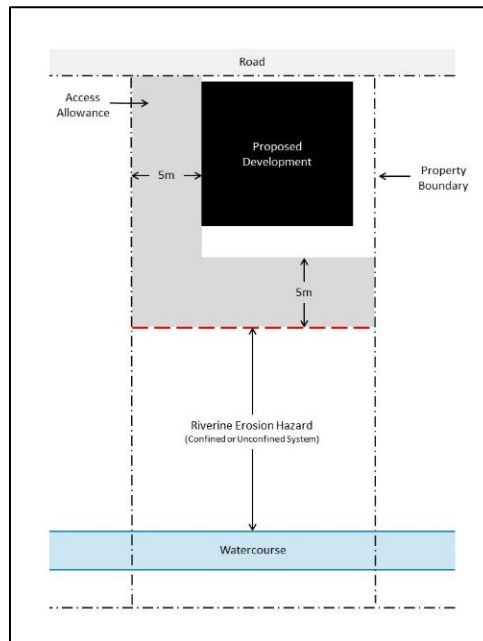


Figure 20: Riverine Access Allowance

5.10 Fill Placement and Site Grading

As defined under the *Conservation Authorities Act* and *Ontario Regulation 41/24, Prohibited Activities, Exemptions and Permits*, development activity includes the temporary or permanent placing, dumping, or removal of any material, originating on the site or elsewhere.

HCA supports soil conservation and the reuse of excess soil in an environmentally sustainable manner. However, the movement of *soil* and other materials, or *fill*, to or from a site requires careful review due to the potentially harmful impacts on *hazardous lands* and water resource and natural heritage systems and features that may contribute to the management of natural hazards.

Fill placement within the jurisdiction of the HCA must be in accordance with the following policies.

5.10.1 General Policies

- a) *Fill placement* shall not be permitted within *hazardous lands*, with the following exceptions:
 - i. for slope stabilization, erosion control or *floodproofing* measures required to protect existing development, in accordance with the flooding and erosion policies of Sections 5.3 and 5.4, *floodproofing* policies of Section 5.8, and the general policies of Section 5.2;
 - ii. as part of cut and fill operations, in accordance with the policies of Section 5.4.5.5;
 - iii. within the Dundas *Special Policy Areas* (SPA), in accordance with the policies of Section 5.4.5.7; or
 - iv. importation of *soil* for the purposes of agricultural soil enrichment in accordance with *normal farm practices*.
- b) Except as prohibited in policy 5.10.1(a), *fill placement* may be permitted in regulated areas where the general policies of Section 5.2 are met.
- c) HCA may require the submission of information, plans and studies to assess the potential impacts of a proposal for *fill placement*.
- d) *Fill placement* in a regulated area will require a permit. The information, plans and studies that are required to be submitted in support of a permit application will be scoped based on the specifics of the proposal, including fill source and receiving site conditions.
- e) Where proposed *fill placement* site locations are regulated jointly by both HCA and a municipal fill or site alteration by-law, and/or the Niagara Escarpment Commission, to the extent practical the proponent shall prepare comprehensive plans and reports for submission to all agencies. Joint pre-consultation with all applicable agencies will be encouraged.

5.10.2 Large-Scale Fill Placement

In addition to the policies of Section 5.10.1, the following policies will be applied when reviewing large-scale *fill placement* proposals within the jurisdiction of the HCA. For the purpose of these policies, large-scale fill applications are those defined as involving the placement, dumping or removal of 500 m³ or more of *fill*. Where site conditions warrant, HCA at its discretion may also apply the following policies to fill proposals of less than 500 m³.

- a) In addition to those studies required to address the policies in Section 5.10.1, applicants for large-scale fill proposals will also be required to complete a comprehensive Fill Management Plan. The information required for the completion of a Fill Management Plan is detailed in the *HCA Application Checklist for Fill Application Submissions*.
- b) Written permission from the HCA for a large-scale *fill placement* operation for the purposes of the temporary stockpiling of fill will only be granted to a maximum of one year. Within this period, the *fill* must either be used on-site or elsewhere under a separate permit where applicable, or a new application will be required for continued fill stockpiling. The new application will be subject to the requirements of these policies.
- c) A final site inspection and review of permit conditions shall be required for all large-scale *fill placement* operations. It will be the responsibility of the property owner or authorized agent to ensure that a final inspection with HCA enforcement staff is coordinated once all work has been completed and prior to the permit expiration date.
- d) The submission of a final post-development ('as-built') topographic survey to confirm elevations on the property will be required for all large-scale *fill placement* activities.

5.11 Development Exemptions

This section outlines minor developments and other activities that may be exempt from requiring a permit from HCA under the *Conservation Authorities Act* and *Ontario Regulation 41/24, Prohibited Activities, Exemptions and Permits*. While these activities may meet the definition of *development activity* or *interference*, any impacts associated with the activities are typically very minor, well understood and/or easily mitigated such that a permit may not be necessary.

The exemptions provided must be considered in conjunction with all other policies in Section 5, and in the case where more than one policy applies to the activity, the more restrictive policy will apply.

Subject to review and confirmation from HCA, the following activities may be exempt from requiring a permit.

- a) Any activity that may be exempted in accordance with regulations passed under Section 28 of the *Conservation Authorities Act*, including those identified in Section 5, Exceptions, of *Ontario Regulation 41/24, Prohibited Activities, Exemptions and Permits* as follows:
 - I. the construction, reconstruction, erection, or placement of:
 - i. seasonal or floating dock that is 10 m² or less, does not require permanent support structures, and can be removed in the event of flooding,
 - ii. a rail, chain-link or panelled fence with a minimum of 75 mm of width between panels, that is not within a wetland or watercourse,
 - iii. agricultural in-field erosion control structures that are not within and that do not have any outlet of water directed or connected to a watercourse, wetland or river or stream valley,
 - iv. a non-habitable accessory building or structure that is incidental or subordinate to the principal building or structure is 15 m² or less, and is not within a wetland or watercourse, or,
 - v. an unenclosed detached deck or patio that is 15 m² or less, is not placed within a watercourse or wetland and does not utilize any method of cantilevering
 - II. the installation of new tile drains that are not within a wetland or watercourse, within 30 m of a wetland or within 15 m of a watercourse, and that have an outlet of water that is not directed or connected to a watercourse, wetland or river or stream valley, or the maintenance or repair of existing tile drains;
 - III. the installation, maintenance or repair of a pond for watering livestock that is not connected to or within a watercourse or wetland, within 15 m of a wetland or a watercourse, and where no excavated material is deposited within an area where subsection 28(1) of the CA Act applies;

- IV. the maintenance or repair of a driveway or private lane that is outside of a wetland or the maintenance or repair of a public road, provided that the driveway or road is not extended or widened and the elevation, bedding materials and existing culverts are not altered;
 - V. the maintenance or repair of municipal drains as described in, and conducted in accordance with the mitigation requirements set out in the *Drainage Act* and the CA Act Protocol, approved by the Minister and available on a government of Ontario website, as it may be amended from time to time; and
 - VI. the reconstruction of a non-habitable garage with no basement, if the reconstruction does not exceed the existing footprint of the garage and does not allow for a change in the potential use of the garage to create a habitable space.
- b) Activities approved under the *Aggregate Resources Act*.
 - c) Activities undertaken by the federal or provincial Crown.
 - d) Site alteration and grading that involves:
 - I. a one-time placement of *fill* less than or equal to 10 m³ within or adjacent to a river or stream valley or within the *regulatory floodplain*, provided that the filled and re-graded area is immediately stabilized, and that the *fill* does not have an adverse impact on *Regulatory Flood* elevations;
 - II. provided (i) above is met, top dressing of existing lawns or gardens with organic material such as topsoil (50 mm depth); and
 - III. resurfacing of existing driveways, laneways and parking lots, where the final grade is generally the same as the existing grade.
 - e) The construction of an *accessory structure* in the Feeder Area lands of the Eramosa Karst ANSI, on any property for which a karst assessment has been completed and supported by HCA as part of a municipal planning process.

6 DEFINITIONS

100-year flood (One-hundred-year flood): for river, stream and small inland lake systems, means that flood, based on an analysis of precipitation, snow melt, or a combination thereof, having a return period of 100 years on average, or having a 1% chance of occurring or being exceeded in any given year.

100-year flood level (One-hundred-year flood level): for the shorelines of the Great Lakes, the peak instantaneous still water level, resulting from combinations of mean monthly lake levels and wind setups, which has a 1% chance of being equaled or exceeded in any given year.

Access allowance (erosion access allowance): the area or setback needed to ensure there is a large enough safety zone for people and vehicles to enter and exit an area during or in response to an emergency, such as a slope failure or flooding, and to provide sufficient area to access, construct and maintain protection works and property along river and stream valleys, *watercourses*, and the Lake Ontario shoreline.

Access standards: means methods or procedures to ensure safe vehicular and pedestrian movement, and access for the maintenance and repair of protection works, during times of *flooding hazards*, *erosion hazards* and/or *other water-related hazards*.

Accessory structure: a secondary, freestanding, non-habitable building or structure on the same lot as the main building to which it is subordinate, devoted exclusively to a use naturally and normally incidental to the main use of the premises. Examples of such structures include detached decks, sheds, pools, pool houses, and gazebos.

Adverse hydraulic and fluvial impacts: any increase in flood elevation or impedance of flood and ice flows and/or an increase in the risk of flooding and erosion on adjacent upstream and/or downstream properties.

Agricultural uses: means the growing of crops, including nursery, biomass, and horticultural crops; raising of livestock; raising of other animals for food, fur or fibre, including poultry and fish; aquaculture; apiaries; agro-forestry; maple syrup production; and associated on-farm buildings and structures, including, but not limited to livestock facilities, manure storages, value-retaining facilities, and housing for farm workers, when the size and nature of the operation requires additional employment.

Agriculture-related uses: means those farm-related commercial and farm-related industrial uses that are directly related to farm operations in the area, support agriculture, benefit from being in close proximity to farm operations, and provide direct products and/or services to farm operations as a primary activity.

Allowance (regulation allowance): the distance from a hazard or regulated feature prescribed in *Ontario Regulation 41/24* to delineate the *regulated area*.

Comprehensive study: means a study or plan undertaken by or under the direction of a public agency at a landscape scale, such as a watershed plan, subwatershed plan, *environmental assessment*, master plan, environmental implementation reports, or similar documents, that have been prepared to consider and document various alternatives and which may be part of a joint or harmonized planning process.

Confined system: means a system wherein the *watercourse* is located within a valley corridor, either with or without a *flood plain*, and is confined by valley walls. The *watercourse* can be located at the toe of the *valley slope*, in close proximity to the toe of the *valley slope* (less than 15 m), or removed from the toe of the *valley slope* (more than 15 m). The *watercourse* can contain perennial, intermittent or ephemeral flows and may range in channel configuration, from seepage and natural springs to detectable channels.

Conservation projects: activities, buildings or structures for conservation or hazard management purposes, such as, but not limited to, flood and erosion control works, habitat creation and enhancement, tree and shrub planting, trails and low intensity recreation activities, cultural heritage and archaeological preservation and interpretation.

Contaminant: means any solid, liquid, gas, odour, heat, sound, vibration, radiation or combination of any of them resulting directly or indirectly from human activities that causes or may cause an adverse effect, as defined in the *Environmental Protection Act*.

Development: means the creation of a new lot, a change in land use, or the construction of buildings and structures requiring approval under the *Planning Act*, but does not include:

- a) activities that create or maintain infrastructure authorized under an environmental assessment process or identified in provincial standards; or
- b) works subject to the *Drainage Act*.

Development activity: means,

- a) the construction, reconstruction, erection or placing of a building or structure of any kind;
- b) any change to a building or structure that would have the effect of altering the use or potential use of the building or structure, increasing the size of the building or structure or increasing the number of dwelling units in the building or structure;
- c) site grading; or
- d) the temporary or permanent placing, dumping or removal of any material, originating on the site or elsewhere.

Disconnected features: means those features that have, as a result of development or natural processes, become disconnected from the feature with which they were originally associated. An example of a disconnected feature is a section of *valley slope* that has been disconnected from the primary slope as a result of road construction.

Dry floodproofing: means *floodproofing* where the objective is to keep a development or structure and its contents completely dry during a flood event. There are two basic techniques to dry floodproofing:

- a. Dry passive *floodproofing* includes the use of fill, columns or design modifications to elevate openings in the structure at or above the level of the *regulatory flood*. These measures do not require flood warning or any other action to put the flood protection into effect.
- b. Dry active *floodproofing* utilizes techniques such as water tight doors or other barriers that must be manually installed to prevent water from entering openings below the level of the *regulatory flood*. Advance flood warning is almost always required in order to make the flood protection operational (i.e. closing of water tight doors, installation of waterproof protective coverings over windows, etc.).

Dwelling unit: means one or more habitable rooms, occupied or capable of being occupied as an independent and separate housekeeping establishment, in which separate kitchen and sanitary facilities are provided for the exclusive use of the occupants.

Dynamic beach hazard: means areas of inherently unstable accumulations of shoreline sediments along the *Great Lakes-St. Lawrence River System* and *large inland lakes*, as identified by provincial standards, as amended from time to time. The *dynamic beach hazard* limit consists of the *flooding hazard* limit plus a dynamic beach *allowance*. [PPS]

Ecological function: means the natural processes, products or services that living and non-living environments provide or perform within or between species, ecosystems and landscapes. These may include biological, physical and socio-economic interactions. [PPS]

Environmental assessment: a study that is completed by a proponent to assess the potential environmental effects (positive or negative) of a project, pursuant to the *Environmental Assessment Act*.

Erosion access allowance: see *access allowance*.

Erosion hazard: means the loss of land, due to human or natural processes, that poses a threat to life and property. The *erosion hazard* limit is determined using considerations that include the 100-year erosion rate (the average annual rate of recession extended over a hundred-year time span), an allowance for slope stability and an *erosion access allowance*.

Essential emergency service: means services which would be impaired during an emergency as a result of flooding, the failure of floodproofing measures and/or protection works, and/or erosion. [PPS]

Fill: means *soil*, earth, sand, gravel, rubble, garbage or any other material whether similar to or different from any of the aforementioned materials, whether originating on the site or elsewhere, used or capable of being used to raise, lower or in any way affect the existing contours of the ground.

Fill placement: includes the temporary or permanent placing, dumping, or removal of any material on or from a site, as well as any associated site alteration and grading works, and where the *fill placement* is the primary activity

Flooding hazard: means the inundation, under the conditions specified below, of areas adjacent to a shoreline or a *river or stream system* and not ordinarily covered by water:

- a. Along the shorelines of the *Great Lakes-St. Lawrence River System* and large *inland lakes*, the flooding hazard limit is based on the *100-year flood level* plus an allowance for *wave action* and *other water-related hazards*.
- b. Along river, stream and small inland lake systems, the flooding hazard limit is the greater of:
 - i. The flood resulting from the rainfall actually experienced during a major storm such as the *Hurricane Hazel* Storm (1954), transposed over a specific *watershed* and combined with the local conditions, where evidence suggests that the storm event could have potentially occurred over *watershed* in the general area;
 - ii. The *100-year flood*; or
 - iii. A flood which is greater than (i) or (ii) which was actually experienced in a particular *watershed* or portion thereof as a result of ice jams and which has been approved as the standard for that specific area by the Minister of Natural Resources,

Except where the use of the *100-year flood* or the actually experienced event has been approved by the Minister of Natural Resources as the standard for a specific *watershed* (where the history of past flooding supports the lowering of the standard). [PPS]

Floodplain spill area: portions of the regulatory floodplain where flood waters are not physically contained within the river valley or stream corridor and exit to surrounding lands. As a consequence, the limit and depth of flooding are difficult to determine. Flood spill areas occur naturally, or can occur as a result of downstream barriers to the passage of flood flows, such as undersized bridges or culverts.

Floodproofing: measures taken to reduce flood damage to buildings and their contents.

Floodproofing standard: means the combination of measures incorporated into the basic design and/or construction of buildings, structures, or properties to reduce or eliminate *flooding hazards*, *wave effects* and *other water-related hazards* along the shorelines of the *Great Lakes - St. Lawrence River System* and large inland lakes, and *flooding hazards* along river, stream and small inland lake systems.

Flood fringe: means the outer portion of the *floodplain* between the *floodway* and the *flooding hazard* limit. Depths and velocities of flooding are generally less severe in the flood fringe than those experienced in the floodway. [PPS]

Floodplain: means the area, usually low lands adjoining a *watercourse*, which has been or may be subject to *flooding hazards*. [PPS]

Floodway: means the portion of the floodplain where development and site alteration would cause a danger to public health and safety or property damage. [PPS]

Great Lakes-St. Lawrence River System: means the major water system consisting of Lakes Superior, Huron, St. Clair, Erie and Ontario and their connecting channels, and the St. Lawrence River within the boundaries of the Province of Ontario. [PPS]

Ground water feature: refers to water-related features in the earth's subsurface, including recharge/discharge areas, water tables, aquifers and unsaturated zones that can be defined by surface and subsurface hydrogeologic investigations. [PPS]

Hazardous lands: means land that could be unsafe for development because of naturally occurring processes associated with flooding, erosion, dynamic beaches or unstable soil or bedrock. [O. Reg. 41/24]

Hazardous sites: means property or lands that could be unsafe for *development* and *site alteration* due to naturally occurring hazards. These may include unstable soils (sensitive marine clays [leda], organic soils) or unstable bedrock (karst topography). [PPS]

Hazardous substance: means substances which, individually, or in combination with other substances, are normally considered to pose a danger to public health, safety and the environment. These substances generally include a wide array of materials that are toxic, ignitable, corrosive, reactive, radioactive or pathological. [PPS]

Hurricane Hazel: means a storm occurring in October 1954 in Southern Ontario, whose quantity and distribution is defined in *Ontario Regulation 41/24*, and which is used as the riverine flood event standard for all *watersheds* in the jurisdiction of the HCA with the exception of the numbered *watercourses* in the former City of Stoney Creek.

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

Impacts of a changing climate: means the present and future consequences from changes in weather patterns at local and regional levels including extreme weather events and increased climate variability. [PPS]

Infrastructure: means physical structures (facilities and corridors) that form the foundation for development. Infrastructure includes: sewage and water systems, septage treatment systems, stormwater management systems, waste management systems, electricity generation facilities, electricity transmission and distribution systems, communications/telecommunications including broadband, transit and transportation corridors and facilities, active transportation systems, oil and gas pipelines and associated facilities. [PPS]

Institutional use: means land uses where there is a threat to the safe evacuation of vulnerable populations such as older persons, persons with disabilities, and those who are sick or young, during an emergency as a result of flooding, failure of floodproofing measures or protection works, or erosion. [PPS]

Interference: any anthropogenic act or instance which hinders, disrupts, degrades or impedes in any way the natural features or hydrologic and ecologic functions of a *wetland* or *watercourse*.

Mitigated erosion hazard: the reduction in the erosion allowance component of the *erosion hazard* that is provided as a result of the installation of protection works that are designed and installed in accordance with the *protection works standard*, and represents the area within the *erosion hazard* limit where it is deemed safe for some forms of development to occur.

Meander belt allowance: means the setback that keeps *development* from being affected by river and stream meandering (this includes allowance for the 100-year erosion rate). [MNR, 2001]

Minor addition: means any construction occurring on an existing building or structure that increases the total area of that building or structure by less than 50% of the *original ground floor area* of the existing structure, and which does not increase the number of *dwelling units*, as existed on October 6, 2005.

Natural heritage features or areas: means features and areas, including significant wetlands, significant coastal wetlands, fish habitat, significant woodlands, significant valleylands, significant habitat of endangered species and threatened species, significant wildlife habitat, and significant Areas of Natural and Scientific Interest, which are important for their environmental and social values as a legacy of the natural landscape of an area. [PPS]

Natural heritage system: means a system made up of *natural heritage features and areas*, linked by natural corridors which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species and ecosystems. These systems can include lands that have been restored and areas with the potential to be restored to a natural state. [PPS]

Negative impacts: means

- a. In regard to water, the degradation to the *quality and quantity of water*, *sensitive surface water features* and *sensitive ground water features*, and their related *hydrologic functions*, due to single, multiple or successive *development* or *site alteration* activities; and
- b. In regard to other *natural heritage features and areas*, the degradation that threatens the health and integrity of the natural features or *ecological functions* for which an area is identified due to single, multiple or successive *development* or *site alteration* activities. [PPS]

Normal farm practices: means a practice, as defined in the *Farming and Food Production Protection Act*, 1998, that is conducted in a manner consistent with proper and acceptable customs and standards as established and followed by similar agricultural operations under similar circumstances; or makes use of innovative technology in a manner consistent with proper advanced farm management practices. Normal farm practices shall be consistent with the *Nutrient Management Act*, 2002 and regulations made under that Act.

One zone area: means the approach whereby the entire *floodplain*, as defined by the *regulatory flood*, is treated as one unit (the *floodway*) and all development is prohibited or restricted.

Original ground floor area: means the total habitable main floor area of a building (excluding decks, patios, garages and other *accessory structures*) as existed at the time of the original construction date of the building.

Other water-related hazard: means water-associated phenomena other than *flooding hazards* and *wave effects* which act on shorelines. This includes, but is not limited to ship-generated waves, ice piling and ice jamming. [PPS]

Protection works standards: means the combination of non-structural or structural works and allowances for slope stability and flooding/erosion to reduce the damage caused by *flooding hazards*, *erosion hazards* and *other water-related hazards*, and to allow access for their maintenance and repair. [PPS]

Provincial standards: the most recently approved legislation, regulations, policies, manuals and technical guidelines administered or prepared by the province.

Regulated area: the areas over which a conservation authority has jurisdiction to prohibit certain activities, as described in the *Conservation Authorities Act* and *Ontario Regulation 41/24*.

Regulation allowance: see *allowance*.

Regional storm: means the rainfall event and soil conditions existing during *Hurricane Hazel*, transposed over a specific *watershed* and combined with local conditions.

Regulatory flood: means the resulting flood from the applicable storm event standard; the greater of the *Regional storm* or 100-year storm utilized for a particular area

Regulatory floodplain: the area adjacent to a *watercourse* that would be inundated by a flood resulting from the most severe of the *Hurricane Hazel* flood event standard (*Regional Storm*) or the *100-year flood* event standard, whichever is greater.

Regulatory storm – means the applicable flood or storm standard utilized to determine the maximum susceptibility to flooding of lands or areas within the *watershed*.

Remediation – the construction or modification of *infrastructure* or land for the purpose of reducing or eliminating risk due to natural hazards.

Replacement (Replacement structure): means the restoration, repair or reconstruction of a building or structure to its original form (i.e. same dimensions, square footage, building footprint and use), but does not include reconstruction on remnant foundations or of derelict or abandoned buildings or structures.

Safe access (Safe ingress/egress): vehicular and pedestrian access to (ingress) and from (egress) a site is safe from the risks due to flooding or erosion hazards, in consideration of the nature of the development and based on *provincial standards*.

Sensitive: in regard to *surface water features* and *ground water features*, means features that are particularly susceptible to impacts from activities or events including, but not limited to, water withdrawals, and additions of pollutants. [PPS]

Sinkhole: means a topographically closed depression, commonly circular or oval in plain view; commonly referred to as dolines.

Site Alteration: means activities, such grading, excavation and the placement of *fill* that would change the landform and natural vegetative characteristics of a site. [PPS]

Soil: means unconsolidated naturally occurring mineral particles and other naturally occurring material resulting from the natural breakdown of rock or organic matter by physical, chemical or biological processes that are smaller than 2 millimetres in size or that pass the US #10 sieve [O. Reg. 153/04]

Special Policy Area (SPA): means an area within a community that has historically existed in the *floodplain* and where site-specific policies, approved by both the Ministers of Natural Resources and Municipal Affairs and Housing, are intended to provide for the continued viability of existing uses (which are generally on a small scale) and address the significant social and economic hardships to the community that would result from strict adherence to provincial policies concerning *development*. The criteria and procedures for approval are established by the Province. A Special Policy Area is not intended to allow for new or intensified *development* and *site alteration*, if a community has viable opportunities for *development* outside the *flood plain*. [PPS]

Stable slope allowance: means the setback that ensures safety if slumping or slope failure occur. Refers to the suggested angle of stability for a slope is 3:1 (horizontal: vertical) or approximately 18 degrees. The stable slope allowance is a horizontal allowance measured landward from the *toe of slope* that is relative to the height of the slope. [MNR, 2001]

Stable toe of slope: means,

- a) the physical *toe of slope* where the existing toe is stable and not impacted by erosion; or
- b) the landward limit of the *toe erosion allowance* where the existing slope is unstable and/or impacted by erosion.

Stable top of slope/bank (long term stable slope): means,

- a) the physical *top of slope* where the existing slope is stable and not impacted by toe erosion; or
- b) the landward limit of the *toe erosion allowance* plus the *stable slope allowance* where the existing slope is unstable and/or impacted by erosion.

Surface water feature: refers to water-related features on the earth's surface, including headwaters, rivers, stream channels, inland lakes, seepage areas, recharge/discharge areas, springs, *wetlands*, *sinkholes*, and associated riparian lands that can be defined by their soil moisture, soil type, vegetation or topographic characteristics. [PPS]

Toe erosion allowance: means the setback that ensures safety if the *toe of slope* adjacent to the river or stream erodes and weakens the bank, increasing the risk of slumping. [MNR, 2001]

Toe of slope (a.k.a. base of slope): means the point of the slope where the downward inclination of the land levels off or the upward inclination of the land begins.

Top of slope (a.k.a. crest of slope, top of bank): means the point of the slope where the downward inclination of the land begins or the upward inclination of the land levels off.

Two zone area: means the approach whereby certain areas of the *floodplain* are considered to be less hazardous than others such that development potentially could safely occur. The *flood fringe* defines that portion of the *floodplain* where development may be permitted, subject to appropriate *floodproofing*. The *floodway* defines that portion of the *floodplain* wherein development is prohibited or restricted.

Unconfined system: means a system wherein the *watercourse* is not located within a valley corridor with discernible slopes, but relatively flat to gently rolling plains and is not confined by valley walls. The *watercourse* can contain perennial, intermittent or ephemeral flows and may range in channel configuration, from seepage and natural springs to detectable channels.

Valley slope: refers to the area between *top of slope* and *toe of slope*.

Valleylands: means a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year. [PPS]

Watercourse: means a defined channel, having a bed and banks or sides, in which a flow of water regularly or continuously occurs. [O. Reg. 41/24]

Watershed: means an area that is drained by a river and its tributaries. [PPS]

Water resource systems: means a system consisting of ground water features and areas, surface water features (including shoreline areas), natural heritage features and areas, and hydrologic functions, which are necessary for the ecological and hydrological integrity of the watershed. [PPS]

Wave effects: means the movement of water up onto a shoreline or structure following the breaking of a wave, including *wave uprush*, *wave setup* and water overtopping or spray; the limit of wave effects is the point of furthest landward horizontal movement of water onto the shoreline. [PPS]

Wave overtopping: essentially occurs when the height of the natural shoreline, or of the protection work, above the still water level is less than the limit of uprush. As a result, waves overtopping the protection work can cause flooding of the onshore and can threaten the structural stability of protection works. [MNR, 2001]

Wave setup: means the mean increase in water level caused by the onshore transport of water due to waves breaking at the shoreline. [MNR, 2001]

Wave uprush: means the rush of water up onto a shoreline or structure following the breaking of a wave; the limit of wave uprush is the point of furthest landward rush of water onto the shoreline. [MNR, 2001]

Wet floodproofing: means *floodproofing* that involves designing a structure using materials, methods and design measures that maintain structural integrity by avoiding external unbalanced forces from acting on buildings during and after a flood, to reduce flood damage to contents, and to reduce the cost of post flood clean up. Buildings or structures are designed so as to intentionally allow flood waters to enter and exit. These *floodproofing* measures require that the interior space below the level of the *regulatory flood* remain unfinished, be non-habitable, and be free of service units and panels.

Wetlands: means lands that,

- a) is seasonally or permanently covered by shallow water or has a water table close to or at its surface;
- b) directly contributes to the hydrological function of a *watershed* through connection with a surface *watercourse*;
- c) has hydric soils, the formation of which has been caused by the presence of abundant water; and

d) has vegetation dominated by hydrophytic plants or water tolerant plants, the dominance of which has been favoured by the presence of abundant water,

But does not include periodically soaked or wet land that is used for agricultural purposes and no longer exhibits a wetland characteristic referred to in clause (c) or (d).
[O. Reg. 41/24]

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Report to: Conservation Advisory Board

Approved for Circulation By: Lisa Burnside, CAO

Reviewed By: Matthew Hall, Director; Capital Projects & Strategic Services

Prepared By: Madolyn Armstrong, Landscape Architect; Capital Projects & Strategic Services

Meeting Date: October 9, 2025

Subject: Final Eramosa Karst Conservation Area Master Plan and Chippawa Rail Trail Management Plan for Approval

Recommendation:

THAT the Conservation Advisory Board recommends to the Board of Directors;

THAT this report and accompanying Master and Management Plans of September 2025 be received as information for project background and general understanding;

and further

THAT the Eramosa Karst Conservation Area Master Plan and Chippawa Rail Trail Management Plan of September 2025 be approved.

Executive Summary:

HCA staff have completed the final draft of a new Master Plan for Eramosa Karst Conservation Area and a new Management Plan for the Chippawa Rail Trail. These Plans are intended to provide direction and guidance for the next ten years of operation for these conservation lands.

Internal and external review and commenting on these plans has concluded, comments and feedback received have been incorporated into the documents. HCA staff are recommending that the plans be endorsed by the Conservation Advisory Board and

approved by the HCA Board of Directors as the official policy documents for the management and development of these conservation areas.

Staff Comment / Discussion:

1. Background

The HCA Ten Year Master Plan Update Strategy was approved by CAB and the Board of Directors in early 2019 for properties that HCA owns and manages. As per this strategy document, the scheduled study area for review in 2023 was the East Mountain Study Area, which includes Eramosa Karst Conservation Area, Mount Albion Conservation Area, Felker's Falls Conservation Area and the Chippawa Rail Trail.

Work on these plans began in January 2023. An informational memo was brought to CAB in April 2023 to inform members about the project. An update was brought to CAB in October of 2024 to share progress on the development of these plans. Since that time, staff have undertaken an internal and external review and commenting period on the drafts involving; HCA staff, Board members, stakeholder agencies and groups, local Indigenous communities and the public. The feedback from this consultation has been incorporated into the final drafts for approval.

HCA staff developed these plans through a process of four phases as follows:

- Phase 1 Background began in January 2023 and was completed in summer 2023. This phase included engagement with HCA staff in all departments and forming the HCA staff steering committee, collection of background information, and the assembling of existing mapping information.
- Phase 2 Inventory included the collection and assembly of natural areas field surveys and mapping information, ecological reports, trail counter data and public surveys. Three facilitated workshop sessions were held with the HCA staff working group covering: site concept and strategic visioning; day use operations, marketing and financial sustainability; and capital project priorities and plans. One public information booth was held by staff at Eramosa Karst Conservation Area in July 2023. Four visitor surveys, one for each area, ran from May to October 2023 on the Bang the Table website. 82 public surveys were received for Eramosa Karst and another 61 for the Chippawa Rail Trail. Visitors to the information booths and to HCA's online public engagement site were also able to register to receive updates on the project.
- Phase 3 Draft Document included developing the first draft of each plan using the information gathered in Phase 2 from staff, stakeholders and the public. Draft plans were reviewed internally by the HCA staff working group and revised following feedback received. Revised documents were then distributed for external review and open to commenting for all HCA staff, HCA's Boards, stakeholder agencies, Indigenous communities, and the public through Bang the Table. The review and commenting period for the plans took place from October 2024 to January 2025, with the exception of ongoing consultation with the NEC, MNR and First Nations.

- Phase 4 Final Document included revisions to the Eramosa Karst and the Chippawa Rail Trail plans completed with the feedback received from the external review period. The final draft plans will be completed upon endorsement by the HCA's Conservation Advisory Board and approval by the Board of Directors.

HCA staff have also been working on a new Master Plan for Mount Albion Conservation Area and a new Management Plan for Felker's Falls Conservation Area as part of this East Mountain Study Area. These two plans are currently undergoing review with the Niagara Escarpment Commission and will be brought to CAB for endorsement when they are complete.

2. Eramosa Karst Conservation Area Master Plan

This Master Plan for Eramosa Karst Conservation Area (EKCA) updates and replaces the 2007 EKCA Master Plan and the 2013 EKCA Feeder Lands Operating Plan. EKCA is a 274-acre day-use conservation area located on top of the Escarpment in Hamilton. It is a popular day-use area for hiking, cycling, nature appreciation and environmental education. The City's East Mountain Trail Loop passes through this conservation area. EKCA is surrounded on all sides by residential and commercial development. It is largely within a provincially designated Area of Natural and Scientific Interest (ANSI) and contains several significant examples of karst topography, a rare landform in the province of Ontario.

This plan focuses on improving and maintaining the existing day-use features and natural areas at EKCA. Key items that are addressed in this Master Plan include:

- Natural Areas
 - Updated terrestrial and aquatic ecological inventories were conducted across the property.
 - Recommended actions to enhance biodiversity and long-term forest resiliency through control of invasive species and restoration plantings.
 - The significant karst features including caves, creeks and sinks are identified along with recommended actions for protecting these features.
 - Information about the Feeder Lands, a portion of the property currently leased by the HCA from the Government of Ontario.
- Conservation Area and Day Use Development
 - Add a pedestrian trail connection near the driveway to connect the sidewalk on Upper Mount Albion Road to the East Mountain Trail Loop.
 - Replace and add new educational interpretive features through the area.
 - Addition of rest areas along the trails.
 - Recommendation to review the "amphitheatre" area and enhance this as a gathering space for visitors and educational groups.
 - Improvements to trail surfaces and seasonally wet areas.

Summary of Consultation and Engagement

HCA received feedback on the EKCA Master Plan from a variety of interested stakeholders, groups and people. Below is a summary of key updates and changes that resulted from consultation.

HCA Staff

- Section 6.3 – more information about the proposed enhancements to the “amphitheatre” area have been added.
- Section 5.15 and 7.9 – information about a recent restoration planting project in partnership with Conservation Halton and the Forests Canada 50 Million Trees program has been added.

City of Hamilton – Cultural Heritage Department

- Section 4.6 and 7.4 – clarification has been made to the information provided about the registered archaeology sites on this property.

City of Hamilton – Planning and Economic Development Department

- Section 2.3 – recognition of the City of Hamilton Biodiversity Action Plan has been added to this document.
- Section 5.6 – recognition of the ongoing Natural Areas Inventory has been added to the document.
- Captions and alt text have been added to all photos in the document.
- Figure 2. Context Map B – updated to show the extents of the Eramosa Karst ANSI more clearly.
- Corrections and updates to policy references and zoning have been made through the document.

Marcus Buck – Marcus is a local karst expert who has been involved with research and projects at EKCA for over 20 years.

- Section 6.3 – language stating that access to cave features should be restricted has been removed from the plan.
- Section 7.1.1 – recommendation for a supplementary cave management plan to be created has been added to the plan.

Six Nations of the Grand River – Wildlife and Stewardship Office

- Section 4.6 – recognition of the Indigenous view that cultural heritage and natural heritage are inseparable has been added.
- Section 5.15.1 – recommendations for protecting water quality and karst features have been added, these actions are also recommended in the 2003 EKCA ANSI Report.
- Section 5.7 – clarification made on timing of frog call surveys.
- Section 7.2 – recognition of snag trees as important habitat features has been added.

- Section 7.3 – acknowledgement of Indigenous peoples right in Canada to hunt, fish and harvest for medicinal, cultural or sustenance purposes has been added.
- Section 9.2 – “Indigenous Perspectives, History and Connections with the Land” has been added as a potential theme to be explored with interpretive features.

3. Chippawa Rail Trail Management Plan

This Management Plan for the Chippawa Rail Trail (CRT) updates and replaces the 1998 CRT Master Plan, which guided the initial construction of the trail. The CRT is a 15-kilometre multi-use recreational trail following a former rail line between Hamilton and the Town of Caledonia. This plan focuses on the 12km of trail owned and managed by the HCA between Stone Church Road East and Haldibrook Road. The parking lot on Dartnall Road in HCA’s Mount Albion Conservation Area is the main staging area at the north end of the trail. The trail is most commonly used for walking, running and cycling. Significant features include the former Harris Grain Elevator located beside the trail between Stone Church Road and Rymal Road, and a parcel of land formerly used as a parking lot adjacent to the trail corridor at Miles Road.

This plan focuses on documenting the condition of trail infrastructure and examining opportunities for enhanced access, connectivity and amenities for visitors. Key items addressed in this Management Plan include:

- Environmental Management
 - Recommendation for invasive species management along the trail corridor through mapping, prioritization and restoration planting.
 - Recommendation for buffering along the trail corridor in target areas.
 - Regular review of watercourse crossings to ensure safe fish passage as well as maintaining infrastructure.
- Trail Infrastructure and Experience
 - Reopening the parking lot on Miles Road to enhance trail access.
 - Improve wayfinding along the trail with new directional signage at road crossings, trailheads and mapping.
 - Addition of interpretive signage and rest areas.
 - Secure and maintain the former Harris Grain Elevator, a designated Cultural Heritage structure. There is also opportunity for partnership with interested local stakeholders on restoring this structure.
 - Recommendation to investigate connection improvements to the Dartnall Road parking lot in partnership with the City of Hamilton.

Summary of Consultation and Engagement

HCA received feedback on the CRT Management Plan from a variety of interested stakeholders, groups and people. Below is a summary of key updates and changes that resulted from consultation.

City of Hamilton – Cultural Heritage Department

- Section 3.3 Heritage Designations and Historic Buildings has been added to the plan.
- Section 3.2 – revised now that the Cultural Heritage designation process for this structure has been completed.
- Section 3.4 – recognition that the former Harris Grain Elevator is now subject to the Ontario Heritage Act has been added.
- Section 6.2 Cultural Heritage Management has been added to the plan.
- Section 3.1.1, 5.1.1 and 7.1.2 – recognition that the HCA will consult with City of Hamilton Cultural Heritage Planning staff on restoration work subject to the Heritage Permit process has been added.
- Appendix 2 Capital Development Priorities – items subject to City of Hamilton involvement and approval have been identified.

City of Hamilton – Planning and Economic Development Department

- Section 2.3.4 – recognition of the City of Hamilton Biodiversity Action Plan has been added to this document.
- Section 4.1.4 – recognition of the ongoing Natural Areas Inventory has been added to the document.
- Captions and alt text have been added to all photos in the document.
- Corrections and updates to policy references and zoning have been made through the document.

City of Hamilton – Active Transportation

- Appendix 1 Mapping – proposed trail connection shown between the Dartnall Road parking lot and north end of the CRT has been removed. The exact alignment of this connection cannot be committed to at this time, further consultation with the City will be required if HCA wants to undertake this project.

Rymal Station Heritage

- Improper reference to the former Harris Grain Elevator as “the silos” has been corrected throughout the plan.
- Section 3.3.1 and 6.7.3 - Recognition of the Rymal Station Heritage organization has been added along with the potential for future partnerships or agreements with this group.

Strategic Plan Linkage:

The initiative refers directly to the HCA Strategic Plan 2025 – 2029:

- **Strategic Priority Area – Natural Heritage Conservation**

Initiative – Manage natural areas on HCA lands through monitoring, inventories, strategies and approved master and management plan recommendations to ensure enhancement of natural areas and ecosystems.

- **Strategic Priority Area – Organizational Excellence**

Initiative – Increase our engagement with First Nations Peoples to learn about and incorporate traditional knowledge in stewardship and teachings on the Treaty and traditional lands within the HCA watershed.

Initiative – Uphold our ties to federal, provincial, and municipal partners to work together to advance conservation efforts.

- **Strategic Priority Area – Connecting People to Nature**

Initiative – Manage and enhance conservation lands utilising best management practices to support nature appreciation and recreation activities, as communities continue to grow and look to HCA’s conservation areas to spend time in nature.

Initiative – Continue development of master and management plans and implementation of priority capital reinvestments.

Agency Comments:

Parts of these plans include lands within the municipal boundaries of the City of Hamilton, and watershed boundaries of the Niagara Peninsula Conservation Authority and the Grand River Conservation Authority. These agencies were circulated for their comments during the external consultation period. The City of Hamilton provided comments on both of these plans that have been incorporated into the final draft.

Legal / Financial Implications:

Not Applicable.

Related Reports and Appendices:

Attachment A – 2025 Eramosa Karst Conservation Area Master Plan

Attachment B – 2025 Chippawa Rail Trail Management Plan

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Eramosa Karst Conservation Area Master Plan

Draft - September 2025



A Healthy Watershed for Everyone

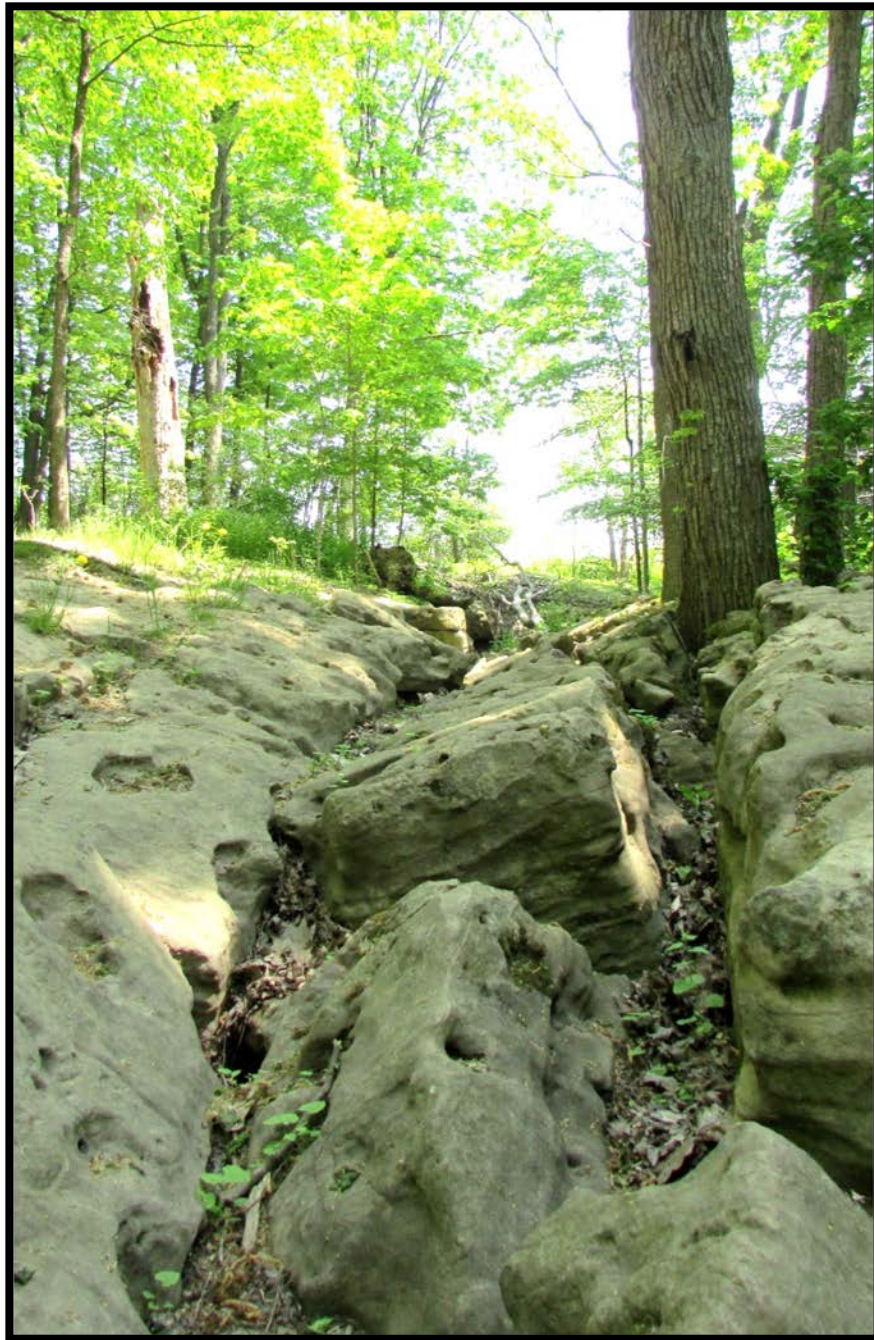


Photo 1: Exposed bedrock at Eramosa Karst

Prepared by: Hamilton Region Conservation Authority (HCA)
Photo Credits: HCA Staff



A Healthy Watershed for Everyone

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1.0 APPROVAL STATEMENT

We are pleased to approve the Eramosa Karst Conservation Area Master Plan 2025 as the official policy document for the Hamilton Region Conservation Authority (HCA).

This plan supports HCA’s current Strategic Plan and reflects our Vision of a healthy watershed for everyone and Mission to lead in the conservation of our watershed and connect people to nature.

Moving forward over the next ten years this plan will provide guidance for management of the conservation area in support of these goals.

Lisa Burnside
Chief Administrative Officer
Hamilton Conservation Authority

Date

Councillor Brad Clark
Chair, Board of Directors
Hamilton Conservation Authority

Date

2.0 PREFACE

The Eramosa Karst Conservation Area Master Plan is the guiding policy document for the management and development of this Hamilton Region Conservation Authority (HCA) conservation area. The recommendations in this Master Plan are intended to help provide direction and guidance for sustainable management and operation of Eramosa Karst Conservation Area (EKCA) over the next ten years.

This Master Plan was developed by HCA staff utilizing in-house expertise and resources, with a public consultation process to receive input from stakeholders and the public as follows:

Phase 1 Background

Background review was initiated January 2023 with the HCA executive team review of the work plan, engagement of staff, collection of mapping information, and gathering information through staff and stakeholder meetings. An information report was presented to the HCA Conservation Advisory Board in April 2023, and Phase 1 was completed by October 2023.

Phase 2 Inventory

Inventory includes the collection and assembly of natural areas field surveys and mapping information, ecological reports, trail and vehicle counter data, and visitor surveys. Natural areas reviews began in 2022 by HCA staff. An online public engagement site was launched on HCA's website in May 2023. A visitor survey for EKCA was conducted online through the HCA website. Flyers were also posted and distributed on site giving visitors QR codes and weblinks to take them to the surveys on their mobile devices. The survey period ran from May 18 to October 16, 2023 with 82 surveys submitted. One public information booth was operated by staff in the conservation area on July 16, 2023 to share information on the plan, respond to questions, and sign up people interested in receiving the draft plan for review and comment. Visitors to the public engagement site during this phase were also able to register to receive and comment on the draft Master Plan in Phase 3. Three facilitated workshop sessions were held with HCA staff covering site concept and strategic vision planning; day use operations, marketing and financial sustainability; and capital project priorities and plans.

Phase 3 Draft Document

Concepts in this plan were completed in-house by HCA staff and refined with the information from the public surveys and input from stakeholders. Staff's professional expertise and experience, plus lessons learned from operating EKCA helped inform this plan. This phase includes reviews of the compiled draft plan by HCA staff and Board members, stakeholders, and circulation to the public who registered during Phase 2.

Phase 4 Final Document

The final draft document considers all staff, stakeholder and public comments received in Phase 2 and 3. After receiving final comments, the plan will be updated and presented to the HCA Conservation Advisory Board for endorsement and the HCA Board of Directors for approval.

3.0 INTRODUCTION

3.1 Executive Summary

Eramosa Karst Conservation Area (EKCA) is a 111 ha (274 acre) day-use area located south of the Niagara Escarpment in the City of Hamilton. The EKCA is bounded by Highland Road, Rymal Road, Upper Mount Albion Road and Second Road West in the former City of Stoney Creek. The karst features found in the conservation area have caused it to be provincially designated as an Area of Natural and Scientific Interest (ANSI). A larger portion of the “feeder area” (karst headwaters) of the Eramosa Karst ANSI lies south of Rymal Road East. The conservation area and surrounding context are shown on Figure 1 Context Map A. The Feeder Lands and ANSI are shown on Figure 2 Context Map B.

The Karst features found at EKCA are rare in the province of Ontario. The term “karst” comes from a Slavic word meaning barren, stony ground. It is also the name of a region in Slovenia that is well-known for sinkholes and springs. Geologists have adopted “karst” as the term for all such terrain, and to describe the whole landscape. Karsts, such as at EKCA, most commonly develop on limestone which is easily eroded over time by water. The karst topography formed by the dissolving of rock and characterized by sinkholes (dolines), sinking streams, caves, and underground drainage that is found at EKCA is uncommon in Ontario.

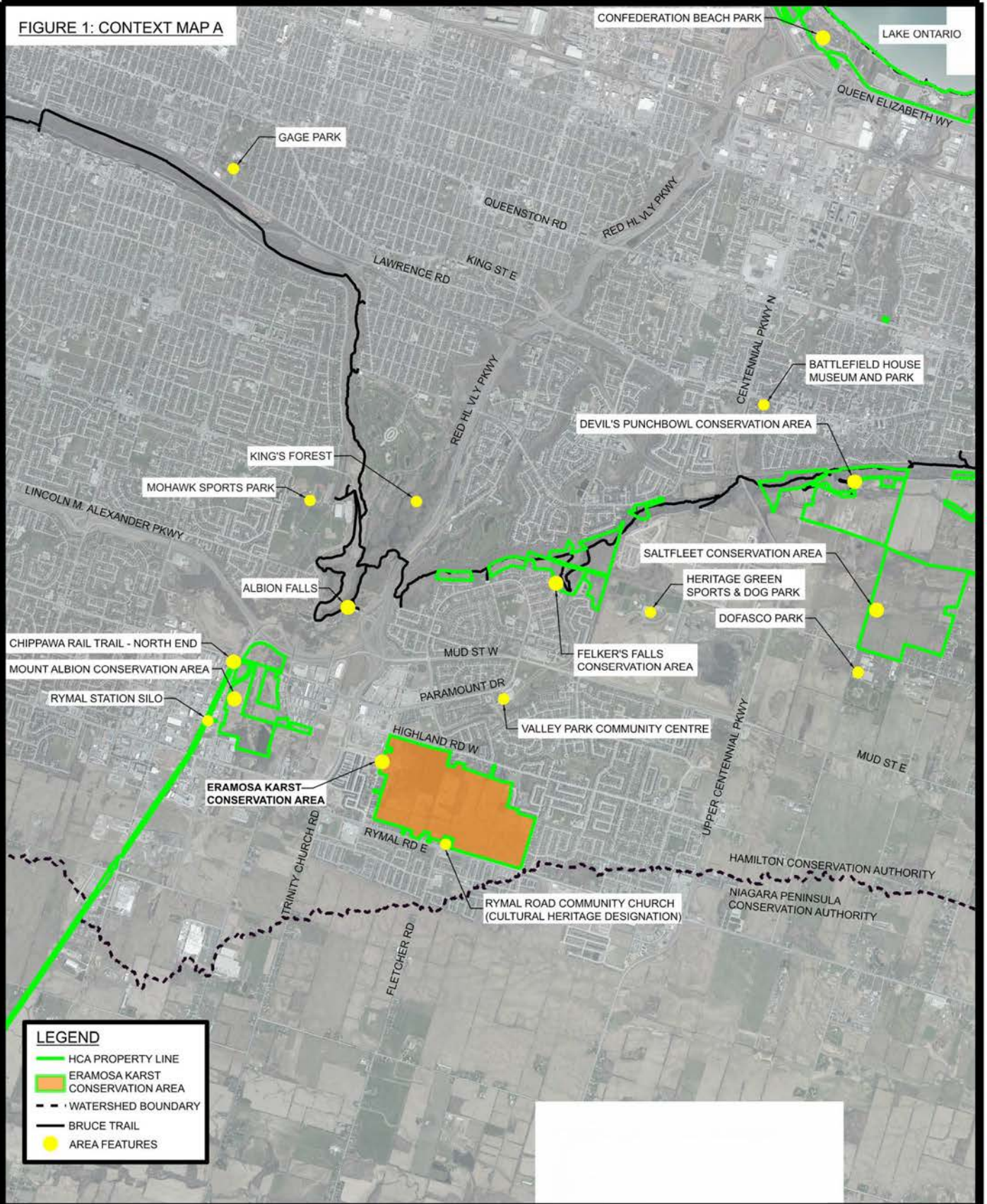
The conservation area provides passive recreational trails for visitors to appreciate the sensitive karst landscape and its associated ecology. A portion of the City of Hamilton’s East Mountain Trail Loop also passes through this conservation area. This unique day-use area is a popular attraction for hiking, nature appreciation, and environmental education.

This ten-year Master Plan consolidates the 2007 EKCA Master Plan and 2013 EKCA Feeder Lands Operating Plan. This plan also supplies updated mapping, site studies and analysis to provide guidance for HCA’s visitor management, natural area conservation, and operation of the conservation area.



Photo 2: Yellow trout lily (*Erythronium americanum*)

FIGURE 1: CONTEXT MAP A



LEGEND

- HCA PROPERTY LINE
- ERAMOSA KARST CONSERVATION AREA
- WATERSHED BOUNDARY
- BRUCE TRAIL
- AREA FEATURES



CONTEXT MAP A
ERAMOSA KARST CONSERVATION AREA
MASTER PLAN

DATE: 2024/06/19

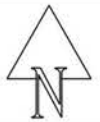
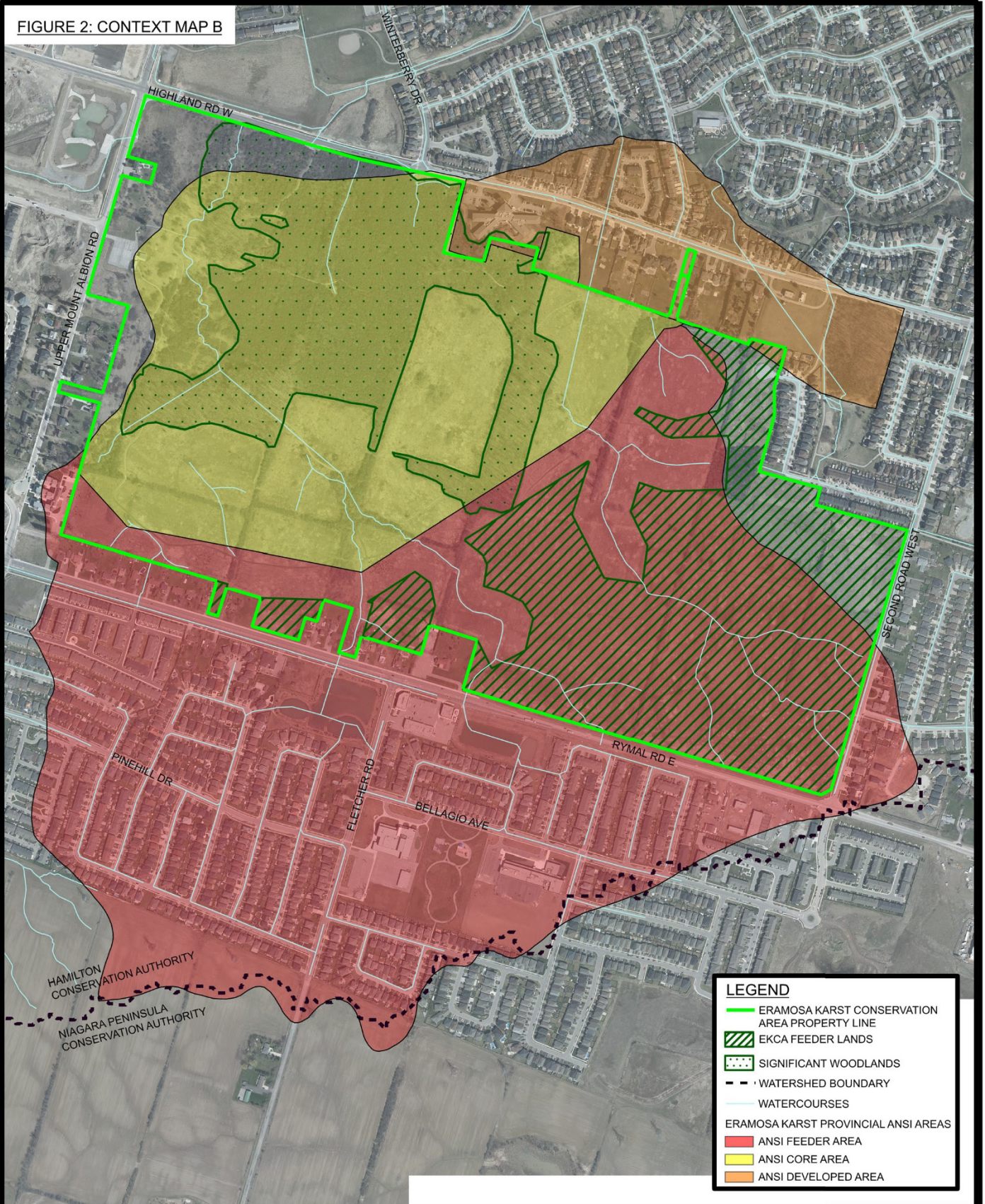


FIGURE 2: CONTEXT MAP B



| LEGEND | |
|-------------------------------------|---|
| | ERAMOSA KARST CONSERVATION AREA PROPERTY LINE |
| | EKCA FEEDER LANDS |
| | SIGNIFICANT WOODLANDS |
| | WATERSHED BOUNDARY |
| | WATERCOURSES |
| ERAMOSA KARST PROVINCIAL ANSI AREAS | |
| | ANSI FEEDER AREA |
| | ANSI CORE AREA |
| | ANSI DEVELOPED AREA |



CONTEXT MAP B
ERAMOSA KARST CONSERVATION AREA
MASTER PLAN

DATE: 2025/09/08



3.2 Goals

This Master Plan outlines the long-term goals for conservation and land management at EKCA, and is intended to be a living document that will be updated completely in ten years' time.

This goal from the 2007 EKCA Master Plan will be carried forward in this plan:

- The goal is to develop and manage the EKCA in a manner that will protect the karst landscape, its associated flora and fauna, and cultural heritage features while providing the public with learning and passive outdoor recreational opportunities.

This goal from the 2013 Feeder Lands Operating Plan will be carried forward in this plan:

- The Tenant (HCA) intends to manage the leased lands which include a portion of the Feeder Area of the ANSI, totaling 38 hectares, in a manner consistent with the goal noted above from the 2007 EKCA Master Plan.

3.2.1 Land Acknowledgement

The HCA joins in stewardship of lands and waters with Indigenous Peoples who have cared for them since time before memory. We acknowledge that the land on which we gather, and the HCA watershed, is part of the Treaty Lands and Territory of the Mississaugas of the Credit First Nation and traditional territory of the Haudenosaunee.

As an organization, we are committed to learning about the shared history and experiences of Indigenous Peoples in Canada and creating relationships based on respect, trust and friendship. In our shared gratitude for every aspect of the natural world, may we create a lasting legacy now and for future generations.

3.2.2 HCA Strategic Plan

Through consultation and analysis of current operations, this plan supports the following long-term goals as outlined in HCA's current Strategic Plan:

Vision

- A healthy watershed for everyone.

Mission

- To lead in the conservation of our watershed and connect people to nature.

Strategic Priority Areas

- **Organizational Excellence** - Focused on our organizational resources to ensure efficient and responsive operations are available to meet the needs of the future.
- **Water Resources Management** - Focused on safeguarding the health of the watershed and protecting people and property from natural hazards.
- **Natural Heritage Conservation** - Focused on the management and conservation of natural

areas, which include the forests, wetlands, meadows, and watercourses within the watershed.

- **Connecting People to Nature** - Focused on the conservation of HCA lands and connecting communities to natural areas.

3.2.3 HCA Climate Change Strategy

The goal of HCA's Climate Change Strategy is to work towards achieving net zero status across HCA's operations through the reduction of greenhouse gases (GHG's), while also working to increase our overall adaptive capacity to changing climatic conditions.

HCA Climate Change Strategy - Key Areas of Focus

- Environment and Natural Heritage
- Experience, Education and Awareness
- Partnerships

3.2.4 City of Hamilton Biodiversity Action Plan

The HCA is a dedicated partner of the Hamilton Biodiversity Action Plan. Developing updated Master and Management Plans for HCA owned and managed natural areas directly supports Action 7.6 in the Biodiversity Action Plan. Management Plans help guide the protection of biodiversity in these natural areas and help to inform local decision making.

3.3 Objectives

The goals and objectives in the previous plans have been assessed, and through consultation and analysis of current operations, the HCA supports the following long-term objectives for the EKCA:

- Protect and monitor the karst landscape and natural environment.
- Maintain the flows of the watercourses in the feeder area.
- Protect and interpret the documented cultural heritage features.
- Identify and communicate the cultural heritage values of the area, both Indigenous and non-Indigenous.
- Provide visitors with accessible recreation, nature appreciation, and educational opportunities.

3.4 Site Concept

The 2007 Master Plan recommended the site development we see at EKCA today. The site concept for EKCA was envisioned with input from the public, an HCA steering committee comprised of key staff and members of the Conservation Advisory Board, the Ontario Realty Corporation and the City of Hamilton. The following sections highlight key site concept items and recommendations to be carried forward for the life of this plan.

3.4.1 Conservation Area Zones

Four conservation area zones were initially recognized for EKCA: Natural Zone, Resource Management Zone, Development Zone and Cultural Heritage Zone. See Section 3.6 for the six zone classifications recommended for this plan as based on current NEPOSS planning guidelines HCA has adopted for Master Plans and Management Plans. The former Natural Zone is now classified as the Nature Reserve Zone, and the zone mapping in Appendix 1 has been updated to include Natural Environment and Access Zones.

3.4.2 Development

The development concept envisioned for the initial 78-hectare (193 acres) conservation area was comprised of a main access point from Upper Mount Albion Road, a visitor kiosk with interpretive facilities, washrooms, a trail system guiding visitors to a number of the key karst features, karst interpretive stations, an amphitheatre area, planting monitoring areas, and a portion of the East Mountain Trail Loop passing through the conservation area. With the exception of the karst interpretive stations and amphitheatre, all of these features have been implemented on the property. See Section 8.2 for further information on recommended capital development projects and priorities for this plan.

3.4.3 Feeder Lands

The feeder lands are mainly comprised of land that was previously farmed, but contain valuable streams that feed the Eramosa Karst ANSI. The boundary of the conservation area was extended to include these feeder creeks, and is an area where new dolines are most likely to occur as the karst features continue to expand with time. The continued function of the karst in a natural condition is dependent upon the maintenance of these surface stream flows in the feeder lands. See Section 5.3 for more information.

3.4.4 Natural Area Restoration

The 2007 plan recommended monitoring for vegetative regeneration, and actively planting areas with native species to accelerate natural succession of the former farm fields. As well, a number of management directives were set out for the removal of garbage, fieldstones, and artificial fill in karst features from former farming activities. Between 2007 and 2016 a number of natural areas restoration projects were completed at EKCA. See Section 5.15 for more information on the current status of the natural areas and recommendations for further work.

3.4.5 Opportunities and Constraints

The EKCA contains a karst landscape underlain by dolostone bedrock supporting underground drainage with many caves and conduits caused by dissolving rock. EKCA contains 16 distinct karst features, see Figure 7 for details. While there are examples of these features elsewhere in Ontario, seven of the feature types were evaluated by the Ontario Ministry of Natural Resources to be the best examples known in the province. Furthermore, some of these features are not well represented elsewhere in Ontario's system of public parks and conservation lands. See Section 5.1 for more information. While protection of the karst landscape may constrain some site activities, all karst features provide opportunities for scientific research, visitor interpretation and public education.

Archaeological assessments conducted in 2005 and 2007 identified two sites in the western section of the property that present opportunities for visitor interpretation. One site consists of a mid-19th century Euro-Canadian homestead and a pre-contact campsite, and the other is a pre-contact campsite. At the larger site, known as the Pottruff site, there are foundations that remain from former farm buildings and a former homestead on the property. See Section 4.6 for more information.

A portion of the City of Hamilton's East Mountain Trail Loop passes through EKCA. This recreational trail provides opportunities to link with City parkland, the Bruce Trail, and nearby HCA conservation areas Felker's Falls and Mount Albion. EKCA also offers visitors more than 7km of recreational trails for hiking, nature appreciation, and education. See Trails Master Plan map in Appendix 1 for more information.

The site's proximity to residential areas and schools has had some disadvantages. Residential encroachment has occurred at several points around the site perimeter, necessitating installation of barrier fencing, boundary signage and site restoration by HCA. Site vandalism has also occurred. Management techniques have included outreach to the nearby schools, enlisting volunteer site monitors, and police patrols. As the surrounding residential areas continue to grow, karst protection and conservation area security and safety will need to be administered in the annual operation of EKCA.

The Feeder Lands, highlighted on Figure 2. Context Map B, are currently leased from the Government of Ontario Infrastructure and Lands Corporation and managed by HCA. The 2013 Feeder Lands Operating Plan was developed as part of this lease agreement, which commenced on February 7, 2013, and spans a twenty-year term, expiring in 2033—coinciding with the conclusion of this ten-year master plan. Given the vital role these lands play within the Eramosa Karst Conservation Area, HCA will pursue with the Province the possibility of acquiring these lands outright or, at a minimum, securing a renewal of the lease agreement. HCA's management of the lands aligns with the goals and objectives of this master plan, and with the extensive environmental studies have been conducted on the Feeder Lands as part of an Environmental Assessment process that was undertaken before HCA began leasing the property. For more information on the Feeder Lands, refer to Section 4.2 Property History and Section 5.3.3 Feeder Area.

3.5 Policy and By-Law Framework

Conservation areas owned and operated by the HCA are diverse in nature and spread across the HCA watershed. EKCA is near the south-eastern boundary of HCA's watershed. See Figure 3 Master Plan Study Area Map for more information.

HCA has approached this Master Plan with the mind-set that all conservation areas in the HCA portfolio requiring Master or Management Plan updates will follow a consistent methodology. A 10 Year Masterplan Update Strategy was approved by HCA's Board of Directors in 2019 and updated in 2022, for properties that HCA owns and manages. As per this strategy document, guidelines were set out for the completion of HCA Master Plans (including Management Plans and Study Areas). This strategy noted that HCA lands that lie within the boundary of the Niagara Escarpment Plan will need Master Plan endorsement from the Niagara Escarpment Commission (NEC) for HCA to formally ratify them and approval from the Ministry of Natural Resources and Forestry. Consequently, HCA strategically decided to develop all HCA Master Plans within the guidelines of the Niagara Escarpment Parks and Open Spaces System (NEPOSS),

which is a requirement of the NEP for any public agency NEPOSS park Master Plans. The NEPOSS policy framework ensures HCA follows a consistent methodology for all plans, and the plans are developed to an appropriate level of detail with sufficient public consultation for all proposed land improvements and uses.

HCA recognizes that certain public infrastructure such as utility corridors, trails, or transportation links may be required to cross conservation area lands. The HCA policy for planning review and regulation of these features adheres to the Conservation Authorities Act, R.S.O.1990, C.27. See Section 7.1 for more information.

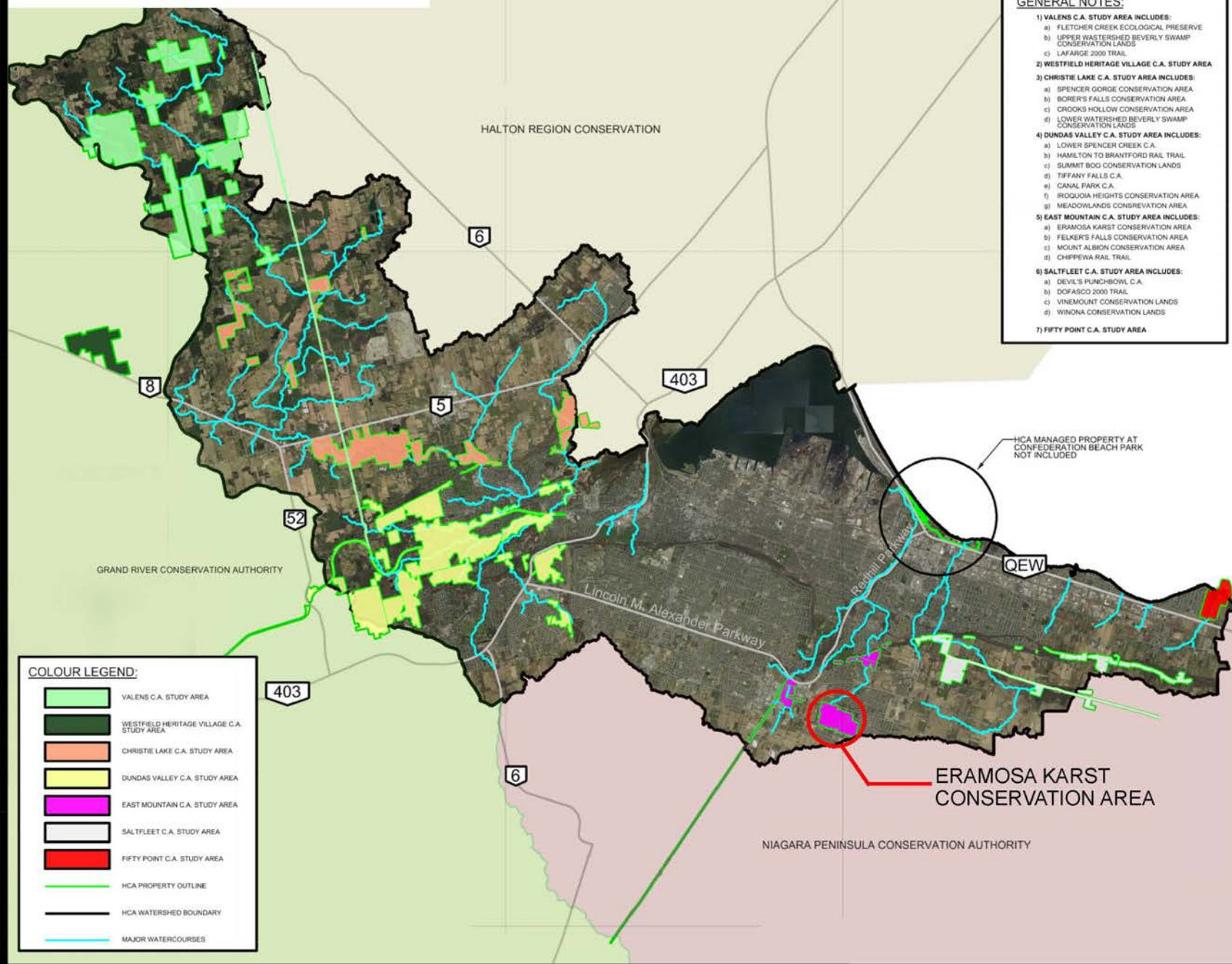
Federal, provincial and municipal planning and development controls including the Accessibility for Ontarians with Disabilities Act (AODA), 2005, will be referenced when the HCA is implementing projects and programs specified in this Master Plan.

The EKCA Master Plan adheres to policies of the Hamilton Conservation Authority, City of Hamilton, and provincial policy. HCA will consult with approval agencies, and obtain the required permits when implementing projects flowing from this Master Plan.



Photo 3: Trail at Eramosa Karst

FIGURE 3: ERAMOSA KARST MP STUDY AREA



DATE: 2024/03/18

MASTER PLAN STUDY AREA MAP



3.6 Conservation Area Zones

Although EKCA is not located within the jurisdiction of the Greenbelt Area and Niagara Escarpment Plan (NEP) Area, the policies of the NEP and guidelines of the Niagara Escarpment Parks and Open Space System (NEPOSS) 2021 planning manual have been observed in the preparation of this Master Plan. The unique karst landscape and the important educational value of EKCA are compatible with the NEP “Natural Environment” park classification which states “These lands are characterized by, and serve to protect, a variety of outstanding natural heritage resources and cultural heritage resources, and scenic resources.” This classification reflects the intent envisioned within this Master Plan.

This Master Plan follows the current NEPOSS planning manual and identifies six land use zones for EKCA. These zones are intended to help guide future planning, development, and management of the conservation area. The zone boundaries are shown in more detail in Appendix 1 on Map 2 - Conservation Area Zones.

Zones are intended to fulfill a variety of functions in the conservation area, including the following as outlined in the current NEPOSS manual:

- Identification and recognition of the features and attributes (values).
- Protection of key natural heritage and cultural heritage resources.
- Confirmation of the appropriate locations for activities (i.e. directing activities with higher impacts to the least sensitive areas and low impact activities to areas that are more sensitive, if appropriate).
- Delineation of areas based on their requirements for management (e.g. management plan objectives).
- Standardization to support management objectives and actions, based on values (e.g. Nature Reserve Zones supports protection of sensitive natural heritage features and cultural heritage resources).
- Balancing of public use with the preservation of the natural environment.

The six land use zones identified for EKCA are:

- Nature Reserve Zone
- Natural Environment Zone
- Access Zone
- Cultural Heritage Zone
- Development Zone
- Resource Management Zone

The following sections briefly describe each zone. The tables in each section provide a zone description, management direction, and permitted uses, including types of development in each zone. All resource, recreational, and facility development uses are subject to Canadian legislation and policies governing public lands and conservation areas, as well as the resource management policies identified in Section 7.

Nature Reserve Zone

Nature reserve zones include significant earth and life science features which require management distinct from that in adjacent zones, as well as a protective buffer with an absolute minimum of development. EKCA’s nature reserve zone contains the Eramosa Karst ANSI, karst features and water courses.

Table 1. Nature Reserve Zone

| Zone | Description | Management Direction | Permitted Uses (subject to management planning) |
|----------------|--|--|---|
| Nature Reserve | <p>Includes the most sensitive natural heritage features and areas that require careful management to ensure long-term protection.</p> <p>Intended to protect in perpetuity features and values of selected life and earth science areas such as:</p> <ul style="list-style-type: none"> ➤ Eramosa Karst Area of Natural and Scientific Interest (ANSI) ➤ Karst Earth Science Features ➤ Karst Hydrologic Function (includes caves, surface and underground streams and sinkholes) ➤ Eramosa Escarpment ➤ Habitat for species at risk | <p>These areas are predominantly natural and should contain naturally functioning ecosystems.</p> <p>This zone is intended to protect and where possible enhance the natural heritage and hydrological systems within the zone.</p> <p>Site uses are to be monitored to protect the natural area resources, and for public safety at karst features.</p> | <p>Sustainable recreational activities that are supported by a detailed environmental review and that are identified as compatible with the natural heritage features and areas of the park or open space.</p> <p>Examples include:</p> <ul style="list-style-type: none"> ➤ Recreational Trails ➤ Nature appreciation from designated trails and educational interpretive stations. ➤ Temporary scientific research ➤ Conservation practices (e.g. tree maintenance and monitoring, invasive species control, erosion control) |

Natural Environment Zone

Natural environment zones include natural, cultural, and aesthetic landscapes in which minimum development is permitted to support low-intensity recreational activities. EKCA’s natural zones are primarily the natural areas outside the boundary of the Eramosa Karst ANSI.

Table 2. Natural Environment Zone

| Zone | Description | Management Direction | Permitted Uses (subject to management planning) |
|---------|--|--|---|
| Natural | <p>Includes scenic landscapes in which minimum development is permitted to support recreational activities that have minimal impacts on the Escarpment environment.</p> <ul style="list-style-type: none"> ➤ Significant Woodlands ➤ Natural areas outside of the Eramosa Karst ANSI | <p>This zone may function as a buffer between Nature Reserve Zones and Development Zones, Cultural Heritage, or Access Zones.</p> <p>Management guidance should maintain and enhance the scenic resources and open landscape character of the environment.</p> | <p>Sustainable recreational activities that have minimal impact on the environment may be permitted.</p> <p>Examples include:</p> <ul style="list-style-type: none"> ➤ Recreational Trails ➤ Nature appreciation from designated trails and educational interpretive stations. ➤ Temporary scientific research ➤ Conservation practices (e.g. tree maintenance and monitoring, invasive species control, erosion control) <p>Infrastructure required for safety or accessibility may be permitted where there is no feasible alternative.</p> |

Access Zone

Access zones serve as staging areas to support adjacent zones. EKCA’s access zones are the main entrance to the parking lot, trail access points and staging areas, and service access areas.

Table 3. Access Zone

| Zone | Description | Management Direction | Permitted Uses (subject to management planning) |
|--------|--|---|--|
| Access | <p>Serve as staging areas (e.g. trailheads, parking lots) where minimal facilities support the use of Nature Reserve Zones and relatively undeveloped Natural Environment and Cultural Heritage Zones.</p> <ul style="list-style-type: none"> ➤ Trailhead / trail access points ➤ Service access | Access zones are intended to support the use of and access to adjacent zones. | <p>Infrastructure may be permitted to support the Nature Reserve, Natural Environment, and Cultural Heritage Zone.</p> <p>Examples include:</p> <ul style="list-style-type: none"> ➤ Roadways ➤ Recreational trails ➤ Entrance signage ➤ Gatehouse, gates ➤ Trailhead kiosks ➤ Site furnishings (benches, waste receptacles) |

Cultural Heritage Zone

Cultural heritage zones are intended to protect significant built heritage resources, archaeological resources, and cultural heritage resources. EKCA’s cultural heritage zone includes archaeological sites and remnant farm features.

Table 4. Cultural Heritage Zone

| Zone | Description | Management Direction | Permitted Uses (subject to management planning) |
|-------------------|---|--|--|
| Cultural Heritage | <p>This zone includes cultural heritage resources that require management to ensure long-term conservation.</p> <ul style="list-style-type: none"> ➤ Documented archaeological sites ➤ Euro-Canadian mid-19th century homestead ➤ Pre-Contact cultural heritage | <p>Management guidance will ensure long-term conservation, enhancement and potentially restoration of cultural heritage resources.</p> | <p>Development will ensure long-term conservation of cultural heritage resources.</p> <p>Examples include:</p> <ul style="list-style-type: none"> ➤ Interpretive/educational signs and supporting infrastructure. ➤ Trails, trail viewing areas. ➤ Historical restorations, reconstructions, or re-enactments. ➤ Research Activities (e.g. archaeological assessments, engagement) |

Development Zone

Development zones provide visitor access, orientation, and operational facilities in the conservation area.

EKCA’s development zone includes the main entrance and parking lot, and the associated washroom building, structures and amenities. Some open space to the north and south of the parking lot are also included. The tile bed for the washroom is located in the area north of the parking lot.

Table 5. Development Zone

| Zone | Description | Management Direction | Permitted Uses (subject to management planning) |
|-------------|---|---|--|
| Development | <p>Development Zones provide the main visitor access to the conservation area, and facilities and services to support nature appreciation and recreational activities.</p> <p>This zone may include areas designed to provide facilities and supporting infrastructure for recreational purposes.</p> <ul style="list-style-type: none"> ➤ Existing gated parking lot ➤ Existing washroom building ➤ Existing picnic shelter | <p>Management guidance should note that recreational uses and development may be accessory or secondary to the protection of natural heritage features and to the conservation of cultural heritage resources such as designated cultural heritage sites and archaeologically significant sites.</p> <p>Retail and visitor facilities should be appropriately scaled for the site.</p> <p>Facility development must be undertaken in a way that will minimize the impact on the Escarpment environment.</p> | <p>Examples of permitted uses that provide access, orientation and operational facilities to support nature appreciation and recreational activities include:</p> <ul style="list-style-type: none"> ➤ Roadways ➤ Parking areas ➤ Public washrooms ➤ Picnic areas ➤ Recreational trails ➤ Temporary events ➤ HCA work areas |

Resource Management Zone

Resource management zones provide for sustainable resource management of agricultural lands, previously disturbed sites, forest products, and land that has a long-term resource agreement such as a managed forest.

EKCA’s resource management zones include the former farmlands that are regenerating and in the early stages of natural vegetative succession. Underground karst features are throughout the site, over time surface karst features may appear within the disturbed areas in this zone.

Table 6. Resource Management Zone

| Zone | Description | Management Direction | Permitted Uses (subject to management planning) |
|---------------------|---|---|--|
| Resource Management | <p>Provides for sustainable resource management of forests, fisheries, watersheds, wildlife, or flood control.</p> <p>Previously disturbed sites (e.g. old farm fields, abandoned quarries) where active measures are being taken to re-establish natural vegetation.</p> <ul style="list-style-type: none"> ➤ Fallow farm fields outside of the Eramosa Karst ANSI. ➤ Created wetland site | <p>Management guidance should support:</p> <ul style="list-style-type: none"> ➤ Experimenting with alternative resource management practices. ➤ Understanding ecosystem structures and functions. ➤ Activating effective conservation and stewardship practices. | <p>These areas may be used to demonstrate ecologically sustainable resource management practices.</p> <p>Examples may include:</p> <ul style="list-style-type: none"> ➤ Research ➤ Recreational trails ➤ Rehabilitation / naturalization projects ➤ Educational tours ➤ Karst watercourse management <p>Recreation uses in this zone are subject to HCA policies and management planning.</p> |

3.7 Development Priorities

The capital development priorities and estimates of development costs for EKCA over the next ten years are listed in Appendix 2 and shown in Appendix 1 - Site Concept Map.

All development projects are to be reviewed annually for the life of this Master Plan, and the capital development priority list updated as necessary. Capital projects should not be started until a long-term strategy with timelines and costs for each project are clearly defined and sufficient resources are available to complete them.

Significant capital development for EKCA over the next ten years falls within these categories:

Replace Significant Features

These features require ongoing repairs for public safety, are nearing or past the end of their life cycle, and are proposed to be replaced or expanded upon.

Add New Features

These new capital projects are proposed to serve the community, generate revenue, and improve customer service.

Enhance Existing Features

These capital projects are proposed to enhance existing park features to improve the natural areas and visitor experience.

Section 8.2 Capital Projects of this Master Plan includes lists of recommended projects for each of these three categories.



Photo 4: Trail at Eramosa Karst

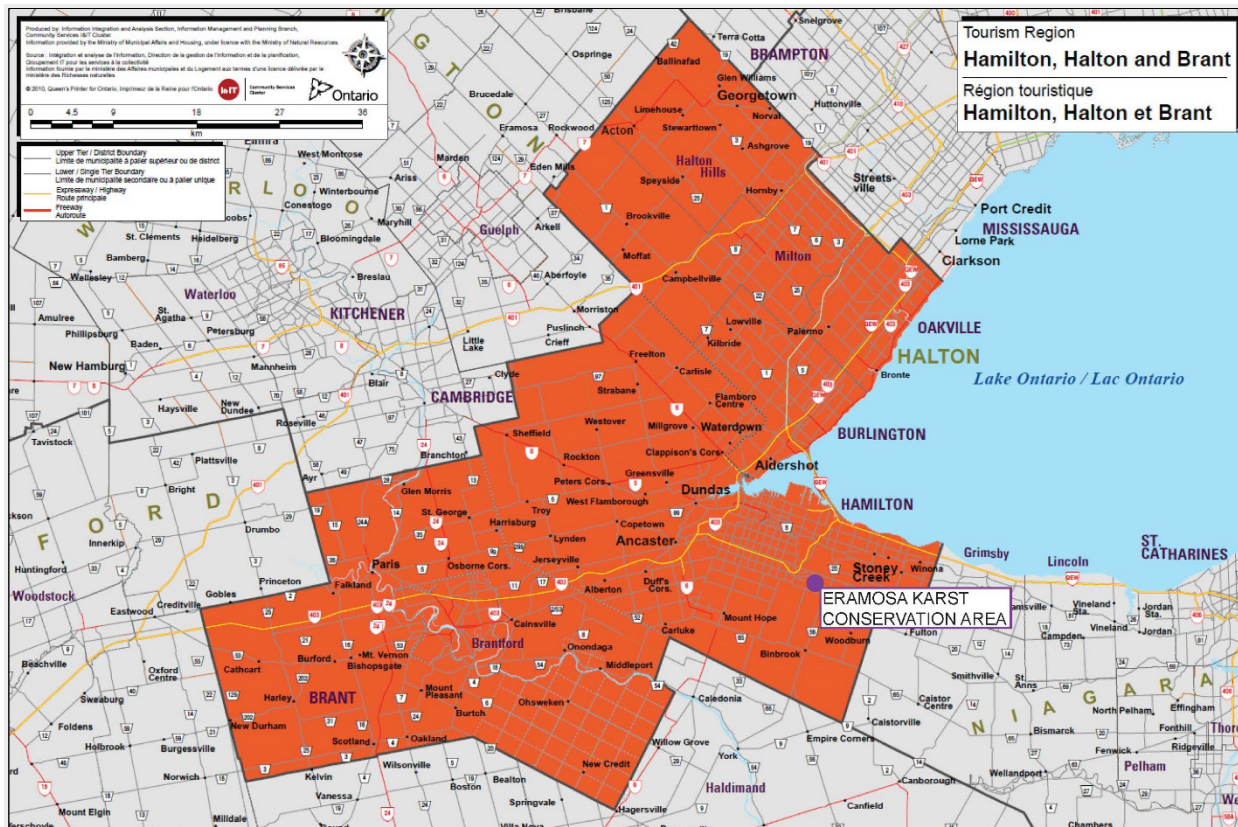
4.0 BACKGROUND

4.1 Study Area

Eramosa Karst Conservation Area (EKCA) is located in the south-eastern area of HCA’s watershed in Stoney Creek, City of Hamilton. Other HCA lands nearby include Felker’s Falls, Mount Albion, and the Chippawa Rail Trail. The 111 ha (274 acre) EKCA property includes 38 hectares of leased feeder lands in the Eramosa Karst Area of Natural and Scientific Interest. EKCA contains some of the best karst features known in the province of Ontario.

EKCA is a popular day-use area and tourist attraction within easy driving distance from the Greater Toronto and Hamilton area as well as Niagara Region. Figure 4 shows the tourism market area considered by this Master Plan.

Figure 4. Tourism Region



Source: Ontario Ministry of Tourism, Culture and Sport

During the preparation of this plan, one visitor survey for EKCA was distributed online and one public information table was held in the conservation area during the public commenting period. The public surveys ran from May to October 2023. See Appendix 4 for a summary of the survey results.

Figure 1 in Section 3.1 shows the study area for this plan. This Master Plan update is part of a ten-year strategy for reviewing HCA lands across the watershed as shown in Figure 3. As noted in Section 3.5, HCA

staff are following this strategy to systematically glean valuable scientific data and site information from targeted study areas and using this information in the preparation of Master and Management Plans.

4.2 Property History

4.2.1 Background

HCA initially acquired 73 hectares (193 acres) of land in October 2006 conveyed from the Ontario Realty Corporation under the direction of the provincial government. In April 2007, the Ontario Government announced that an additional 3.13 hectares (7.7 acres) of land at the corner of Upper Mount Albion and Highland Road would be transferred to HCA. In June 2007, the City of Hamilton agreed to transfer to HCA 1.39 hectares, which was the road allowance that divided the conservation area. These land parcels formed the 78 hectares (192.7 acres) conservation area that was studied in the 2007 Master Plan. Upon adoption of the Master Plan by the HCA Board of Directors, development was implemented between 2007 and 2008 to accommodate a grand opening celebration in the summer of 2008 as part of the HCA's 50th Anniversary.

By 2010 a Planning and Class Environmental Assessment study was conducted by Infrastructure Ontario (IO, recently merged with Ontario Realty Corporation), on behalf of the Ministry of Infrastructure (MOI) for the possible disposition of four parcels of Provincially-owned land in the City of Hamilton (former City of Stoney Creek). The Class EA process resulted in the MOI and IO approaching HCA to determine leasing options for the land. Subsequently, HCA agreed to enter a lease agreement with the government, as represented by Ontario Infrastructure and Lands Corporation, to manage and operate these 38 hectares, identified as the "Feeder Lands" with the adjacent lands known as the Eramosa Karst Conservation Area. This arrangement supported the goal of managing EKCA in a manner that will protect the karst landscape, its associated flora and fauna, and cultural heritage features while providing the public with learning and passive outdoor recreational opportunities. As per the terms of the lease agreement, the Eramosa Karst Feeder Lands Operating Plan (2013) was prepared by HCA, and ultimately accepted by both parties. This new Master Plan consolidates information from the 2013 Operating Plan.

EKCA is thus comprised of land parcels containing the core conservation area and leased feeder land area, the Eramosa Karst ANSI and buffer area, and much of the feeder watercourses north of Rymal Road.

4.2.2 Site Improvements

See Section 4.4 for notes on the site buildings.

Upon acquisition of the property in 2007, HCA began site work to open the conservation area to the public. Initial projects included general site clean up, installation of the main entrance road and the parking lot, perimeter fencing and restoration landscaping. Interpretive signage and educational information on the karst features were also provided with the trail system.

Work on the inner two loops of the trail system was completed by 2008, and the trail outer loop in 2009 connecting to Richdale and Second Roads. Trail bridges were installed in 2011. The East Mountain Trail

Loop through EKCA began construction in 2010 and was completed by spring 2011. Perimeter fencing of the feeder lands was completed by 2013. The trail link to Highland Road was completed in 2017.

A number of site restoration and planting projects were implemented in the Feeder Lands between 2013 and 2019, with the assistance of the Friends of the Eramosa Karst (FOTEK). See Section 7.9 for

more information on FOTEK. Tree planting began in 2014 with the assistance of FOTEK, students, and volunteers. Removal of invasive phragmites was also initiated in 2018 by HCA in the watercourses near Rymal Road as well as other areas, and management is ongoing.



Photo 5: Karst interpretive signs at the pavilion

The main parking lot was improved in 2016 with asphalt paved accessible parking spaces. The main entrance autogates were installed December 2021, the entrance road improved and parking lot squared up. This work complemented the municipal road and sidewalk improvements for Upper Mount Albion Road to support the growing residential development on the adjacent lands.

In the spring of 2024, HCA installed new trailhead and wayfinding signage in the conservation area. This new signage includes updated mapping of the trails that was developed in 2022.



Photo 6: New trailhead sign at EKCA parking lot

4.3 Planning and Development Controls

See Figure 5. City of Hamilton Zoning Map for the location of the planning areas described below.

EKCA is located in the City of Hamilton (Stoney Creek) Ward 9. The property is covered under the City of Hamilton's Urban Official Plan and the City of Stoney Creek Zoning By-law. The City of Hamilton zoning classifications include P5 Conservation/Hazard Land and ND Neighbourhood Development (permitted uses in this zone include agricultural, urban farm, and community garden). The urban land use designation for the property is Open Space (Urban Hamilton Official Plan, Schedule E-1).

In the City of Hamilton Official Plan several planning designations are identified for the property including:

- The Eramosa Karst ANSI, natural areas and feeder lands are part of the City Natural Heritage System – Core Areas, Linkages, Area Specific Policies USC-1, USC-2 and USC-5 in Volume 3, Key Hydrologic Feature Streams and Local Natural Earth Science ANSI. (Urban Hamilton Official Plan, Schedules B, B-7 and B-8).
- The woodlot in the conservation area is a City Natural Heritage Feature Significant Woodlands. (Urban Hamilton Official Plan, Schedule B-2).
- The wetland at the north west corner of the conservation area is a City Key Natural Heritage and Key Hydrologic Feature Wetlands. (Urban Hamilton Official Plan, Schedule B-4)

The following federal and provincial designations are also identified for the property including:

- Provincial Planning Statement (2024) under the Planning Act which have implications for Significant Woodland, Fish habitat, Significant Wildlife Habitat, habitat for Species at Risk.
- Ontario Endangered Species Act which has implications for endangered and threatened species and their habitat observed on the property.
- Canada Migratory Birds Convention Act which protects numerous bird species and their breeding season generally extending between late March to August. Timing of construction activities and especially vegetation clearing must take this into account.
- Ontario Heritage Act governing lands which contain archaeological resources or areas of archaeological potential.
- Canadian Fisheries Act for any work completed in the vicinity of Upper Davis Creek and its tributaries including the karst features depending on the project scope.
- Ontario Fish and Wildlife Conservation Act.
- Conservation Authorities Act, R.S.O. 1990.
- Ministry of Environment, Conservation and Parks Environmental Protection Act.

Since the completion of the 2007 Master Plan, land development projects have transformed the area surrounding EKCA. One of the biggest City projects completed was the building of the Upper Red Hill Valley Parkway, a four-lane arterial road from the Stone Church ramp off the Red Hill Valley Parkway to Rymal Road East. As part of this project, an eco passage in the form of a bridge was installed to allow

wildlife to move freely under the road and between EKCA and Mount Albion Conservation Area. Upper Mount Albion Road has also been reconstructed between Highland Road West and Rymal Road East, and is terminated north of Rymal preventing through traffic. As well, new residential and commercial development around EKCA has increased vehicle traffic, and brought more cyclists and pedestrian walk-ins to EKCA. A new road, Times Square Boulevard, now intersects with Upper Mount Albion Road near the main entrance to EKCA. This intersection also includes pedestrian sidewalks serving the new 'Central Park' residential development.

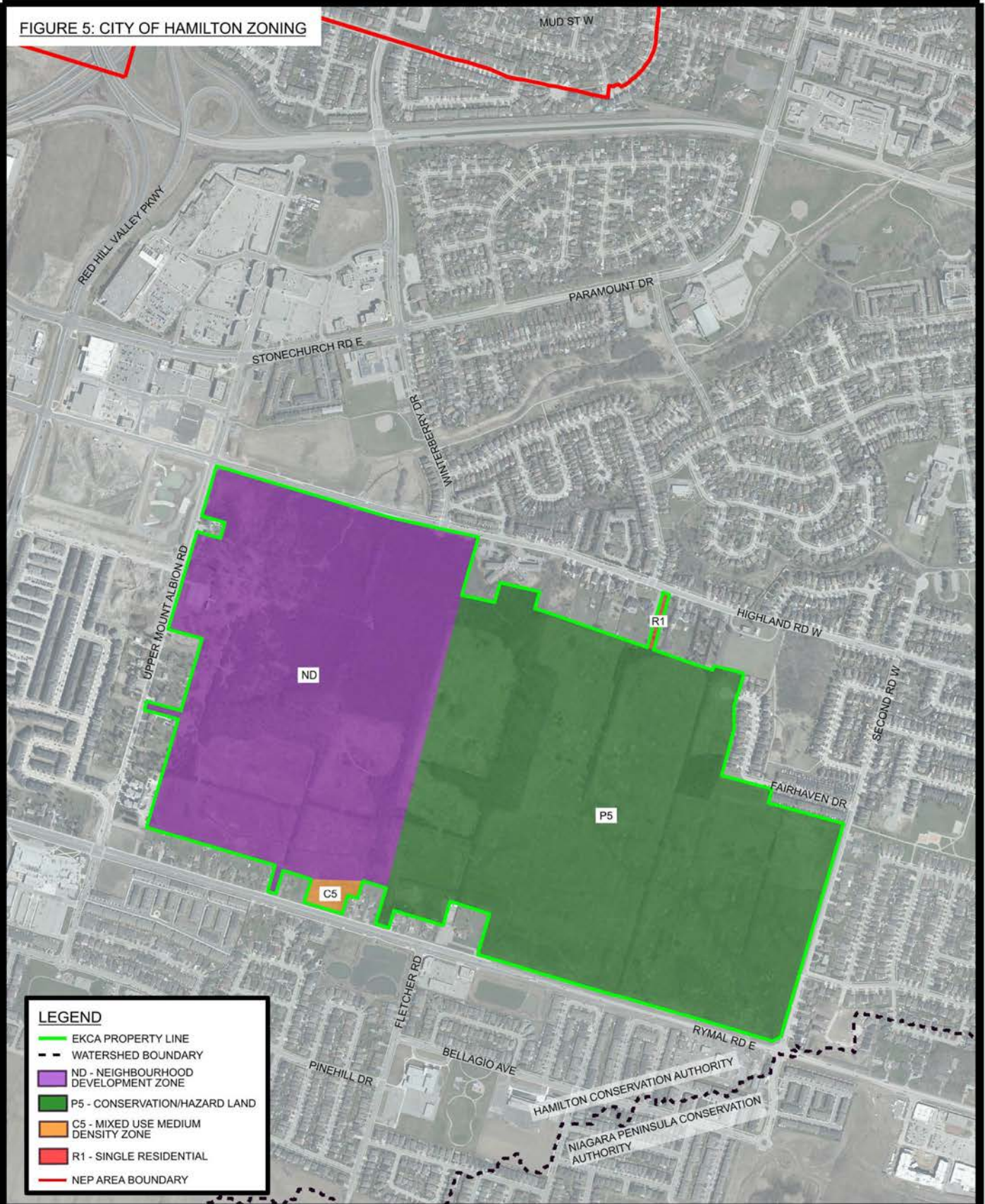
A number of active development applications are in process on adjacent lands. Figure 6 shows land development around EKCA since the 2007 master plan.

A review of the demographic trends revealed over the lifespan of this Master Plan, population growth is estimated to add 68,000 more residents within 15 minutes travel to the conservation area. (2022 City of Hamilton Recreation Master Plan). See Section 8 for more information.



Photo 7: Naturalizing agricultural field at EKCA

FIGURE 5: CITY OF HAMILTON ZONING



LEGEND

- EKCA PROPERTY LINE
- WATERSHED BOUNDARY
- ND - NEIGHBOURHOOD DEVELOPMENT ZONE
- P5 - CONSERVATION/HAZARD LAND
- C5 - MIXED USE MEDIUM DENSITY ZONE
- R1 - SINGLE RESIDENTIAL
- NEP AREA BOUNDARY

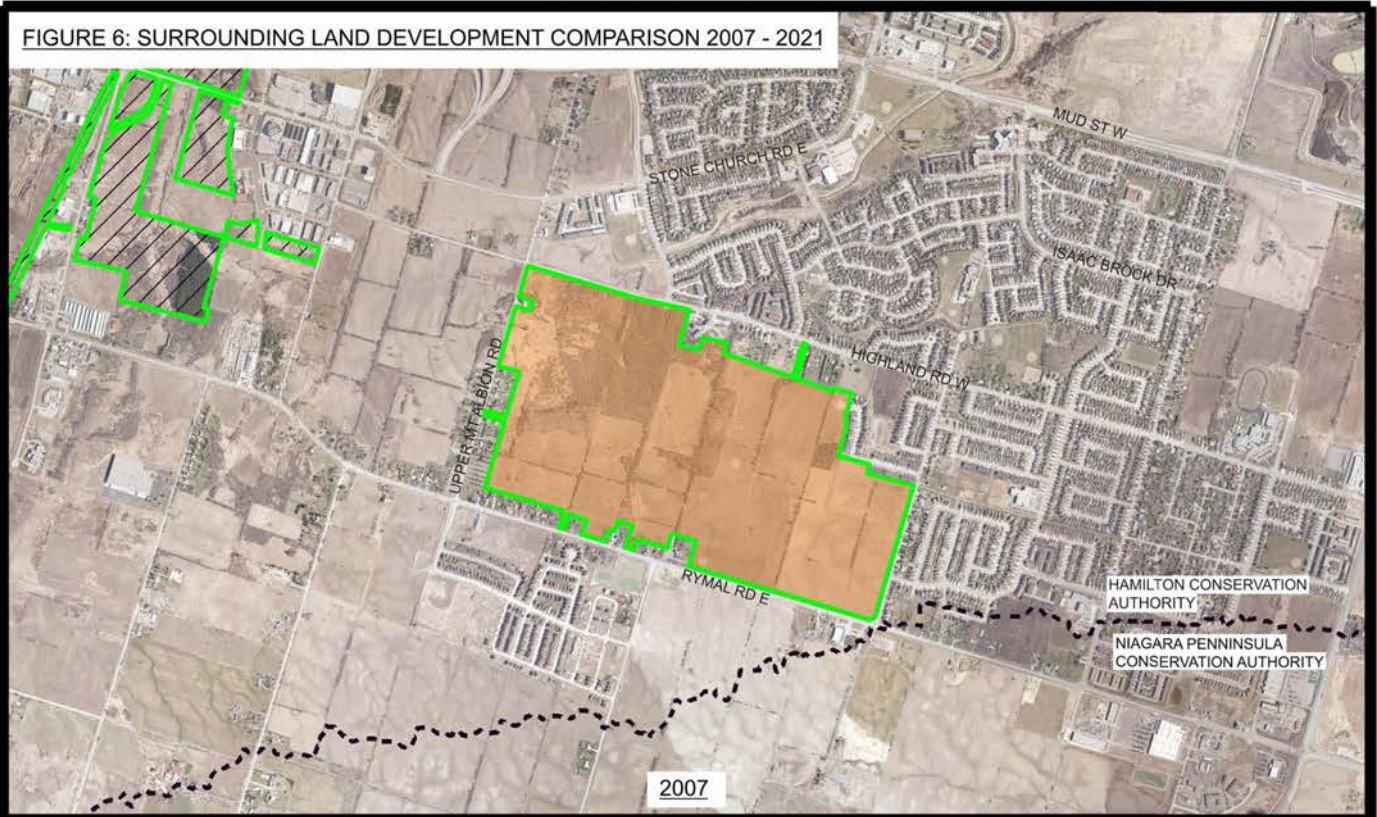


**CITY OF HAMILTON ZONING
ERAMOSA KARST CONSERVATION AREA
MASTER PLAN**

DATE: 2024/06/19



FIGURE 6: SURROUNDING LAND DEVELOPMENT COMPARISON 2007 - 2021



LEGEND

- HCA PROPERTY LINE
- - - WATERSHED BOUNDARY
- HCA PROPERTY OUTSIDE OF STUDY AREA

**SURROUNDING LAND DEVELOPMENT
COMPARISON 2007 - 2021
ERAMOSA KARST CONSERVATION AREA
MASTER PLAN**



DATE: 2024/06/20

4.4 Buildings

See Sections 4.6 and 4.7 for site historic information and maps in Appendix 1 for building locations.

HCA commenced site development at EKCA in 2007 to prepare for the opening of the conservation area in 2008. During that time the open-air picnic pavilion was designed and construction completed by October 2008. The washroom building project was started in the fall of 2010 and the washroom building operational by January 2012. No significant changes are proposed to these buildings for the life of this plan.

4.5 Physical Features

The Eramosa Karst ANSI is a unique landscape in Ontario and consists of a topography formed in dolostone, comprising depressions and holes, with underground drainage as well as surface streams. The EKCA is therefore, composed of 2 landscapes interconnected through a series of structures and dynamic processes. One of the landscapes is relatively accessible, the visible surface landscape and the other is the subsurface cave landscape, the majority of which is unexplored or inaccessible. While the surface streams have readily defined drainage catchments, most of these streams are pirated underground as they flow across the karst.



Photo 8: Pottruff Cave

The streams typically sink into caves and dolines, then follow caves and conduits in the subsurface to where they resurge at springs. Each of these springs has its own drainage catchment, and these catchments can only be determined through tracer studies. Often, their catchments deviate significantly from their apparent surface catchments as defined by topography. As such, the subsurface streams may cross surface drainage divides and flow in the opposite direction to the general topographic slope. The EKCA's geomorphology has created distinctive microclimates, flora and fauna, and patterns of hydrology, all of which are interesting as specific elements but more so as interconnected biotic and abiotic systems.

See Section 5.1 for more information on these physical features.

4.6 Cultural Heritage

HCA recognizes that these conservation area lands were inhabited by First Nations peoples including the Mississaugas of the Credit First Nation, the Haudenosaunee, and the Huron-Wendat. HCA also recognizes that this area has been, and continues to be, home to many Indigenous peoples including the Métis, Inuit and Urban Indigenous communities. From the Indigenous perspective, cultural heritage and natural heritage are inseparable, as the lands and waters have always provided all the needs for survival.

Post-European contact maps of the area from 1859 and 1875 give the names of landowners at the time as McGill, Kinney, Phoenix, Stewart, Pottruff and Olmsted families. Various creeks and other features in the area were named after them. The historical atlas maps indicate there were no residences located either on, or close to EKCA at that time. Historic air photos clearly show extensive alterations to the natural landscape for agriculture.

Two archaeological assessments have been conducted at EKCA as follows:

- A Stage 1-2 archaeological assessment in 2005 identified two sites on the property. One was an early to mid-19th century Euro-Canadian homestead known as the Pottruff site. The foundations of a house and barn, which had been demolished, were noted in the central section of the property 100 metres east of Upper Mount Albion Road. The other was a precontact indeterminate native campsite known as the Swampy Rise site.
- A Stage 3 assessment of both sites was completed in 2007 to ensure that these sites would be avoided with the construction of the proposed trail system. The Stage 3 assessment determined that both sites are significant archaeological resources and will require Stage 4 mitigation if they cannot be avoided and preserved. The trail system was designed to avoid these sites when it was built in 2008.

This Master Plan sets out a Cultural Heritage Zone surrounding the archaeological sites and associated remnant structures, with the intent to maintain the heritage values of the property for the community. Further research and engagement are recommended, and to develop a specific HCA cultural heritage management plan for the continued care and operation of these features within EKCA. See Section 7.4 Cultural Heritage Management for more information.

4.7 Heritage Designation and Historic Buildings

The Ontario Heritage Act enables municipalities to protect and manage Ontario's cultural heritage resources. Part IV of the Act provides for municipal designation of individual properties as having cultural heritage value. Properties are designated by a municipal by-law, with reasons for designation or a description of heritage attributes which must be retained to conserve the cultural heritage value. Heritage property designation serves to: recognize the importance of a property to the community; identify and protect the property's cultural heritage value; encourage good stewardship and conservation; and promote knowledge and understanding about the property and the development of the community.

Municipal heritage designation provides long-term protection of a property's historic value by by-law, and the City offers financial incentives to assist with the conservation, restoration, and rehabilitation of designated heritage properties. The City of Hamilton recently changed its heritage designation process because of provincial amendments to the Ontario Heritage Act and Planning Act. City Cultural Heritage staff have been consulted for EKCA, and their comments are incorporated in this plan.

There are no heritage designations for the conservation area buildings or land.

The City of Hamilton Cultural Heritage Resources Inventory notes the following property near the conservation area of heritage interest:

4.7.1 Rymal Road Community Church, 1969 Rymal Road

The following information is excerpted from the City’s heritage inventory:

“The church, originally called Hannon Free Methodist Church, was organized by Charles Sage on 15 February 1879. Land for the church and adjacent cemetery was donated to the congregation by James Fletcher and a building erected in 1887.... Both the church and associated parsonage were moved to their present location and away from being too close to the road during the summer of 1959...Twenty years later...The present Sanctuary and foyer were built.”

“The property may still contain portions of the original 1887 structure. To be confirmed The property helps maintain the character of the area. The property is historically, functionally, physically, and visually linked to its surroundings (Hannon Free Methodist Cemetery).”

4.8 Natural Areas

Eramosa Karst natural areas include Significant Woodlands, City of Hamilton Core Areas (Key Hydrologic Features – streams and wetlands) and the provincially significant Eramosa Karst Earth Science Area of Natural and Scientific Interest (ANSI). See section 5.13 for more details.

All future development from this Master Plan is to follow the Master Plan zone guidelines outlined in Section 3.6 and the natural areas recommendations noted in Section 5.15.



Photo 9: Mayapples (*Podophyllum peltatum*)

5.0 NATURAL AREAS INVENTORY

5.1 Physiography and Topography

Information about the Karst features provided in this section has been sourced from the 2003 report “Earth Science Inventory and Evaluation of the Eramosa Karst” prepared for the Ontario Ministry of Natural Resources. This report provided the scientific basis for evaluating the Eramosa Karst as a Provincially Significant Earth Science ANSI (Area of Natural and Scientific Interest).

Karst is a landscape, generally underlain by limestone or dolomite, in which the topography is chiefly formed by the dissolving of rock and which may be characterized by dolines, sinking streams, caves, and subterranean drainage.

The Eramosa Karst sits on the Eramosa Escarpment south of the Niagara Escarpment. The smaller Eramosa Escarpment is shaped with a steep north-facing scarp slope and a gentle south-facing dip slope. It is composed of dolostones of the Eramosa member, which is the uppermost part of the Lockport Formation. The Niagara Escarpment is also capped by dolostone giving it a similar morphology.

The Eramosa Escarpment is quite variable and often exhibits two scarps or tiers. This is noticeable along Pottruff Creek. Pottruff Spring is at the base of the upper tier. Downstream from Pottruff Spring the creek flows on the surface for 200 metres and then flows underground for 120 metres, emerging at a spring at the base of the lower tier.

In most of the local area, unconsolidated sediments deposited in the last glaciation cover the bedrock. Close to the crest of both the Niagara and Eramosa Escarpments the overburden is thinner and bedrock is



Photo 10: Eramosa Escarpment within EKCA

exposed in places. Surface runoff flowing over the bedrock and down fractures has produced solution features. Small-scale solution features are common along the crest of the Niagara Escarpment. However, in Stoney Creek the solution enlargement of the bedrock fractures has proceeded to the stage where several surface creeks disappear into sinkholes in the bedrock. These creeks flow along underground conduits for up to several hundred meters before emerging at springs at the base of the escarpment.

Within the ANSI core area, the extent of karst development is exceptional for Ontario. Of the 17 drainage catchments that cross the upper tier of the Eramosa Escarpment within this area, 14 have well-developed

karst with most surface runoff sinking prior to reaching the escarpment. The ANSI is comprised of three sub-areas. The first is the Core Area, which is the undeveloped area at EKCA with a high density of significant karst features. Second is the Developed Area which is an urban area where the karst features have been impacted by development but the remaining karst features are significant and worth preserving. Third is the Feeder Area which encompasses the drainage catchments for several streams that flow into and sink underground in the Core Area. See Figure 7 for more information.

Two major subdivisions of karst landscapes are fluviokarst and holokarst. EKCA has examples of both. Fluviokarst is a karst area where runoff is able to maintain flow at the surface in regular stream channels until part or all of it is swallowed underground into conduits. The area southeast of Pottruff Spring provides one example. Holokarst is a karst without surface stream channels because surface runoff is captured underground, preventing build-up to the volume needed to erode a channel. The area around Nexus Cave is a good example.



Photo 11: Nexus Cave

EKCA contains a good range of typical karst features situated along the valleys. There are two blind valleys that end abruptly in the downstream direction, and two excellent examples of half-blind valleys where there is occasional surface flow downstream of the sinkpoints. There are also several dry valleys with no surface stream channels visible. Figure 7 illustrates the location of the following significant karst and fluvial features.

5.1.1 Nexus Cave

The Nexus Cave is the largest of the caves on site capable of human entry or probing. This cave captures the flow from Nexus Creek and has been mapped for a length of 344 metres. This cave is one of only three explorable caves known in Ontario that contains an in-cave solution shaft. At this shaft, the cave passage descends four metres along a vertical joint between two bedding plane passages.

5.1.2 Pottruff Cave

The Pottruff Cave is the dramatic cave entrance well known to park visitors, and is an example of a karst window. A karst window is a rock-walled depression, usually with vertical walls, with a stream flowing across its floor from one side to the other. The cave is a small segment of a larger cave that extends from the Phoenix Creek and Stewart Creek sinkpoints to Pottruff Spring. Both Stewart and Phoenix Creeks sink and flow in the subsurface through the larger Pottruff Cave to Pottruff Spring.



Photo 12: Pottruff Cave

5.1.3 Pottruff Spring

The Pottruff Spring is located at the base of the Eramosa Escarpment. Geological observations indicate there has been collapse of the bedrock beneath the adjacent escarpment slope due to natural processes. Although this has blocked entry into Pottruff Cave, it is recommended that the escarpment slope should not be disturbed or the cave entrance excavated.

5.1.4 Olmsted Cave

Part of the Eramosa Karst system, the Olmsted Cave is located in a City-owned green space north-east of the EKCA property near Richdale Drive.

5.1.5 Overflow Sinks

Overflow sinks are sinkpoints for a creek when there is overflow from sinks further upstream. Overflow sinks are found along four valleys, most notably at Phoenix and Stewart Creeks. At low and moderate flows these two creeks disappear into sinkholes. At high flows the sinkpoints are inundated and the creek flows on the surface to two overflow sinks near the downstream end of a prominent gully. At very high flows the surface flow continues along a broad shallow valley to a series of dolines leading to Pottruff Cave and finally to the Eramosa



Photo 13: Overflow Sink

Escarpment. The progressive downstream migration of the overflow under different flow conditions along Phoenix and Stewart Creeks is the very best example known in Ontario.

5.1.6 Other Karst Features at EKCA:

- Dolines (or sinkholes) are often considered to be the diagnostic karst landform. These are topographically closed depressions in the landscape, commonly circular or oval in plan view, overlying caves and smaller bedrock fractures.
- Soil pipes are roughly circular cavities in the soil formed by rapidly moving water. Many are developed along dry cracks in the clay-rich soil. These are found at the base of many of the dolines and it is inferred that they permit the draining of surface runoff into underlying bedrock conduits.
- Karren are small features such as pits and runnels found on soluble exposed bedrock. In this area karren are found along the exposed crest of the Eramosa Escarpment, and where fluvial erosion has exposed bedrock along the larger dry valleys. Spreads of karren appearing like a layout of paving stone are also present, the largest is situated near Nexus Cave.

5.1.7 Geomorphic Features of Interest:

The geomorphic features found at EKCA, briefly described above, are listed below in Table 7. Those that are considered regionally or provincially significant are as noted from the 2003 ANSI report. The “Provincial” designation indicates that this is one of the best examples in Ontario of this feature.

Table 7. Geomorphic Features of Interest (from 2003 ANSI report)

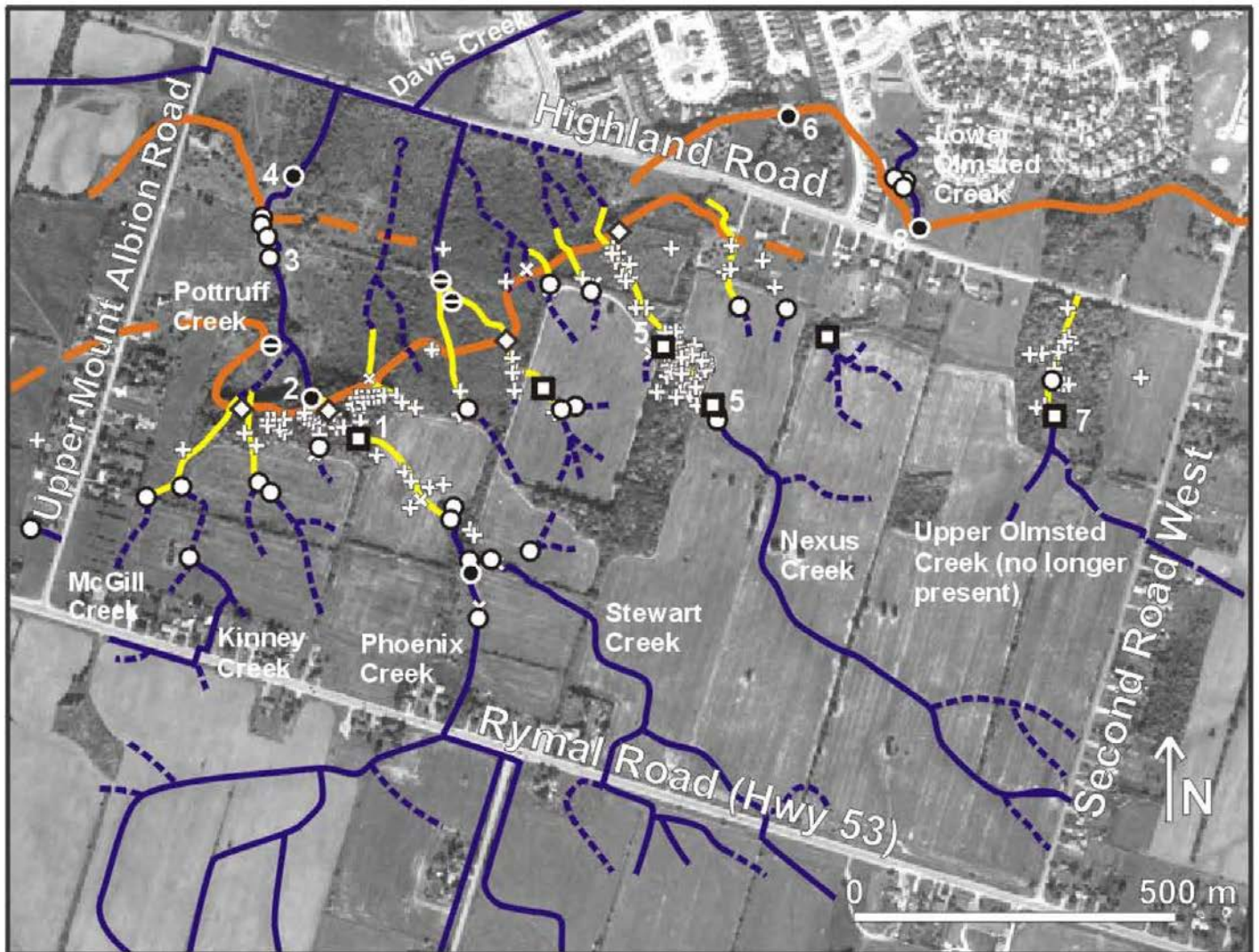
| Geomorphic Feature | Examples at Eramosa Karst | Significance |
|--------------------|---|---|
| Karren | A few excellent examples of a variety of small scale karren | |
| Dolostone pavement | A few limited examples | |
| Grikes | Numerous examples | |
| Collapse dolines | A few examples | |
| Suffosion dolines | Widespread in Eramosa Karst | Provincial: although reasonably common in Ontario, this is the highest concentration known in the province. |
| Soil pipes | Widespread (typically associated with suffusion dolines and drainage courses) | Provincial: the only known location in Ontario; potential to be the type-example for an erosion mechanism of doline formation. |
| Karst windows | Pottruff Cave; Nexus Cave, Window Entrance | Regional: Pottruff Cave is the largest example along the Niagara Escarpment. |
| Caves | Nexus Cave | Provincial: of the three caves of its type in Ontario, it is the largest, most complex and best preserved. |
| Solution shaft | Unnamed shaft, Nexus Cave | Provincial: one of only three in-cave examples. |

| | | |
|---------------------|--|---|
| Sinking streams | Nexus, Stewart, Phoenix, Kinney and McGill Creeks | Provincial: the largest concentration of sinking streams in a relatively small area. |
| Overflow sinks | Various excellent examples situated downstream from Phoenix and Stewart Creeks | Provincial: clearly the best example in Ontario of overflow sinks in mantled karst developed in well bedded carbonates |
| Dry valley | Nexus dry valley | Provincial: the very best example in the province |
| Blind valley | Nexus Creek blind valley (at the sinkpoint) | |
| Half-blind valley | Phoenix Creek, Stewart Creek | |
| resurgence (spring) | Pottruff Spring, Nexus Spring | |
| exsurgence (spring) | Unnamed spring, situated 280 m northeast of Pottruff Spring | |



Photo 14: Water flowing into the Nexus Cave entrance after rainfall

Figure 7. Location of Karst Features in the Study Area (Earth Science Inventory and Evaluation of the Eramosa Karst Area of Natural and Scientific Interest, Ontario Ministry of Natural Resources, April 2003)



- | | | | | |
|------------------------|-------|---|---|--------------------------|
| Karst Features: | ○ | sinkpoint | 1 | Pottruff Cave |
| | ● | spring (resurgence) | 2 | Pottruff Spring |
| | ⊖ | spring (exsurgence) | 3 | Watercress Sink |
| | ■ | cave | 4 | Willow Spring |
| | ◇ | dolostone pavement | 5 | Nexus Cave (2 entrances) |
| | + | doline (sinkhole) | 6 | Nexus Spring |
| | ⊗ | isolated soil pipe | 7 | Olmsted Cave |
| | — | dry valley | 8 | Olmsted Spring |
| Other Features: | — | crest of bedrock scarp (partially exposed): defined | | |
| | - - - | crest of bedrock scarp (buried): assumed | | |
| | — | stream | | |
| | - - - | gully with occasional streamflow | | |

5.2 Soil Composition

Environmental Impact Statement (EIS) reports from Ecoplans (2008 and 2009) for Ontario Realty Corporation for the Feeder Lands noted the following soils information.

The soils at EKCA are dominated by a low permeability silty clay overburden. The thickness of these soil deposits varies from three to six meters. The low permeability creates ‘flashy’ conditions that promote stormwater runoff and ‘feed’ the geomorphological function of the karst features at EKCA.

A previously infilled sinkpoint near Fairhaven Drive and Richdale Drive exhibited a bedrock ridge at a depth of 2m below clay fill and clay soils.

A geotechnical investigation completed by consultants in 2004 identified 2m and 3m soil overburden areas which were plotted on maps and used to identify the buffer zones for the Karst ANSI.

EKCA is located in a narrow band of the Haldimand clay plain situated between the Niagara Escarpment to the north and a small moraine to the south. See Figure 8. Soil Composition for more information.

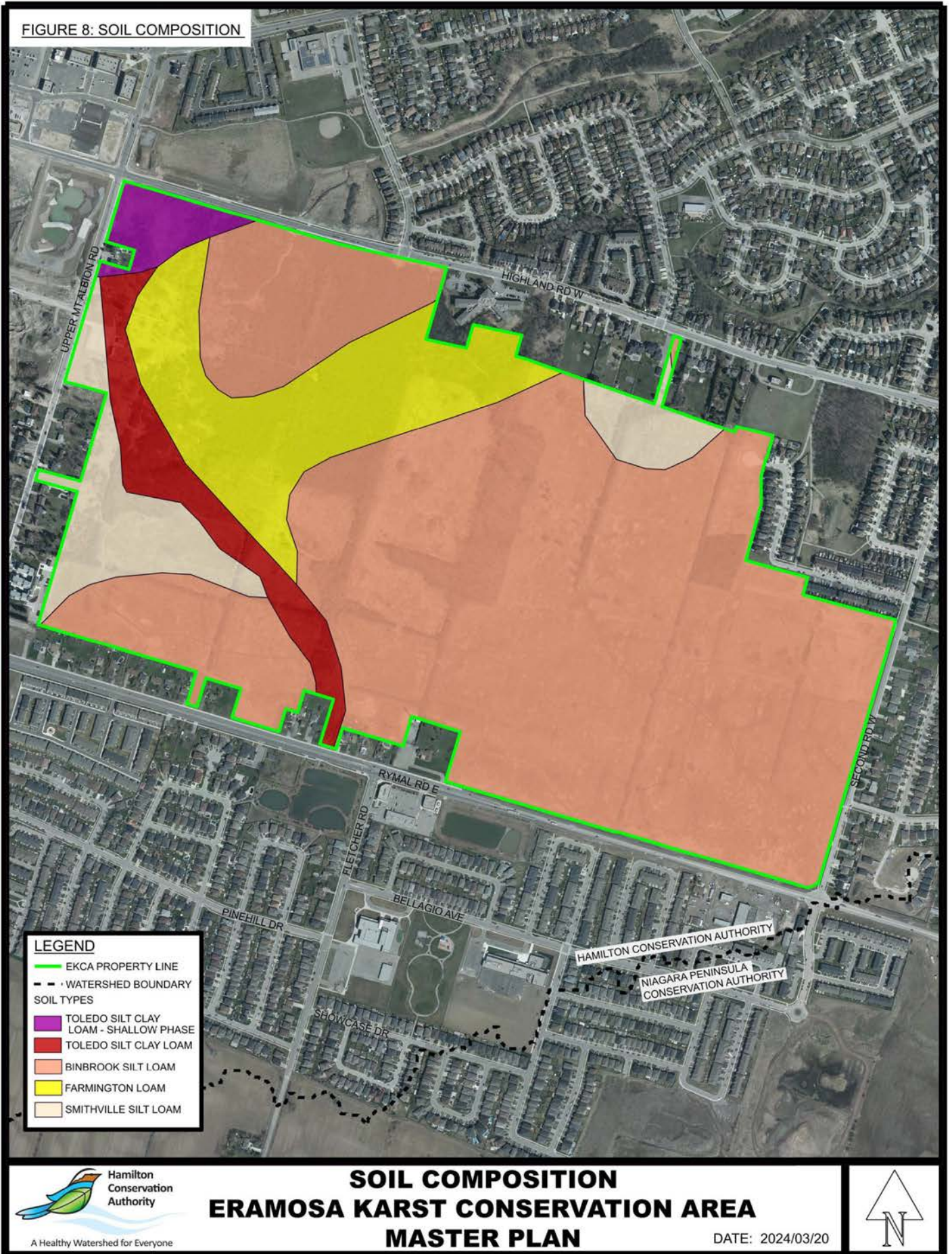
5.3 Hydrology and Surface Drainage

5.3.1 Surface Water Features

EKCA is at the headwaters of the Upper Davis Creek Subwatershed. See Figure 9. Subwatersheds for more information. Upper Davis Creek (main) previously originated upstream of a Cattail marsh within the vicinity of the Upper Mount Albion Road and Highland Road intersection. Due to the development of the property and installation of the Upper Redhill Expressway, this section of the creek was altered. It now begins upstream of the Upper Red Hill Expressway, and as the water moves under the highway it converges into a recently engineered channel that carries it to Upper Mount Albion Road. From there it enters EKCA into a marsh on the south-east corner of the Upper Mount Albion and Highland Road West intersection. From here, it flows east along the Highland Road ditch line before turning north. This creek flows north and ultimately ends when it flows over Felker’s Falls at the Niagara Escarpment. The Creek transitions to Lower Davis Creek below the falls and continues north where it meets Redhill Creek, which discharges into Hamilton Harbour.

There are numerous surface water features at EKCA, all of which are influenced by the karst landscape. The Upper Davis Creek system is fed by many of these headwater features which all sink into the ground and re-emerge as springs further downstream. The extensive karst geological system connects these sinkholes and springs. These springs are fed by groundwater as well as storm water that drops into the sinkholes. The Davis Creek Subwatershed Study (DCSS, Philips et al. 2006) notes Stewart Creek and Nexus Creek flow in a northwest direction. Phoenix Creek flows northerly and joins with Stewart Creek immediately west. West of Phoenix Creek there are two smaller systems, McGill Creek and Kinney Creek, both of which sink a short distance downstream of their origins. (Buck et al. 2003 field observations).

FIGURE 8: SOIL COMPOSITION



LEGEND

- EKCA PROPERTY LINE
- WATERSHED BOUNDARY

SOIL TYPES

- TOLEDO SILT CLAY LOAM - SHALLOW PHASE
- TOLEDO SILT CLAY LOAM
- BINBROOK SILT LOAM
- FARMINGTON LOAM
- SMITHVILLE SILT LOAM



**SOIL COMPOSITION
ERAMOSA KARST CONSERVATION AREA
MASTER PLAN**

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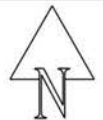
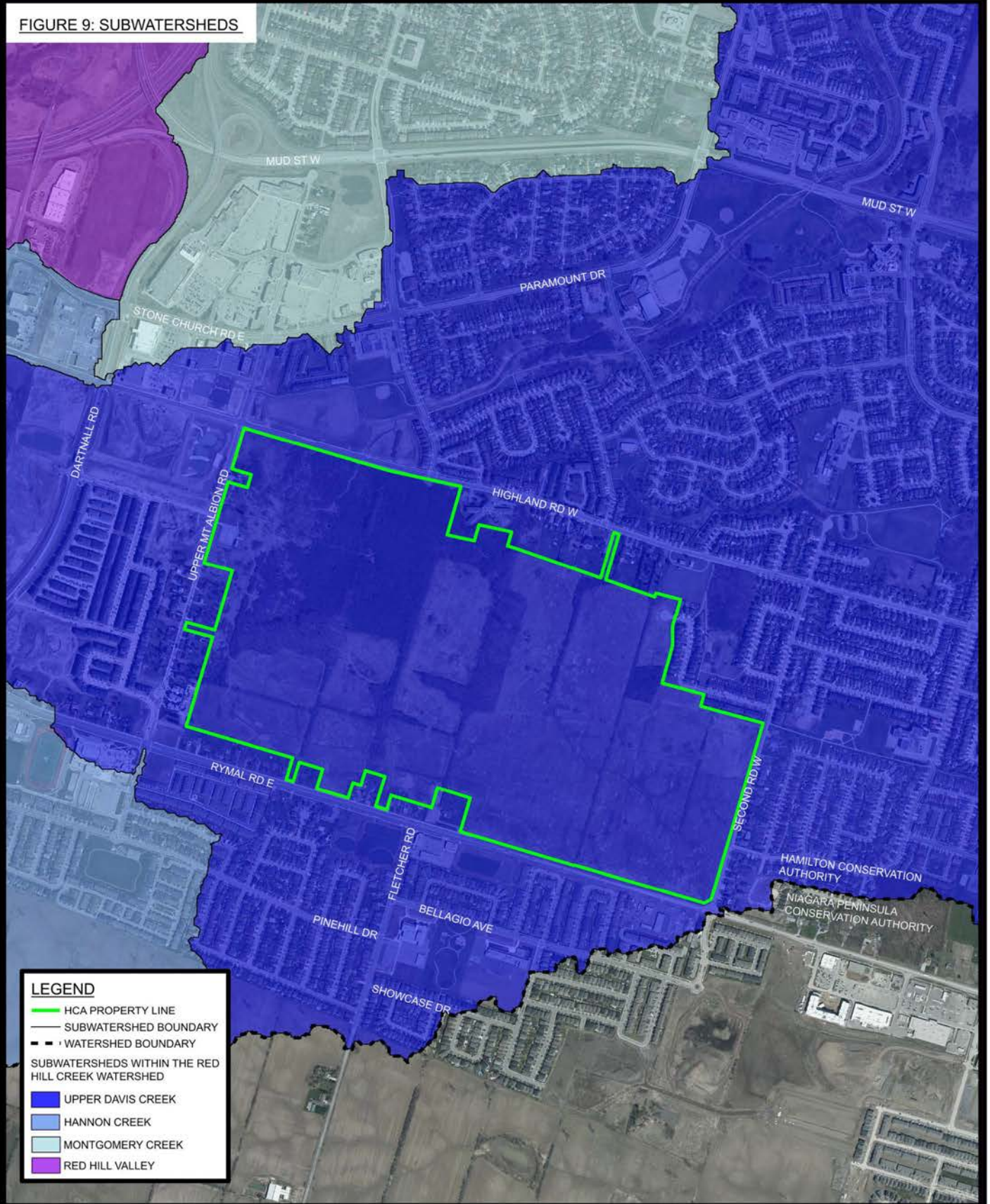


FIGURE 9: SUBWATERSHEDS



LEGEND

- HCA PROPERTY LINE
- SUBWATERSHED BOUNDARY
- - - WATERSHED BOUNDARY

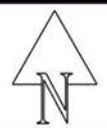
SUBWATERSHEDS WITHIN THE RED HILL CREEK WATERSHED

- UPPER DAVIS CREEK
- HANNON CREEK
- MONTGOMERY CREEK
- RED HILL VALLEY



**SUBWATERSHEDS
ERAMOSA KARST CONSERVATION AREA
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Past agricultural practices impacted the surface water features, resulting in altered channels as well as silt contamination of some of the karst features. The more recent residential development of the area surrounding the conservation area will serve to further alter the natural conditions but also likely has improved some conditions related to agriculture with proper stormwater management. The drainage area watercourses at EKCA are ephemeral in nature, supporting flow for short periods of time in the spring or in response to run-off events. These conditions reflect the low permeability clay-based soils that create “flashy” flow conditions.



Photo 15: Field erosion at Eramosa Karst before vegetation was established

This combined with the karst conditions makes this conservation area a very unique place to visit.

5.3.2 Wetlands

The biophysical inventory and ecological land classification provide details of the small marshes that occur on site, see Section 5.9 and maps in Appendix 1 for more information.

Plans are in place for the existing wetland area at the north-west corner of the property at Highland Road West and Upper Mount Albion Road to be restored with an enhanced wetland as part of the wildlife corridor between Mount Albion CA and Eramosa Karst CA. This wetland will help to improve water quality and stormwater flows from the west side of Upper Mount Albion Road. The wetland will be a shallow marsh with Upper Davis Creek flowing through the centre. This wetland will be completed during the life of this master plan.

5.3.3 Feeder Area

The Feeder Area includes all of the watersheds for streams that sink along the south edge of the Core Area. All of these streams contribute flow to the provincially significant karst systems in the Eramosa Karst ANSI. This was confirmed by tracer tests conducted from the Nexus Creek sinkpoint to Nexus Spring, and from the sinkpoints at Stewart, Phoenix, and McGill Creeks to Pottruff Spring.

It is essential that the watersheds for all of these sinking streams within the Feeder Area are protected to ensure comprehensive protection for the well-integrated karst hydrologic systems. The underground flow from the dolines to the springs and the occasional surface overflow are integral to the hydrological functioning of the karst. In addition, the creeks help maintain the distinctive karst geomorphology of the area. The creek flows prevent the dolines and sinkpoints from gradually becoming infilled with debris and sediment. The origin and evolution of the karst features is readily appreciated with the existing natural flow patterns. Thus, the features themselves, and their scientific and educational value, would suffer significantly if the natural flows of the sinking streams are not maintained.

In an urban environment, there are a number of potential sources of contamination that could have a significant impact on the karst. The possibility for road contaminants (e.g. road salt) and accidental spills along Rymal Road and Second Road West should be considered for those creeks that cross these roads. For example, oil or gas spills along Rymal Road could have a devastating effect on the EKCA caves if carried by surface streams to the core areas. Once such contaminants enter caves, they can become trapped and contaminate the area for an extended period of time. Consequently, the ANSI report for the feeder lands recommended that “the hydrology and geomorphology of the surface streams within the Feeder Area be protected in a natural state (as much as possible) upstream from the sinkpoints in the Core Area. Buffers should extend along these streams upstream to the point where the overburden reaches a thickness of at least 2.0m.”

The current sinkpoints for Nexus, Phoenix and Stewart Creeks are over 300 metres from the Eramosa Escarpment. It is therefore probable that karst conduits in the subsurface extend well into the Feeder Area. In future, enlarged fractures will eventually capture surface flow from the major sinking streams, and the sinkpoints for these various streams will continue to migrate upstream where the overburden is thin (less than 2.0 metres). This is the basis for recommending the protection of the hydrology and geomorphology of the surface streams in the Feeder Area where the overburden thickness is less than 2.0m. The 2003 ANSI report recommended that urban development be restricted by a buffer zone of 50 metres to protect the karst features at the edge of the core area.

5.4 Biophysical Inventory Methodology

Biophysical inventories completed at Eramosa Karst Conservation Area consisted of plant, bird, amphibian and incidental surveys of mammals and insects completed in 2023, noted in Table 8. Species lists are included in Appendix 6. Ecological Land Classification was also completed alongside the other surveys and the results are shown on Map 1 in Appendix 1.

Table 8. Summary of Ecological Field Studies at Eramosa Karst Conservation Area Property

| Survey Type | Dates | |
|--------------------------------------|---|--|
| | Year | Day(s) |
| Floral Inventory | 2023 | Concurrent with ELC surveys |
| Breeding Bird Surveys | 2023 | June 1 2023, June 29 2023 |
| Frog Call Surveys | 2022 | April 13 2022, May 11 2022 |
| Ecological Land Classification (ELC) | 2023 | May 17, June 29, July 12, July 18, July 25, Aug 9, Aug 17, Aug 18, Sep 1, Sep 29 |
| Incidental wildlife survey | Recorded when encountered during all visits –2023 | |

5.5 Ecological Land Classification

The Ecological Land Classification (ELC) system for Ontario was used to describe the vegetation communities at Eramosa Karst Conservation Area. Details on the canopy, sub canopy, shrub and ground

layers of each vegetation community were recorded. Vegetation community boundaries were determined using air photo analysis and further refined in the field.

5.6 Flora/Botanical Inventory

Botanical inventories were conducted as a part of the Ecological Land Classification surveys of the properties. Specific floristic inventories occurred in the spring of 2023 for spring ephemerals (early spring flowers) and the fall of 2023 to further identify asters and goldenrod species as they bloom late in the season. Species nomenclature is based on the Natural Heritage Information Centre (NHIC) Plant Species list (updated yearly). Species and community ranks are determined provincially by the Ministry of Natural Resources and Forestry Natural Heritage Information Centre Database (Srank) and locally via the Hamilton Natural Areas Inventory (Schwetz 2014). A new Natural Areas Inventory is currently underway in Hamilton. Findings of the new NAI will be incorporated in future updates to this Management Plan.

5.7 Fauna Inventory

Frog call surveys were conducted in 2022. All surveys followed the Marsh Monitoring Program protocol. The protocol includes three nights of surveys from April to June when temperatures at night are 5, 10 and 15 degrees Celsius respectively. For this plan, surveys were conducted on two nights, and no frog calls were heard. Background data including iNaturalist and the NAI were used to develop a list of species recorded in the area.

No specific surveys were conducted for other wildlife on the property other than breeding birds. All wildlife encounters were incidental while conducting other aspects of field work. These surveys involved general coverage recording all species observations and signs (e.g. tracks/trails, scat, and burrows, dens, browse and vocalizations). Background data including older survey material was used to develop a list of butterflies, mammals and dragonflies recorded by naturalists at Eramosa Karst Conservation Area over the last 10 years. A summary of the findings is in Appendix 6.

5.8 Breeding Bird Surveys

Breeding bird surveys were conducted over two visits in 2023 following the Ontario Breeding Bird Atlas (Cadman 2010) methodology. These visits are conducted between half an hour before sunrise until 10 a.m. All birds seen and heard are recorded as well as any breeding evidence. Breeding evidence can include such things as carrying food or nesting materials. Two surveys were conducted, one between May 24th and June 15th and another between June 16th and July 10th. This is done to ensure all breeding birds are noted, from those that breed early in the season to those that are later breeders. A combination of wandering transects, and 5-minute point counts are used to record the birds on the property. These were completed by staff.

5.9 Ecological Land Classification Results

Field surveys occurred over 10 visits in 2023. This included all properties throughout the Eramosa Karst Conservation Area. The subject properties were delineated into 15 vegetation communities outlined in Table 9 below. Details on community classifications can be found on Map 1 in Appendix 1.

Table 9. Vegetation Communities

| Community Type | ELC Code | Community Description |
|------------------------------|-------------------|--|
| Deciduous Forest | FOD5-11/ FODM5-11 | Dry - Fresh Sugar Maple - Hardwood Deciduous Forest Type |
| | FODM4-10 | Dry-Fresh hawthorn-Apple Deciduous Forest type |
| Deciduous Woodland | WODM4-4 | Dry-Fresh Black Walnut Deciduous Woodland Type |
| Deciduous Shrub Thicket | THDM2-11 | Hawthorn Deciduous Shrub Thicket Type |
| | THDM2-6 | Buckthorn Deciduous Shrub Thicket type |
| | THDM3-1 | Buckthorn Deciduous Hedgerow Thicket Type |
| | CUT1-4/ THDM2-4 | Gray Dogwood Deciduous Shrub Thicket Type |
| Graminoid Meadow | MEGM3 | Dry – Fresh Graminoid Meadow Ecosite |
| | MEGM3-7 | Timothy Graminoid Meadow Type |
| | MEGM3-4 | Kentucky Blue Grass Graminoid Meadow Type |
| Forb meadow | MEFM1-1 | Goldenrod Forb Meadow Type |
| Mineral Meadow Marsh | MAM2 / MAMM1 | Graminoid Mineral Meadow Marsh Ecosite |
| Mineral Shallow Marsh | MASM1-14 | Reed Canary Grass Mineral Shallow Marsh Type |
| | MAS2-1/ MASM1-1 | Cattail Mineral Shallow Marsh Type |
| | MASM1-4 | Narrow-Leaved Sedge Mineral Shallow Marsh Type |
| Transportation and Utilities | CVI_1 | Transportation |
| Residential | CVR_3 | Single Family Residential |

5.9.1 Forest

Dry - Fresh Sugar Maple - Hardwood Deciduous Forest Type (FOD5-11/ FODM5-11)

This community type can be found in two different sites at Eramosa Karst Conservation Area (EKCA). The first site is on the west side of the property, close to the parking lot. This community is dominated by sugar maple in the canopy and subcanopy. Chokecherry was the species present in abundance in the understory layer. Ground vegetation layer has yellow trout lily and may apple present occasionally in the spring, whereas summer vegetation has goldenrod species in abundance.

The second area with this community type can be found in the center of the property. At this site, shagbark hickory and American beech are also present occasionally in the canopy with sugar maple still dominant.

Dry-Fresh hawthorn-Apple Deciduous Forest type (FODM4-10)

This is an old orchard, on the northeastern side of the property. This community has fruit bearing apple, hawthorn and pear trees. Sugar maple can be found rarely in the canopy. Other notable species in the canopy are bitternut hickory, ironwood and American basswood. Two fruiting butternuts were also found in this area. Staghorn sumac is present in the subcanopy occasionally. The understory has gray dogwood, and the ground cover has common buckthorn seedlings as occasional species.

5.9.2 Woodland

Dry-Fresh Black Walnut Deciduous Woodland Type (WODM4-4)

This black walnut dominated woodland community can be found along the Upper Davis Creek channel starting from the south side of the fork between Karst Features Trail and East Mountain Trail Loop leading towards Highland Road West. Hawthorn is present occasionally in the canopy as well as sub-canopy layer. A small population of honey locusts are also present around the fork of the trails in the canopy layer. Various grass species like timothy grass, bromes, Kentucky blue grass, and reed canary can be found in the ground cover. Goldenrod sp. and aster species were also recorded in the ground cover late in the summer season.

This woodland has an inclusion of goldenrod Forb Meadow Type (MEFM1-1) on the eastern edge of the community. This community has grass leaf goldenrod, reed canary, and Japanese hedge parsley present as abundant species. Other occasional species that were found are Queen Anne's lace, common hawkweed, common milkweed and tufted vetch.

5.9.3 Thicket

Hawthorn Deciduous Shrub Thicket Type (THDM2-11)

This is the dense thicket in the north west side of the property. Hawthorn is dominant in the canopy and common buckthorn is dominant in the sub-canopy layer. Both species form a dense thicket, leaving sparse gaps for sunlight to penetrate to the ground. Black walnut and pear species were also found occasionally present in the canopy. Understory had grey dogwood as the most dominant species. Ground cover has common buckthorn seedlings and garlic mustard present in abundance.

This community has two inclusions within this dense thicket. One of these inclusions is reed canary grass Mineral Shallow Marsh Type (MASM1-14), which can be found at two different spots. Both of these spots are wet areas, one near the East Mountain Trail Loop and second around the boardwalk on the Karst Features Trail. Reed canary is the dominant species at these sites with curled dock, quack grass, and buttercup present rarely. The site near the East Mountain Trail Loop has Eastern cottonwood and staghorn sumac present in the canopy and understory layer respectively. The second inclusion in this thicket is Buckthorn Deciduous Hedgerow Thicket Type (THDM3-1). There is a small section of remnant hedgerow of Common Buckthorn within this community.

Buckthorn Deciduous Shrub Thicket type (THDM2-6)

Three sites at this property were identified to be this community type with common buckthorn as the dominant species. One of these sites is at the eastern end of the property, near Richdale Drive. This site has bur oaks occasionally in the canopy layer. Some rare white oak, ironwood and green ash were also found in small numbers. The community is dominated by the common buckthorn in the sub-canopy and Hawthorn is also present in abundant numbers. The sub-canopy is very dense here, resulting in sparse ground cover due to lack of sunlight.

Another site with this community can be found on the western side of the property behind the residential area and third site is in the northwest side around a private property. Both private properties are along

the Upper Mount Albion Road. These two sites have common buckthorn dominating the community, but it is not dense and has open spaces with grass species.

Buckthorn Deciduous Hedgerow Thicket Type (THDM3-1)

This community type can be found all over the property, dividing open fields and edging the forests and thickets. Common buckthorn is the dominant species found in these hedgerows. The parts of hedgerows which are closer to the forest edges have trees like shagbark hickory, trembling aspen, bur oak, ironwood, and white ash present with larger gaps in the canopy. These gaps have been occupied by common buckthorn extensively but other species like pear, crab apple, and honeysuckle were also recorded.

Gray Dogwood Deciduous Shrub Thicket Type (CUT1-4/ THDM2-4)

This community is present near the intersection of Highland Road West and Upper Mount Albion Road. It is dominated by the gray dogwood shrubs with occasional common buckthorn in the canopy layer. Gray dogwood is dominant in the ground cover as well along with common milkweed, goldenrod, and aster species present occasionally.

5.9.4 Meadow

Dry – Fresh Graminoid Meadow Ecosite (MEGM3)

This is an access point in the northeast side of Eramosa Karst Conservation Area from Highland Road West. There is a trail leading to the Conservation Area and grass is mowed along the edges of the trail. In unmown areas it is a mix of pasture grasses such as timothy and orchard grass. This area is bordered by residential houses on both sides.

Timothy Graminoid Meadow Type (MEGM3-7)

This timothy grass dominated community is found at multiple sites at Eramosa Karst Conservation Area in the west and south-west side of the property, divided by hedgerows. Black walnut, common buckthorn, and trembling aspen were found in the canopy occasionally throughout the community. Hawthorn and white oak were also found in the sub-canopy layer. In the understory layer, established patches of gray dogwood were found in most of the areas with this community type. Species like common milkweed, cut leaf teasel, Japanese hedge parsley, knapweed sp., and aster sp. was also found in the ground cover amongst other grass and forb species.

This open field community includes Reed Canary Grass Mineral Shallow Marsh Type (MASM1-14) on the south-west side. This site has cattails and phragmites mixed in with the reed canary grass. The creek channel flowing through is fed from the stormwater ponds across the Rymal Road and are connected via culvert. This creek channel is in the catchment area of Upper Davis Creek. All of the sites with this community type are bordered by the residential area along the Upper Mount Albion Road and Rymal Road. The impact of these neighbouring land uses can be seen from unofficial paths forming and litter blowing into the meadows.

Kentucky Blue Grass Graminoid Meadow Type (MEGM3-4)

The open fields on the north-east and east-south side of the property are dominated by Kentucky blue grass. Common buckthorn and apple sp. can be found in the canopy present occasionally. White clover,

red clover, and timothy grass are present in abundance. Hawthorn and common buckthorn can be found throughout the open fields present occasionally. In the area along Rymal Road, close to Rymal Road Community Church, appears to have plantings done in the past. Species like red osier dogwood, meadow sweet, cranberry, willow sp., silver maple, sycamore, tamarack and American basswood were found.

In the same area, there is an inclusion of Cattail Mineral Shallow Marsh type (MAS2-1/MASM1-1). Cattail runs along the creek channel starting from the Rymal Road towards the west of the property to meet with another channel coming off from the stormwater ponds across the road through a culvert. After these two channels meet, they flow to the north of the property for some distance before turning west again to meet the other channels. All these watercourses are in the Upper Davis Creek catchment area. The cattail marsh also has phragmites population, mainly concentrated closer to the road and one other spot, north of the Rymal Road Community Church, near the hedgerow.

5.9.5 Marsh

Graminoid Mineral Meadow Marsh Ecosite (MAM2 / MAMM1)

Along the banks of Upper Davis Creek, in the north-east section of the property, this community can be found within the hawthorn thicket and black walnut woodland towards the Highland Road West. Species like rice cutgrass, fowl manna grass, field horsetail, and reed canary grass were found in the ground vegetation. On the eastern side, where this community starts, ground water upwelling was noticed with watercress growth around it.

Narrow-Leaved Sedge Mineral Shallow Marsh Type (MASM1-4)

This community is found in the northeast direction of the property, near the intersection of Highland Road West and Upper Mount Albion Road. This community is bordered by cattail marsh on one side and gray dogwood thicket on the other. *Carex annectens* is the dominant sedge species present in this marsh, with swamp milkweed, reed canary, and aster sp. present occasionally. This site is adjacent to a cattail marsh and floods occasionally during spring melt or rain events.

This site has an inclusion of Narrowleaf Cattail Mineral Shallow Marsh Type (MAS2-1/ MASM1-1) along the intersection and bordering the narrow-leaved sedge marsh. This is dominated by cattail with one willow sp. tree in the canopy layer. A small population of phragmites is present near the edge of the cattail along the Highland Road West side.

Another inclusion at this is Transportation (CVI_1) on the edge of the cattail marsh, along Upper Mount Albion Road. This was disturbed topsoil, with species like Canada thistle the dominant species and bird's foot trefoil abundant.

5.9.6 Transportation and Utilities

Transportation (CVI_1)

This is the parking lot area on the northeast side of the property, which can be accessed from Upper Mount Albion Road. Along with the parking area, it also has toilet facilities and a rain shelter with sign boards displaying some interesting features of the area.

5.9.7 Residential

Single Family Residential (CVR_3)

This area can be found on the southern side of the property. These are the backyards of the single-family residential area and have mostly mowed grass.

5.10 Flora/Botanical Inventory Results

Over multiple survey dates, including ELC surveys, staff identified 163 species of plants on this property. Of these, 101 are considered native plant species (62%) while 62 are non-native species (38%) and there were an additional 41 species identified to genus only. The Hamilton Natural Areas Inventory (Schwetz 2014) indicates that there are 1496 species of plants in the Hamilton-Wentworth jurisdiction. Plant species at Eramosa Karst Conservation Area represent 11% of that regional flora. Appendix 6 contains a full list of all species inventoried.

Table 10. Summary of plant species surveys

| | |
|------------------------------|----------|
| Native Plant species | 101 |
| Non-native plant species | 62 |
| Total plants recorded | 163 |
| % of regional flora | 11 |
| Mean CC | 3.94 |
| Floristic Quality Assessment | 39.60 |
| Value assessment (Quality) | Moderate |

The Floristic Quality Index (FQI) and the Native Mean Coefficient of Conservatism (CC) have been calculated for the entire property. The CC is a measure of the species specificity of habitat requirements, with a coefficient of 0 indicating a plant tolerant of a wide range of conditions and 10 indicating a plant that has the most specific habitat requirements. FQI is a measure of vegetation quality and is based on both the habitat fidelity of each species and species richness. The FQI for Eramosa Karst Conservation Area is 39.60 and the mean CC value is 3.94. These are considered Moderate values for FQI and mean CC.

5.11 Fauna Inventory Results

5.11.1 Breeding Bird Surveys

Breeding bird surveys identified 43 species of birds at Eramosa Karst Conservation Area. Federal and provincial species at risk identified during these surveys include barn swallow, bobolink and Eastern wood-pewee. Additionally, surveys identified the grasshopper sparrow which is at risk provincially. Other notable species include the alder flycatcher, black-billed cuckoo, brown thrasher, great blue heron, mourning warbler, and red-bellied woodpecker which are uncommon in the City of Hamilton, as well as the clay-colored sparrow and common raven which are rare in the City of Hamilton.

Data was also collected from the Natural Areas Inventory, iNaturalist, and eBird as historical data. This data has identified 109 additional species in the area, 33 of which are uncommon and 22 are rare to the City of Hamilton. Appendix 6 contains a full species list.

5.11.2 Butterflies and Dragonflies

No dedicated surveys were conducted for these two taxa. There is background information from the Natural Areas Inventory (NAI) and the data was also extracted from iNaturalist (research grade only). The background information identified 30 species of butterflies and five species of dragonflies. Three species of butterfly and one dragonfly species are uncommon in Hamilton. Monarch was also observed, which is considered an Endangered species by federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the status has recently been changed to Endangered on Schedule 1 of SARA. Provincially (ESA) there has been no update, and it is still under special concern as of writing of the Master Plan. It will be treated as SAR in this document. Appendix 6 contains a full species list.

5.11.3 Mammals

All incidental wildlife encounters were recorded while conducting other aspects of field work. These surveys involved general coverage recording all species observations and signs (e.g. tracks/trails, scat, burrows, dens, browse, and vocalizations). Three mammals, Eastern coyote, white-tailed deer and Eastern gray squirrel were observed. Mammal sighting records were also extracted from historical surveys conducted for the NAI and iNaturalist (research grade only). Twelve additional species were identified from historical surveys and iNaturalist. All mammal species identified are common in Hamilton and Ontario. Appendix 6 contains a full species list.

5.11.4 Herpetofauna

Frog call surveys were conducted from the Eramosa Karst Conservation Area parking lot. No frogs or toads were heard within the 100m station area at either visit. Data was also collected from NAI and iNaturalist (research grade only) which identified one species of toad, and five species of frog. Three snake species were also identified from the background data including Eastern milksnake, which is federally (SARA) a species of special concern and provincially (ESA) a species of Special Concern. Staff also recorded an Eastern milksnake during vegetation surveys. Appendix 6 contains a full species list.

5.12 Aquatic Inventory

Due to the shallow and ephemeral nature of the features on this property no surveys were completed. Upper Davis Creek is known to support brook stickleback and pumpkinseed, this was supported through sampling that did occur as part of the Felker's Falls Conservation Area Master Plan assessment.

5.13 Significant Ecological Features

5.13.1 Significant Woodlands

The mature woodlot and shrub thicket within the central portion of EKCA is considered by the City of Hamilton to be significant woodland. Significant woodlands for the City mean an area which is ecologically important in terms of features (species composition, age of trees and stand history) and function (contributes to the broader landscape because of its location, size or the amount of forest cover in the planning area) (City of Hamilton, 2019).

5.13.2 Core Areas

The majority of the EKCA is considered a core area by the City of Hamilton. Core areas include key natural heritage features and key hydrologic features (City of Hamilton, 2022). At EKCA this includes the significant woodland, noted above and the karst features. Core Areas area protected within the urban official plan for the City of Hamilton. It is the City’s policy to preserve and enhance Core Areas and to ensure that any development or site alteration within or adjacent to them shall not negatively impact their natural features or their ecological functions.

5.13.3 Provincially Significant Earth Science ANSI

Much of this Conservation Area is designated as a Provincially Significant Earth Science ANSI. As per the ANSI report (Buck et al 2003) “Eramosa Karst in Stoney Creek contains numerous diverse karstic features, several of which are provincially significant. These include soil pipes, a high concentration of suffosion dolines and sinking streams, overflow sinks, dry valleys and a post-glacial stream cave of significant length. Each of these features is considered the best example of its type in Ontario. Using the “gap analysis” methodology of the Ontario Ministry of Natural Resources, this area of karst is rated the best example of its type in Ontario. This karst type and the various provincially significant features identified at the Eramosa Karst are not currently represented elsewhere in Ontario within protected areas”.



Photo 16: Water flowing over bedrock

5.14 Biophysical Inventory – Analysis

5.14.1 Species at Risk and Locally Rare Species

Appendix 6 contains the natural inventory species lists from background research and field work completed for the preparation of the Master Plan. In this Master Plan, “species at risk” means species listed by the MECP or Government of Canada as threatened, endangered, extirpated or extinct in Ontario including:

- Species designated as endangered, threatened, or special concern by the Species at Risk Act (federal) via the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and listed in Section 5.14.
- Species designated as endangered, threatened, or special concern by the Endangered Species Act (provincial) via the Committee on the Status of Species at Risk in Ontario (COSSARO).

5.14.1.1 Significant Flora

Of the plant species recorded on the subject lands through the 2023 field surveys, one federally (SARA) and Provincially (ESA) endangered species, Butternut (*Juglans cinerea*) was observed in multiple locations. Three provincially rare (table 12), two locally uncommon (table 13) and four locally (table 13) rare plant species were also observed. Details for these species are provided in Section 5.14.4 Special Concern and Wildlife Species.

5.14.1.2 Significant Fauna

The following seven species were recorded at various parcels of the Conservation Area and are at risk either federally (SARA) or provincially (ESA). These species were recorded at EKCA at different life stages from migration to breeding as indicated below.

Table 11. Federal and Provincial Species at Risk

| Common name | Scientific name | SARA status (Schedule 1) | ESA status | Observed | Documented |
|--------------------|------------------------------|--------------------------|------------|-----------------|-------------|
| Barn swallow | <i>Hirundo rustica</i> | THR | THR | Breeding | BBS |
| Bank swallow | <i>Riparia riparia</i> | THR | THR | | NAI |
| Bobolink | <i>Dolichonyx oryzivorus</i> | THR | THR | Breeding | BBS |
| Chimney swift | <i>Chaetura pelagica</i> | THR | THR | Flying overhead | iNaturalist |
| Eastern meadowlark | <i>Sturnella magna</i> | THR | THR | migration | eBird/NAI |
| Lesser yellowlegs | <i>Tringa flavipes</i> | THR | THR | migration | eBird |
| Wood thrush | <i>Hylocichla mustelina</i> | THR | SC | migration | eBird/NAI |

Bobolink and barn swallow have been reassessed recently by the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC) to Special Concern. The status has not been changed on Schedule 1 of SARA as of the writing of this Master Plan so they will be treated as SAR in this document. Bobolink and barn swallow were observed in the open fields closer to Second Road. Three bobolink pairs were noted in these fields. Barn swallow was noted foraging over these fields. Chimney swift was noted via eBird in June of 2022 flying and foraging over the Conservation Area. Species noted in eBird on migration include lesser yellowlegs (October 2017), Eastern meadowlark (April 2023), wood thrush (May 2022). These species were likely using a variety of habitats from the open fields to the forests on the property. Monarch butterflies were noted in the habitats surrounding the Conservation Area on iNaturalist.

Threatened and endangered species habitat is protected under the Endangered Species Act (provincially) and the Species at Risk Act (federally). Permits maybe required for development within the habitat for threatened and endangered species.

5.14.1.3 Significant Wildlife Habitat

The Significant Wildlife Habitat Technical manual (Ontario 2000) along with the Eco regional criteria tables for Ecoregion 7E (OMNR 2015) were used to determine and define significant wildlife habitat (SWH) on the Eramosa karst property. Significant wildlife habitat includes broad categories of habitats for flora and fauna. SWH has been identified under the Provincial Planning Statement (2024) for Ontario. No new development is allowed within identified portions of significant wildlife habitat unless there will be no negative impact to the form and function of this habitat type. The broad categories for significant wildlife habitat include seasonal concentration areas of animals, rare vegetation communities or specialized habitat for wildlife, habitats for species of conservation concern and animal movement corridors.

5.14.2 Seasonal Concentration areas of animals

Seasonal concentration areas of animals are areas where wildlife species occur annually in aggregations (groups) at certain times of the year (Ontario 2015). This can include single species concentrations or aggregations of multiple species.

5.14.2.1 Reptile Hibernaculum

This is a difficult type of significant wildlife habitat to survey due to the cryptic nature of snakes. iNaturalist contains several snake records (Eastern milksnake, Garter snake, and DeKay's brown snake) from the western portion of EKCA. These sightings are research grade and occur between March and April. It is likely there is a snake hibernaculum in the western portion of EKCA, east of the parking lot. Further field work will be required in the spring or fall to determine the exact location.

5.14.3 Habitat for species of conservation concern

Habitat for species of conservation concern includes wildlife that are listed provincially as species concern or are rare and declining.

5.14.3.1 Open Country Breeding Bird Habitat

The fields on the eastern portion of EKCA had more than 10 savannah sparrow pairs nesting as well as grasshopper sparrow. As there are two different species and many of them, these fields would be confirmed as SWH for open country birds.

5.14.3.2 Shrub/Early Successional Bird Breeding Habitat

EKCA has a few areas of field that are succeeding to thickets along the borders of the deciduous forest and at the western side closer to the parking lot. Staff observed brown thrasher, field sparrow, black-billed cuckoo and willow flycatcher in these habitats. These are all indicator species for shrub/early successional bird breeding habitat and are therefore confirmed as SWH

5.14.4 Special Concern and Wildlife Species

Table 13 provides a list of the nine species observed by either staff or through citizen science programs at EKCA, that are either considered special concern by the province or are have an Srank between 1 and 3 and are therefore considered provincially rare. This list includes migratory species such as the rusty

blackbird, bald eagle, and horned grebe all seen early in the spring. Eastern wood pewee was noted in several locations within the forested section of the property while the monarchs and grasshopper sparrows were seen in the open fields.

Table 12. Species of Conservation Concern

| Common name | Scientific name | SARA status (Schedule 1) | ESA status | Observed | Documented |
|--------------------------------|---------------------------------|--------------------------|------------|-----------|-------------------|
| Eastern wood-pewee | <i>Contopus virens</i> | SC | SC | Breeding | BBS |
| Monarch | <i>Danaus plexippus</i> | END | SC | Breeding | iNaturalist |
| Rusty blackbird | <i>Euphagus carolinus</i> | SC | SC | Migration | eBird |
| Bald eagle | <i>Haliaeetus leucocephalus</i> | NAR | SC | Migration | eBird |
| Peregrine falcon | <i>Falco peregrinus</i> | NAR | SC | Breeding | eBird |
| Horned grebe | <i>Podiceps auritus</i> | SC | SC | Migration | eBird |
| Grasshopper sparrow | <i>Ammodramus savannarum</i> | SC | SC | Breeding | BBS |
| Honey-locust | <i>Gleditsia triacanthos</i> | | S2* | Unknown | Staff/iNaturalist |
| Yellow-fruited sedge | <i>Carex annectens</i> | | S2* | Wetlands | Staff |
| Gray-headed prairie coneflower | <i>Ratibida pinnata</i> | | S3** | Unknown | iNaturalist |

*S2 is a provincial rank that indicating fewer than 20 populations in the province.

**S3 is a provincial rank that indicating fewer than 80 populations in the province.

There were also many locally rare and uncommon species to the City of Hamilton recorded during field surveys and found in the background research. There are 23 rare species and 45 uncommon species. These include birds, dragonflies, and butterflies and are mostly concentrated within the forest and thicket sections of EKCA.

Table 13. Locally rare and uncommon species

| Common name | Scientific name | City of Hamilton Status |
|--------------------------|---------------------------------|-------------------------|
| Golden-crowned kinglet | <i>Regulus satrapa</i> | rare |
| Yellow-bellied sapsucker | <i>Sphyrapicus varius</i> | rare |
| Long-eared owl | <i>Asio otus</i> | rare |
| Magnolia warbler | <i>Setophaga magnolia</i> | rare |
| Yellow-rumped warbler | <i>Setophaga coronata</i> | rare |
| Carolina wren | <i>Thryothorus ludovicianus</i> | rare |
| Sharp-shinned hawk | <i>Accipiter striatus</i> | rare |
| Common raven | <i>Corvus corax</i> | rare |

| | | |
|------------------------------|---------------------------------|----------|
| Clay-colored sparrow | <i>Spizella pallida</i> | rare |
| American black duck | <i>Anas rubripes</i> | rare |
| Bald eagle | <i>Haliaeetus leucocephalus</i> | rare |
| Blackburnian warbler | <i>Setophaga fusca</i> | rare |
| Black-throated green warbler | <i>Setophaga virens</i> | rare |
| Blue-headed vireo | <i>Vireo solitarius</i> | rare |
| Broad-winged hawk | <i>Buteo platypterus</i> | rare |
| Merlin | <i>Falco columbarius</i> | rare |
| Northern harrier | <i>Circus hudsonius</i> | rare |
| Osprey | <i>Pandion haliaetus</i> | rare |
| Peregrine falcon | <i>Falco peregrinus</i> | rare |
| Prairie warbler | <i>Setophaga discolor</i> | rare |
| Purple finch | <i>Haemorhous purpureus</i> | rare |
| Red-shouldered hawk | <i>Buteo lineatus</i> | rare |
| Yellow-billed cuckoo | <i>Coccyzus americanus</i> | rare |
| Early buttercup | <i>Ranunculus fascicularis</i> | rare |
| Swamp agrimony | <i>Agrimonia parviflora</i> | rare |
| Northern stickseed | <i>Hackalia deflexa</i> | rare |
| Marsh horsetail | <i>Equisetum palustre</i> | rare |
| American redstart | <i>Setophaga ruticilla</i> | uncommon |
| Cooper's hawk | <i>Accipiter cooperii</i> | uncommon |
| Least flycatcher | <i>Empidonax minimus</i> | uncommon |
| Red-tailed hawk | <i>Buteo jamaicensis</i> | uncommon |
| Turkey vulture | <i>Cathartes aura</i> | uncommon |
| Brown thrasher | <i>Toxostoma rufum</i> | uncommon |
| American kestrel | <i>Falco sparverius</i> | uncommon |
| Eastern meadowlark | <i>Sturnella magna</i> | uncommon |
| Eastern towhee | <i>Pipilo erythrophthalmus</i> | uncommon |
| Northern mockingbird | <i>Mimus polyglottos</i> | uncommon |
| Ruby-throated hummingbird | <i>Archilochus colubris</i> | uncommon |
| Vesper sparrow | <i>Pooecetes gramineus</i> | uncommon |
| White-throated sparrow | <i>Zonotrichia albicollis</i> | uncommon |
| Wood thrush | <i>Hylocichla mustelina</i> | uncommon |
| Bobolink | <i>Dolichonyx oryzivorus</i> | uncommon |
| Red-bellied woodpecker | <i>Melanerpes carolinus</i> | uncommon |
| Brown creeper | <i>Certhia americana</i> | uncommon |
| Chimney swift | <i>Chaetura pelagica</i> | uncommon |
| Eastern phoebe | <i>Sayornis phoebe</i> | uncommon |
| Pine warbler | <i>Setophaga pinus</i> | uncommon |
| Scarlet tanager | <i>Piranga olivacea</i> | uncommon |

| | | |
|-------------------------|----------------------------------|----------|
| Black-billed cuckoo | <i>Coccyzus erythrophthalmus</i> | uncommon |
| Great blue heron | <i>Ardea herodias</i> | uncommon |
| Alder flycatcher | <i>Empidonax alnorum</i> | uncommon |
| Belted kingfisher | <i>Megaceryle alcyon</i> | uncommon |
| Black-and-white warbler | <i>Mniotilta varia</i> | uncommon |
| Blue-gray gnatcatcher | <i>Poliophtila caerulea</i> | uncommon |
| Chestnut-sided warbler | <i>Setophaga pensylvanica</i> | uncommon |
| Common tern | <i>Sterna hirundo</i> | uncommon |
| Eastern bluebird | <i>Sialia sialis</i> | uncommon |
| Green heron | <i>Butorides virescens</i> | uncommon |
| Hairy woodpecker | <i>Dryobates villosus</i> | uncommon |
| Herring gull | <i>Larus argentatus</i> | uncommon |
| Marsh wren | <i>Cistothorus palustris</i> | uncommon |
| Nashville warbler | <i>Oreothlypis ruficapilla</i> | uncommon |
| Red-breasted nuthatch | <i>Sitta canadensis</i> | uncommon |
| Winter wren | <i>Troglodytes hiemalis</i> | uncommon |
| Bank swallow | <i>Riparia riparia</i> | uncommon |
| Blue-winged warbler | <i>Vermivora cyanoptera</i> | uncommon |
| Eastern screech-owl | <i>Megascops asio</i> | uncommon |
| Mourning warbler | <i>Geothlypis philadelphia</i> | uncommon |
| Grasshopper sparrow | <i>Ammodramus savannarum</i> | uncommon |
| Silvery blue | <i>Glaucopteryx lygdamus</i> | uncommon |
| Prince baskettail | <i>Epithecya princeps</i> | uncommon |
| Compton tortoiseshell | <i>Nymphalis l-album</i> | uncommon |
| Common hackberry | <i>Celtis occidentalis</i> | uncommon |
| Smooth gooseberry | <i>Ribes hirtellum</i> | uncommon |

5.14.5 Invasive Species at Eramosa Karst Conservation Area

The species detailed below are a threat to the biodiversity and conservation values in Eramosa Karst Conservation Area. The following section details the invasive species that occur within Eramosa Karst Conservation Area. Recommendations for prioritization for each species are detailed here.

5.14.5.1 Common buckthorn

Common Buckthorn (*Rhamnus cathartica*) is a small tree or shrub that was introduced to Ontario from Eurasia. It was widely planted in farm hedgerows and fencerows as a wind break. It can survive in a wide range of conditions making it very good at invading a variety of habitats (Anderson, 2012a). Birds and small mammals feed on the berries of this plant, which has caused it to spread. Common buckthorn is widespread throughout Eramosa Karst in varying population sizes. There are three major areas that have larger populations forming dense thickets. One of these thickets is in the east side of the property near Richdale Drive. The other two thickets are behind the private residential properties along the Upper Mount Albion Road in the west and northwest direction of the property.

5.14.5.2 Phragmites

This species of common reed from Eurasia is a perennial grass. It is not clear how it was transported to North America. Phragmites (*Phragmites australis*) is an aggressive plant that spreads quickly and outcompetes other native species in wetland habitats (Nichols, 2020). It forms large monocultures that decrease plant biodiversity and create poor habitat for wildlife. At EKCA, there are two very small populations in the northwestern corner, near the washroom building and on the edge of the wetland along Highland Road West. The south side of the property has some bigger phragmites populations along the Upper Davis Creek corridor mixed in with the cattail. These sites are being treated since 2021 by the staff and the process will be continued to manage and control the spread further into the EKCA property.

5.14.5.3 Honeysuckle sp.

There are four main species of invasive honeysuckle (*Lonicera*) in Ontario which can be difficult to identify due to their tendency towards hybridization and the lack of identifying characteristics (flowers and fruits) throughout much of the field season (Tassie and Sherman, 2014). These plants have been brought to North America for three centuries from Europe and Asia as an ornamental. Invasive honeysuckles can rapidly reproduce, grow quickly, and outcompete beneficial vegetation including our native honeysuckles. Their fruits are attractive to birds and mammals, which aid their spread. While identification is easiest in the spring during bloom, hand pulling and weed wrenching smaller shrubs should be conducted in the fall as not to disturb the growth of any nearby spring ephemerals. Cutting and girdling larger shrubs should always be paired with the application of herbicide to newly exposed woody material to prevent excessive suckering come next season.

Honeysuckle can be found in almost all the areas at EKCA, mixed in with common buckthorn thicket, hedgerows and hawthorn thickets. A scarce number of honeysuckle shrubs were found in the open fields.

5.14.5.4 Erect Hedge Parsley

Erect hedge parsley (*Torilis japonica*) was introduced from Eurasia in 1917 for reasons unknown (Kendall, 2021). It is a small biennial plant with parsley or carrot-like leaves and small clusters of white flowers. The seeds of this plant have a hooked coat, which allows them to stick onto passing people or wildlife and spread to new areas. Erect hedge parsley can grow in almost any habitat, and produces up to 7000 seeds per plant, making it a threat to numerous native ecosystems. A small scarcely present population of erect hedge parsley can be found in the black walnut woodland. Hand pulling of sporadic plants can be performed between April and July before seeds start to develop and mature.

5.14.5.5 Reed Canary Grass

The Reed Canary Grass (*Phalaris arundinacea*) that has become invasive in Ontario is thought to be a Eurasian cultivar brought to Ontario as forage for cattle (Anderson 2012c). It displaces native wetland plants and can decrease biodiversity. This plant can grow in a range of habitats and spreads quickly in wetlands. It spreads by both seeds and rhizomes. This species can be shaded out through the addition of trees and shrubs to invaded areas. Mulch can also be used to suppress the growth of reed canary grass. At EKCA, reed canary grass can be found in most of the wet areas, around the wetland in the northwest corner and the creek corridors along the southern side of the property.

5.14.5.6 Cut – leaved Teasel

A perennial plant that occurs in a variety of habitats including meadows, waste areas, and roadsides. Cut-leaved Teasel (*Dipsacus laciniatus*) has high seed production and can spread and take over areas. In its first year it is a large rosette and by its second year can grow up to 2m high, shading out other meadow species (MDA, n.d.b).

It can be found in all open fields at EKCA, however its density varies from one field to another. Annual cutting of these plants can occur in the spring to damage the taproot since its full removal can be difficult (MDA, n.d.b). Alternatively, the plant responds well to annual herbicide treatment during the main growing season. Eradication can be achieved in three to five years when the seed bank is depleted.

5.14.5.7 Garlic Mustard

This species was introduced in the 1800's from Europe as an edible herb for early pioneers in the spring. It is a biennial plant that produces seed in its second year (Anderson, 2012d). It can grow in a variety of conditions making it a very good invader in a variety of habitats. It easily outcompetes other native ground cover and can change the soil environments to favour its growth over others. Garlic mustard (*Alliaria petiolata*) can be found as a ground vegetation ground under the dense hawthorn dominated thicket along the Karst Features Trail. Removal of this species is straight forward with hand picking between April and June, before the plant goes to seed. With a dedicated effort over five years removal of this species can be achieved.

5.14.5.8 White Sweet Clover

This plant can be biennial or annual depending upon the conditions and it was introduced as a forage crop and honey plant. White Sweet Clover (*Melilotus albus*) grows in disturbed areas, roadsides, and it thrives in habitats such as Prairies, Savannahs, alvars, and meadows. This being a leguminous nitrogen fixer, it adds nitrogen to the soil to a level which can makes soil unsuitable for the native species hence they are very easily outcompeted. The seeds of white sweet clover can remain viable in the soil for 80 years; therefore, restoration of the area is necessary to eliminate the potential re-invasion. Soil rehabilitation may also require in some areas to restore the nutrient balance in the soil (Anderson, 2013).

At EKCA, open fields in the southeast direction have a large population of white sweet clover. Mowing the field before the plants go to seed could help control seed production. Prescribed burn is also an option but burns stimulate the white sweet clover seeds hence helping them germinate in the following season. This could lead to increase in the size of invasion by stimulating the seed bank, although that could also be good to deplete the seed bank.

5.14.5.9 Common Milkpea

In the late 19th century, common milkpea (*Galega officianalis*) was introduced to Canada as an ornamental plant, since then, it has established as a noxious weed and has been spreading locally in southern Ontario. This plant is a member of Fabaceae family and forms symbiotic relationship with the nitrogen fixing bacteria. According to Darbyshire et al. 2022, common milkpea has been found growing in soils with pH higher than 7. There is also no adaptation for seed dispersal to longer distances and aside from anthropogenic involvement, water is the only natural dispersal method for seeds. All these factors limit the introduction of this plant into new areas and makes management of the species somewhat easier.

Open fields in the southeast side have a very large population of common milkpea. Eradication of this species require intensive integrated management. The roots of the herbicide treated plants can stay viable for up to seven years, so it may require re-treatment or uprooting. Field could also be mowed to lower the seed production, when plants are still in flowering stage (Darbyshire et al. 2022).

5.15 Natural Areas Recommendations

HCA is a supporting partner of the City of Hamilton's Biodiversity Action Plan and a supporter of the Province of Ontario Biodiversity Action Plan. One method that helps us to protect and strengthen biodiversity on our properties is the development of natural areas recommendations in our master and management plans. The natural habitat features at EKCA have been evaluated for restoration opportunities and invasive species removals. Restoration in certain areas can assist with buffering the natural habitats from the impacts of moderate to high levels of visitor use. These recommendations are best developed through the lens of biodiversity/conservation targets.

Biodiversity or conservation targets are a limited number of species or ecological communities that ecologists select to represent the biodiversity of a protected area, and that therefore serve as the focus for conservation investment. Thus, conservation targets are simply those ecosystems, communities, or species upon which we focus planning and management efforts. Because we use only a handful of targets to plan for biodiversity conservation, selecting the appropriate suite of targets is crucial to successful conservation planning and adaptive management. A coarse filter/fine filter approach looking at both broad-scale ecosystem protection and targeted, species-specific efforts was used when analyzing and describing conservation targets for Eramosa Karst Conservation Area. The open fields at EKCA provide habitat for Bobolink, a species at risk, as well as providing significant wildlife habitat for open country bird species. Meadow habitat is important for many wildlife species as well as pollinator species. These meadows need to be maintained within the urban matrix of this conservation area.

As noted in the invasive species section there are several invasive species within the meadow habitats at EKCA. Mowing, chemical treatment, and physical removals will be important as outlined in the section above to control these species. Once under control restoration should occur. Restoration of the fields after the management of the invasive species is essential to keep re-invasion in check. It is very common for the new or existing invasives to utilize open habitats to as an opportunity to re-establish in the areas where some disturbance has occurred. Sectioning off the fields and working on removals followed by restoration over five to 10 years would be the preferred method. This will ensure restoration of the site where invasive removal work was done, and the soil is vulnerable to new invasions. The restoration should use native meadow grass and forb species to create a mixed meadow. This is the habitat that supports a diverse number of bird species.

In addition, there is a field that occurs between the deciduous forest and the thicket habitat in the middle of the property that should be planted with trees. This will connect the thicket and forest and create a larger deciduous forest habitat at EKCA. This will over the course of 25 years create interior forest habitat within the property which will be beneficial for birds and other wildlife in this property. A portion of this field was planted in spring of 2025. Trees were planted using row planting equipment in partnership with

Conservation Halton as part of the Forests Canada 50 Million Trees program. Trees were spaced to allow for maintenance mowing between the rows to reduce competition from other vegetation and grasses.

5.15.1 Karst Features

The karst features throughout the conservation area are described in Section 5.1. Over the time that HCA has owned and managed the property, maintenance and restoration work has been needed at some of these features. Clean up and restoration work is needed for a variety of reasons including maintaining the hydrologic function of the karst system, restoring the features to their natural state by removing litter and debris, and maintaining the safety and aesthetic value of the features for visitors to the area. A cave cleanup project was most recently done at EKCA in 2018. This work was coordinated by HCA staff and the Hamilton Conservation Foundation, local karst expert Marcus Buck, the Friends of the Eramosa Karst (FOTEK) group and volunteers. This work took place at the Nexus Cave.

Further work to clean up and restore the karst features is recommended. Restoration is recommended at several of the caves in the south-west section of the property to remove natural obstructions such as branches, field stone and soil that have been deposited there over time, as well as litter and debris. It is recommended that HCA staff engage with professionals with a knowledge of karst landscapes to determine the details and methodology for conducting restoration work.

Conducting cleanouts at caves and sinkpoints is important in maintaining water flow through the karst features and preserving subsurface features. Maintaining flow and water quality through the Feeder Area of the ANSI into the Core Area (see Figure 2) is also important. The naturalization of the former agricultural fields has likely helped to reduce sediment load in the water and reduce contamination. Ensuring that the Feeder Area remains vegetated and planting buffers along the streams would further help to protect water quality.

It is also recommended that a supplementary cave management plan be developed for the area. For more information see Section 7.1.1.



Photo 17: Pottruff Cave

6.0 OVERALL SITE CONCEPT

This Master Plan for EKCA aims to balance the need to conserve and protect the sensitive karst environment with the need to accommodate day use visitors. EKCA contains some of the best karst features known in the province of Ontario. Some of these features are located in the 38 hectares of leased feeder lands in the Eramosa Karst Area of Natural and Scientific Interest (ANSI).

This section outlines the key concepts for EKCA that have come out of staff workshops, meetings, detailed design sessions and site inventory. Public, stakeholder, and Indigenous engagement input has also been considered in developing these concepts. See maps in Appendix 1 for more information.

6.1 Natural Areas Development

The priority of this plan is to conserve and protect the sensitive and environmentally significant natural areas of the Eramosa Karst ANSI. Accordingly, Nature Reserve and Natural Area Zones have been identified in this plan with management guidelines as noted in Section 3.6. The ecological mapping and species documented within this plan are also provided as a baseline inventory to help guide future land management decisions and project planning. See Section 5.15 for more information on the natural areas recommendations.



Photo 18: Field at Eramosa Karst

Development in the natural areas will be strictly limited by HCA, and may also be subject to review by the City of Hamilton, and the Ontario Realty Corporation in the land lease area. HCA's development focus in the natural areas will be to support the natural areas values and desired outcomes for EKCA noted in Section 3.4 for sustainability, karst diversity, and ecological integrity. Naturalization of the former agricultural lands is recommended as a priority item, with action taken annually on invasive species control, tree planting, meadow restoration and stewardship to move this forward.

Site monitoring, annual maintenance, restoration programs, and ongoing visitor education will also be necessary to support these initiatives' goals.

6.2 Conservation Area Development

The priority of this plan is the continued operation of the conservation area to provide the public with access to high quality visitor amenities for passive recreation, nature appreciation, and education. As noted in Section 3.4, key values and desired outcomes will be to support visitor satisfaction, cultural

heritage appreciation, education, and aesthetics. The main development focus will be to improve upon the existing visitor amenities including the main entrance, parking area, washrooms, trailhead orientation, picnic area, trail wayfinding and the recreational trails on site. The secondary development focus will be to improve upon site security, maintenance and equipment access for HCA site operations and ongoing natural areas restoration programs. Maintenance and equipment access will also be required for the wetland enhancements in the north-west corner of the conservation area.

6.3 Day Use Activity Areas

EKCA's day use activity areas include the visitor main entrance and parking area, recreational trail system, access to the East Mountain Trail Loop, and viewing of the karst features. Amenities to be provided with the recreational trail system are to include improved trailhead kiosks and map boards, trail wayfinding signage, educational interpretive signage, and rest areas.

Passive recreation will continue to be the focus for nature appreciation, hiking, dog-walking, and cycling. The public washrooms, structures, and site furnishings at the parking area are to be maintained and repaired as required for the life of this plan. It is not anticipated that major capital items such as the buildings and structures will need to be replaced in the life of this plan.

The area known as the amphitheatre is located about 300m south of the parking lot along the trail loop. The location can be seen on Map 3 in Appendix 1. The area is defined by exposed bedrock creating a "wall" around a lower, roughly circular area. The area feels like a natural gathering space and was identified in the 2007 EKCA Master Plan: "The Amphitheatre area will include lengths of stone or timber seats may be added for an audience and perhaps a large stone lectern for presentations." This vision has not yet been implemented at EKCA. The amphitheatre space should be reviewed and formalized as a gathering space for visitors and groups. The space could be designed as an outdoor classroom, and would support the educational value of the conservation area. Some clean up of branches, addition of natural seating elements, opportunities for woodland planting and educational signage should be explored.

Visitor education on permitted activities will need to be provided and enforced to help conserve the natural areas and protect the karst features such as the caves. Some areas of the property may need to be restricted from cycling and unauthorized footpaths blocked and the site rehabilitated. Monitoring of areas restricted for rehabilitation or protection will need to be implemented as needed to ensure that efforts are successful. Cycling is also not recommended on any seasonally flooded trails, and dogs are to be kept on leash.

6.4 Marketing

There are marketing and communications activities for EKCA provided by HCA including promotion through print, the HCA website, and on various social media platforms and mobile trail wayfinding applications.

During public engagement for this plan, a visitor survey was conducted to gather information on the conservation area and feeder lands. From May 18 to October 16, 2023, 82 surveys were submitted by the

public. A summary of survey comments is noted in Appendix 4. The survey information will be reviewed by HCA staff when preparing marketing materials for EKCA.

Key marketing items from the surveys and staff workshops to be addressed in the lifespan of this Master Plan include the following:

- Providing self-guided tours by means of interpretive applications and signage, and wayfinding signage.
- Helping to connect people to nature by promoting EKCA’s recreational amenities.
- Providing information on the importance of protecting natural spaces and significant landscapes.
- Promoting the educational value of EKCA as a place to view and learn about provincially significant karst features.



Photo 19: Amphitheatre gathering space

7.0 CONSERVATION AREA MANAGEMENT

7.1 Land and Water Management

Land management planning will be accomplished through adherence to the guidelines of the management zones noted in this plan, and through additional resource management plans developed by HCA as necessary. The overall intent will be to ensure protection and conservation of the significant karst features and natural areas noted as Nature Reserve and Natural Zones on the Conservation Area Zones Map in Appendix 1.

The ecological mapping and species data documented within this plan are provided as a baseline inventory to help guide future land management decisions and project planning. Occasionally, active management may be required for a particular species. This will be accomplished through an HCA approved resource management strategy considering the guidelines outlined in this plan, and in accordance with policies of all governing agencies.

No new trail development is proposed that could adversely affect water resources. Should installation or replacement of culverts, bridges and boardwalk features for water crossings be required, HCA will adhere to federal, provincial and local policies and regulations and any proposed project will be reviewed internally by HCA Ecologists.

7.1.1 Cave and Karst Feature Management

It is recommended that a supplementary Cave Management Plan be developed for Eramosa Karst to provide a framework for managing and protecting the cave features within the conservation area. This cave management plan should examine cave access and safety, research and monitoring, and preservation and protection. The karst features at EKCA are easily accessible to the public visiting the property, therefore guidelines to allow safe access for people visiting the caves for recreational, research and maintenance purposes should be considered.

7.1.2 Public Infrastructure – Utilities, Trails and Transportation

Public infrastructure such as utility corridors (watermains, storm and sanitary sewers, natural gas or oil pipelines, hydro and communication corridors), trails (footpaths, boardwalks) and transportation links may cross conservation area lands.

These uses may also have associated rights-of-way, land use agreements, licenses of occupation, permits etc. that are to be considered in the management of the ecological preserve and when implementing items from this management plan.

When new public infrastructure projects are proposed within conservation area owned lands, such uses will be subject, but not limited to, the following criteria:

- The need for the project, area of construction disturbance, and potential site disruption such as soil erosion, flooding, and vegetation loss.

- To maintain or where possible improve or restore key ecological linkages, habitat, and wildlife movement corridors.
- The potential public benefits of the project for research, education, or recreation.

HCA may require detailed environmental assessments, studies, and resource management plans in order to support such land uses.

7.2 Vegetation Management

Forests will be managed in accordance with the MNR approved HCA Managed Forest Plan 2018 - 2037. Forest plantations and treed areas will also be managed to remove hazard trees and fallen logs in areas of public use such as recreational trails and picnic areas. Where there is no threat to the public, snag trees and fallen logs will be left in place as important habitat features. Forest management is to be carried out with generally accepted sustainable forestry practices.

Invasive species are in the conservation area and HCA places a high priority on invasive species management to maintain biodiversity and conservation values. See Section 5.14.5 for more information on invasive species vegetation management.

EKCA has large and established Common Buckthorn thickets, which are slowly growing into the forests, meadows and black walnut woodland communities. Removal efforts should be focused on these edge communities as management is still possible. Many of the Common Buckthorn are small and manual removal along with some chemical removal would result in a large reduction in the expansion of this species.

All the open fields at Eramosa Karst CA have significant population of Cut-leaf teasel, white sweet clover and common milkpea. For eradication of the cut-leaf teasel, 3-5-year restoration plan should be developed to deplete the seed bank and reintroduce native species. Fields on the southeastern side of the property have white sweet clover and common milkpea along with other non-native grass species. These can be mowed to keep these species in check but timing the mowing with seed production of sweet clover and common milkpea will be the key. The white sweet clover flowers between June to October and seed formation starts in October. Milkpea starts flowering in late June and seeds start forming from early July to September. Flowering and seeding in both species can vary with the respective region's growing season. Mowing should be timed when the flowers are just going to seed but before the seeds mature. The plants have then exhausted their energy reserves for flower production and would not have enough energy or time to grow more flowers. Mowing must also be timed with the breeding bird timing window. Accurate timing will be difficult. To avoid the breeding bird timing window and mow before seeding, the fields should be mown in mid-August. This should be followed by chemical treatment after a few weeks of regrowth. Chemical treatment can also be done in the spring when the plants start re-sprouting from the tap roots or seed germination.

There are two very small populations of phragmites in the northwestern side of the property. One is near the washroom building and the other is in the wetland along the Highland Road West. They both can be managed on priority basis to eliminate any chance of further spread. Phragmites in the southeast side of the property, which are larger populations, are being managed (2021) and management should be continued in the coming years.

Additional non-native plant species will not be deliberately introduced into the conservation area. Introduction of any new plant species by HCA will consider the biodiversity of this site, historical data of species present in the area, research, and additional relevant species inventories and contiguous surroundings within an approved restoration and stewardship strategy. In this plan “non-native” means species not native to Ontario as well as species native to Ontario but not to Hamilton. If established non-native plant species threaten natural heritage values, a program for their eradication will be developed subject to specific guidelines noted in the natural heritage inventory of this plan.

Vegetation may be mowed only:

- Along the conservation area boundary, where mowing would assist in clearer boundary identification.
- In the development zone of this Master Plan to support public usage of the open space, and only to the extent necessary.
- As required along roadways and recreational trails for safety.
- To assist in the control of invasive species, trees and brush may be cut and pruned only.
- To enable resource management or facility development specifically authorized by this Master Plan or an HCA approved resource management or other implementation plan.
- To ensure public safety.
- In service easements i.e., Utility corridors, subject to specific service agreements.

The eastern fields should be mown in rotation every 3-5 years to maintain them as field habitat for Bobolink. There are at least three pairs of Bobolink and other open country bird species that use these fields for breeding. This is important habitat for this species. The mowing plan should follow the timing windows indicated for breeding birds and invasive species management.

Trees may not be cut for the sole purpose of providing firewood. Trees and brush cut in nature reserve and natural zones outside of forest plantations will be left to deteriorate naturally as close as possible to where they have been felled, or if that is not feasible, may be used for firewood or wood chips in the conservation area.

Native insects and diseases affecting vegetation will be allowed to progress naturally, except where they threaten significant natural heritage values in nature reserve and natural zones, or significant aesthetic and infrastructure values in development zones. Non-native insects and diseases will be controlled where feasible. Where controls are undertaken, it will be directed as narrowly as possible to the specific insect or disease so as to have minimal effects on the surrounding environment. Biological controls will be used whenever possible.

Chemical fertilizers, herbicides, pesticides and suppressants will not be used for any vegetation management purpose except:

- Insect and disease control under the conditions set out in this section of the Master Plan.
- Eradication of non-native species where it has been demonstrated other methods are not feasible.
- Control of poison ivy in development zones.

7.3 Fish and Wildlife Management

Where applicable on the Conservation Area property, fisheries management will seek to maintain and enhance native, self-sustaining fish populations. Fishing is regulated through the Ontario Fishery Regulations under the Federal Fisheries Act. If necessary, fishing may not be permitted in certain areas of the property due to fisheries or wildlife research, or habitat and natural areas management.

The small number of fish species present are under great pressures from the ecosystem conditions, and their numbers are small. Commercial or recreational fishery/harvest is not recommended on these CA lands. Further assessment of the aquatic areas is recommended as noted in Section 5.12.

In order to protect populations, the harvest of flora and fauna is generally not allowed within EKCA, with an exception for research purposes (see Section 7.7). The HCA acknowledges that Indigenous peoples in Canada reserve the right to hunt, fish and harvest for medicinal, cultural or sustenance purposes, and ongoing discussions will continue with local Indigenous partners.

For wildlife/human conflict HCA has developed the Hamilton Conservation Authority Wildlife Conflict Management Strategy. This strategy outlines the process and methods staff are to follow when dealing with any animal related issues within all conservation areas. This document was produced by the Hamilton Conservation Authority Wildlife Management Committee (WMC). The WMC was a special HCA committee that was established in May 2014 based on HCA staff recommendation and at the direction of the HCA Board of Directors. The purpose of the WMC was to develop best management protocols and practices for the management of wildlife on HCA lands.

Additional non-native animal species will not be deliberately introduced to the conservation area. If already established non-native species threaten the conservation area values, a program for their eradication may be developed if feasible and practical. Missing native species may be reintroduced, and existing populations replenished if feasible and acceptable to HCA.

7.4 Cultural Heritage Management

The Cultural Heritage Zone set out in this plan is shown on Map 2 Conservation Area Zones in Appendix 1. Incompatible resource uses and recreational activities will be restricted or prohibited where necessary to protect cultural heritage resources in this zone. The foundations remaining at the Pottruff site in this zone should be reviewed for public safety. A review of the site should be done to determine appropriate maintenance, repair or restoration programs for this area. The Pottruff site is discussed in more detail in Section 4.6 Cultural Heritage.

Capital projects recommended within a Cultural Heritage Zone will require approval by the HCA Board of Directors, and may require approval from the City of Hamilton.

Archaeological studies have been completed for this conservation area. See Section 4.6 for more information.

Management strategies for any archaeological sites found in the future may range from allowing the sites to remain without interference, to research, excavation, and rehabilitation. Archaeological and historical artifacts may only be removed, and heritage landscapes altered, in accordance with all applicable legislation. Protection and management will be undertaken in consultation with First Nations and governing agencies.



Photo 20: Remaining foundations at the Pottruff site.

7.5 Conservation Area Operations

HCA will review the operation plan for these lands annually and update as required. HCA will provide staff with information and resources as required to operate the conservation area on a day-to-day basis. This will include specific direction for the management and operation of all facilities and activities and address such topics as budgets, staffing, maintenance, enforcement and emergency services.

Self-serve facilities may be developed, and individual volunteers and partner organizations may be involved in programs as approved by the HCA, within the conservation area.

The HCA has the right to suspend operations of any facilities or services due to funding limitations, but in so doing will ensure that heritage values are not impaired and customer service standards are affected as little as possible.

New business practices may be introduced into the conservation area operations in accordance with HCA policy such as:

- Improving operating efficiency and controlling costs.
- Contracting out some operating functions.
- Improving customer service standards.

7.6 Education

Education in the conservation area is intended to develop visitors' awareness and appreciation of Ontario's natural and cultural heritage, fostering a commitment to protect that heritage for all generations. Education opportunities are meant to be educational and recreational, formal and informal, and accessible to all. Information, education, and outdoor recreation are the three main components of education in the conservation area. The level of service provided at EKCA will be determined by its significance and visitation. A priority will be placed on providing natural areas education in support of the goals and objectives outlined in this plan.

7.7 Research

EKCA, like all of HCA's properties, provide in essence an opportunity for living laboratories. HCA Ecologists monitor the health of lands using established protocols and can, when needed, develop special research programs to answer resource related questions.

Outside Research by qualified individuals that contributes to the knowledge of natural and cultural history and to environmental and recreational management will be encouraged by HCA staff.

All research projects will require authorization from HCA and authorization is obtained by contacting the staff ecologists who administer the process and issue research authorizations.

7.8 Recreation

The conservation area is open from sunrise to sunset, year-round. Entry to EKCA will be controlled year-round and HCA will enforce the collection of entrance fees from visitors. Day use parking spaces are provided on a first come, first serve basis and visitors may be restricted from entering the conservation area when the parking areas are full.

See Appendix 4 for highlights of key items from the visitor surveys for EKCA.

The following recreational activities will not be permitted in the conservation area:

- All-terrain vehicle use
- Motor bikes on trails
- Snowmobiling
- Personal unmanned aerial vehicle (UAV / Drone)
- Personal watercraft (fishing boats, canoes, kayaks, SUPS) in the watercourses and wetlands.
- Fires in the day use area are not permitted.
- Hiking and cycling off of the HCA maintained trail system



Photo 21: Family walking a trail at Eramosa Karst

The following recreational activities are permitted in the conservation area:

- Hiking
- Cycling (with restrictions on e-bikes noted below)
- Dog Walking
- Picnicking
- Nature Appreciation
- Geocaching

- Snowshoeing
- Cross Country Skiing

For power-assisted bicycles, HCA follows the provincial regulations for pedal-assist electric bikes that look and operate like a bicycle with an electric motor that provides additional assistance. An e-bike that is designed to be propelled primarily by muscular power and to travel on two or three wheels, operating at speeds less than 30km/hr are permitted on bike trails owned and maintained by HCA. E-bikes that meet provincial requirements are allowed on roads and highways where conventional bicycles are currently permitted. The regulations also permit exceptions where e-bikes may not be used including municipal roads and sidewalks where bicycles are banned under municipal bylaws, bike paths, bike trails, or bike lanes. Currently e-bikes that could be described as a scooter-like vehicle that is not designed to be propelled primarily by muscular power are not permitted on HCA recreational trails. These types of vehicles are typically heavier and have more mass than typical bicycles, are operated like a low-speed motorcycle rather than pedaled, and are capable of speeds greater than 30km/hr. It is recommended that HCA further review e-bike use and permissions with the City of Hamilton should e-bike use be found to be causing concerns for public safety of trail users, or conflicts between trail users in the community on HCA trails.

A long-term goal of this Master Plan is to provide visitors with appropriate, high quality, sustainable recreational experiences. Recreational opportunities are to be provided that are appropriate to the conservation area and Master Plan zones outlined in Section 3.6.

7.9 Partnerships

HCA values the community support from area residents and landowners, businesses, service clubs, interested First Nations, volunteers, and volunteer organizations that currently or could contribute in a variety of ways at EKCA. HCA will continue to nurture existing support and will seek out new opportunities for partnerships. Support provided by the Friends of the Eramosa Karst (FOTEK), the Hamilton Conservation Foundation, and the Heritage Green Community Trust is recognized and appreciated. HCA values these partnerships to raise awareness, funds and resources for the important work of HCA at EKCA.

HCA recognizes in particular the importance of the friends' group, FOTEK, in the establishment and development of this conservation area. Prior to 2007, a citizen advisory committee initiated by the City of Hamilton was assembled to review development plans for this area of the city. It was at that time the idea of expanding the EKCA to include the adjacent feeder lands was born. In October 2007, the Friends of the Eramosa Karst (FOTEK) was formed by interested citizens.

FOTEK's mission was to engage the public and lobby the Provincial Government to preserve these lands. Between 2007 and 2012 they were involved in citizen engagement activities including hosting public educational events, guided hikes, fundraising, presentations to partner groups, cave clean-ups, and more. With the successful attainment of the feeder land lease in 2012, FOTEK's activities transitioned to community education, and project assistance to HCA for the trail system and management of the natural areas. FOTEK is a valued partner that has helped support and secure funding, and provided hand-on volunteer assistance to conservation and preservation projects at EKCA.

HCA values community relationships and help from volunteers to manage natural areas and the species that utilize and inhabit them. HCA Stewardship Action Plans, public consultation, and stewardship work are examples of this and are to be encouraged for the life of this Master Plan.

Volunteers are governed by volunteer policies set by HCA for recruitment, orientation, training, supervision, health and safety instruction, evaluation and recognition. Volunteer programs shall be considered in all business decisions made by HCA in the operation of this conservation area.



Photo 22: Friends of the Eramosa Karst recognition rock

Adjacent private property owners and neighbouring communities play a role in protecting and enhancing the natural areas at EKCA by supporting biodiversity, managing invasive species on their lands, and undertaking conservation projects on their neighbouring properties that enhance wildlife habitat or water quality. Property owners interested in environmental stewardship are encouraged to reach out to Hamilton Watershed Stewardship Program staff.

In 2025, HCA partnered with Conservation Halton to participate in the Forests Canada 50 Million Trees program. This program provides funding to landowners to implement large-scale tree planting with the goal of increasing forest cover. A portion of an interior field was planted in rows using Conservation Halton's equipment and staff. HCA will pursue this partnership opportunity in upcoming years to undertake tree planting through the rest of the field.

7.10 Paid Staff

EKCA, similar to staffing at other conservation areas, includes full time permanent employees and part time casual employees to undertake its operations.

In addition, staff from other departments at HCA are involved in varying capacities with the management and operation of EKCA. Staff may also be involved in supervising the activities of outside consultants, partners, or contractors retained by HCA.

A supplemental operation plan is recommended to be developed for EKCA by HCA staff once this Master Plan is adopted.

8.0 FINANCIAL

8.1 Attendance and Revenue Forecasts

Supporting information on visitor attendance, visitor surveys and operating revenue and expenses for EKCA are included in Appendices 3, 4 and 5.

Four trail counters were active in the conservation area during the peak season from May to October 2023. These counters provide an insight on visitor attendance at the main parking lot and key points in the trail system. A total of 58,024 counts were taken between the four trail counters through the peak season. A summary of the data collected from the trail counters is included in Appendix 5.

Trail counters were located along the trails approaching both the south and north ends of the parking lot. The trail on the north side is a portion of the East Mountain Trail Loop. The third counter was located at a trail intersection near the Highland Road and Richdale Drive pedestrian access points. The fourth counter was located just inside the Second Road West pedestrian access point. The counts on the trails near the parking lot were significantly higher than those at the east end of the conservation area.

8.2 Capital Projects

The capital development priorities list in Appendix 2 provides preliminary estimates for the development envisioned in the Master Plan. As noted in Section 3.7, 5.15 and 6.0, the following capital development priorities are proposed for the next ten years at EKCA:

8.2.1 Enhance Natural Areas

These capital projects are proposed to enhance the natural environment and habitat features within the conservation area:

- Plant trees and shrubs in the central portion of the property to fill in the gap between the Dry-Fresh Sugar Maple Deciduous Forest (eastern portion) and the buckthorn-hawthorn thicket as shown on the ELC Map in Appendix 1.
- Improve perimeter vegetated buffers and continue outreach with neighbours to reduce encroachment.
- Conduct clean up and restoration work at karst features as needed to preserve the function of caves and sinks in collaboration with karst professionals.

8.2.2 Replace Significant Features

These features require ongoing repairs for public safety, are nearing or past the end of their life cycle, and are proposed to be replaced or expanded upon.

- Work with the City to update the East Mountain Trail Loop asphalt trail section as it nears the end of its life-cycle.
- Replace aging interpretive signage around the pavilion and along the trails.
- Replace aging site furnishings and interpretive signs around the main visitor entrance.

8.2.3 Add New Features

These capital projects are proposed to serve the community, generate revenue, and improve customer service.

- Add a pedestrian trail connection at the parking lot entrance to connect the city sidewalk with the East Mountain Trail Loop to improve walk-in and cycling access.
- Provide educational interpretive information throughout the conservation area covering a range of significant topics.
- Add rest areas along the trail system with site furnishings (benches, bike racks).

8.2.4 Enhance Existing Features

These capital projects are proposed to enhance existing features to improve the visitor experience and natural areas.

- Review the amphitheatre area in more detail to see how this could be made into an interpretive or gathering area for visitors or educational groups.
- Improve the surfacing of the gravel trails as needed.
- Address seasonally wet areas in the mown grass trails with gravel, culverts or bridges as needed.
- Improve the service access off of Richdale Drive.

8.3 Funding Sources

Funding for the initial development of the conservation area was a target 50th Anniversary project of the Hamilton Conservation Foundation. Key donors for the formation of EKCA include: The Province of Ontario/Ontario Realty Corporation contributing 1.5 million; The Heritage Green Community Trust contributing \$750,000 for conservation area development, as well as an additional \$750,000 as an endowment to sustain operations and programming; the Friends of the Eramosa Karst also contributed both financially and in-kind through planting events; and numerous individual and corporate donors who submitted donations to the Hamilton Conservation Foundation. The conservation area development was implemented in 2007 and 2008 to accommodate a grand opening celebration in 2008 as part of the HCA's 50th Anniversary. The donor boards currently in the conservation area will need to be refreshed and updated by HCA. There is a stone plaque recognizing the Heritage Green Community Trust that will remain near the main parking area and maintained by HCA.

Currently HCA's operation of EKCA is primarily self-funded. User and membership fees generated by the properties in the East Mountain business unit are anticipated to be the primary funding source for operations. Revenue anticipated to be generated through gate admissions (gate and pre-sold tickets), vehicle passes, and miscellaneous items is outlined in Appendix 3.

Permitted special events and programs may provide a source of additional revenue. These potential revenue sources may require outside agency approval and permits to proceed, and are to be weighed against the disruption to the daily activities and revenue generation in the conservation area.

Funding for Capital Projects comes mainly from capital block funding from the City of Hamilton. Financing for special projects and some capital development will continue to be provided as needed through grants, sponsorship, corporate donations, and private donations. The Hamilton Conservation Foundation also provides funding for specific projects and oversees the tribute/memorial bench program the supplies additional benches to HCA conservation areas. There is good potential for increasing donor funding, donor recognition is also a key element that needs to be nurtured and sustained.

8.4 Business Model

HCA receives a levy from the City of Hamilton and also the Township of Puslinch that forms part of the operating budget. The remainder of the budget is funded through self-generated revenue which includes user fees, membership fees, grants and donations. These dollars directly contribute to conservation work throughout HCA’s watershed and preserve heritage sites on HCA lands. Financial statements are audited annually and available to the public once approved by HCA’s Board of Directors.

Cost recovery is a prime requirement for all services and programs delivered at EKCA. In the development of programs, the following factors will be considered: anticipated attendance, income sources, market, volunteer resources, HCA staffing requirements, advertising, insurance, administration, operation costs and maintenance expenses.



Photo 23: Trail at Eramosa Karst on a foggy autumn day

9.0 PROGRAMMING

9.1 Special Events and Programming

Eramosa Karst Conservation Area may be used as a filming location, and filming on site will continue to be supported by HCA with strict procedures so the integrity of the site is not sacrificed.

The Development Zone outlined in this Master Plan offers HCA opportunities to provide visitors with access to approved recreational events using the trail system. These uses are to be explored further by HCA for the site on a case by case basis moving forward.

A limited number of site restoration events, education, and interpretation programs are offered as staff time and resources allow. HCA also supports partnerships with outside agencies for educational programs. Education programs are an opportunity to reach new visitors. Outdoor and nature focused programs at EKCA may range from individual activities, to educational demonstrations, workshops, self-guided hikes and more.

9.2 Education and Interpretive Programs

Education and interpretive programs are an opportunity to attract new visitors and provide variety for repeat visitors. Opportunities range from self-guided tours with interpretive signs and mobile applications along the trail system, to hands-on activities, educational demonstrations, workshops, and more.

HCA is developing a guided hike mobile application that will be implemented at EKCA during the life of this plan. The app will be available for public use in fall of 2025. This app will have interpretive text and audio georeferenced to different features in the conservation area. Visitors will be able to use the application's map to explore the area and learn about natural and cultural features at their leisure.

Some potential themes that could be explored include:

- Karst Landscapes
- Local History
- Indigenous Perspectives, History and Connections with the Land
- Role of Conservation Authorities
- Watershed Stewardship
- Climate Change
- Habitat Types at EKCA
- Invasive Species
- Wildlife and Species at Risk

All programs should relate to HCA's strategic value of providing outdoor learning experiences, and increasing knowledge and awareness of the value of our environment and heritage.

10.0 SUMMARY

Eramosa Karst Conservation Area is a unique, passive day-use area with ecologically significant karst landscapes that provides an opportunity for visitors to spend time in nature. This large natural space is surrounded by a continually developing urban and residential landscape. The overall intent of this master plan is to ensure protection and conservation of the karst features and natural areas while creating accessible visitor opportunities for recreation, nature appreciation, and education.

This master plan recommends projects to improve and protect the natural areas on the properties. This includes managing invasive species on the property, planting native species where invasive species have been removed and to improve habitat, and maintaining the open field habitat on the property that is home to a variety of bird species. The karst features will continue to be monitored and protected.

Some capital work will need to be completed over the life of this plan. See Section 8.2 and Appendices 2 and 3 for more information. Improvements to the day-use areas such as trail surfacing, new rest areas with benches, and interpretive signage will improve the visitor experience. The wayfinding signage system has been recently updated and installed in 2024. The interesting natural and cultural features at EKCA create a great opportunity to engage and educate visitors to the area. Interpretive opportunities such as signs and self guided tours, as well as outreach and partnerships with institutions and communities are highly encouraged.



Photo 24: Bloodroot (*Sanguinaria canadensis*)

11.0 APPENDIX CONTENTS

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| APPENDIX 1 | Mapping |
| APPENDIX 2 | Capital Development Priorities |
| APPENDIX 3 | Operating Revenue and Expenses |
| APPENDIX 4 | Public Survey Results Summary |
| APPENDIX 5 | Trail Counter Data |
| APPENDIX 6 | Natural Inventory – Species Lists |
| APPENDIX 7 | References |

Appendix 1 – Mapping

Map 1 – Ecological Land Classification

Map 2 – Master Plan Zones

Map 3 – Site Concept

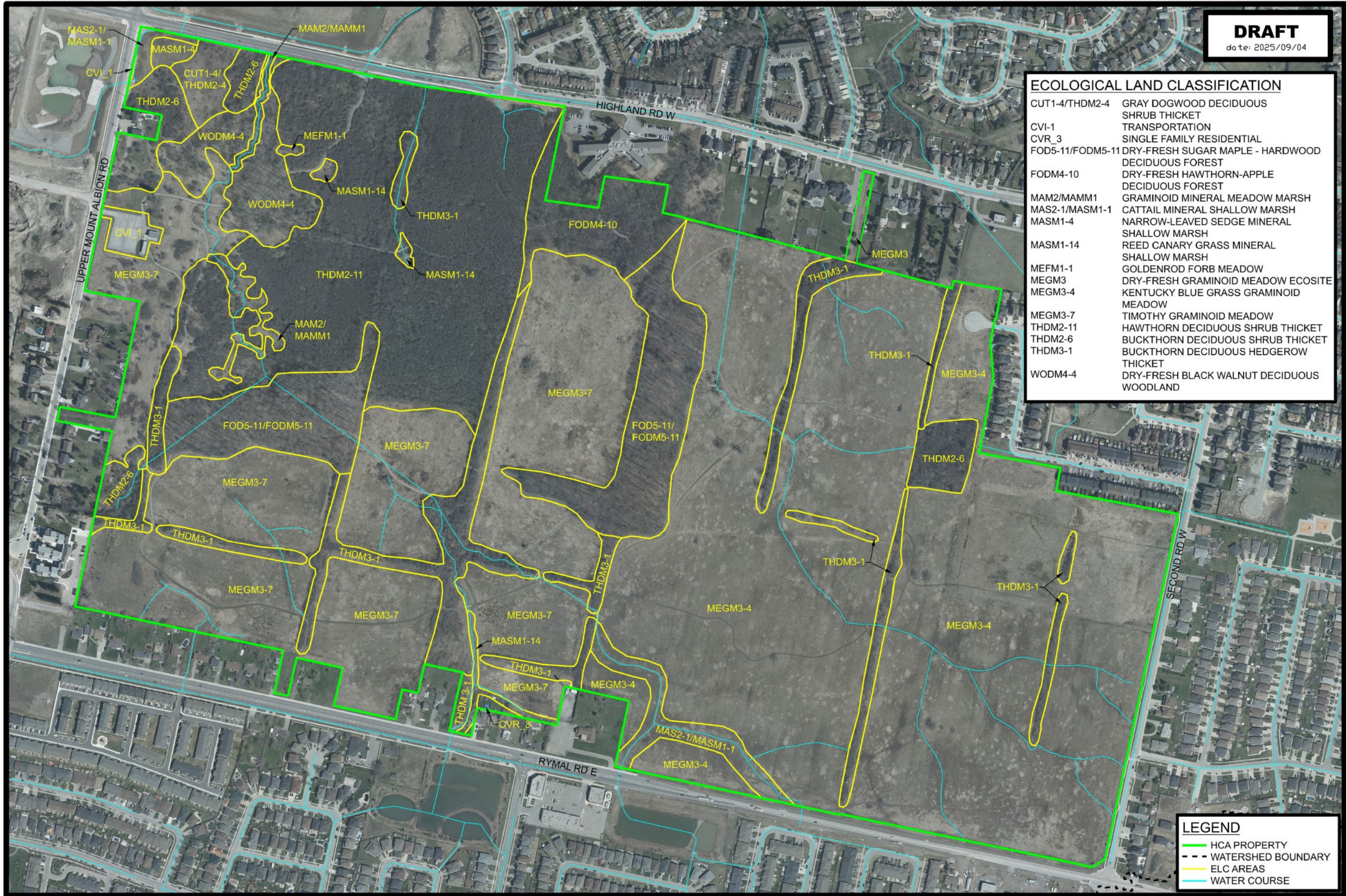
Map 4 – Trails Master Plan

DRAFT
date: 2025/09/04



DATE: 2025/09/04

| ECOLOGICAL LAND CLASSIFICATION | |
|--------------------------------|---|
| CUT1-4/THDM2-4 | GRAY DOGWOOD DECIDUOUS SHRUB THICKET |
| CVI-1 | TRANSPORTATION |
| CVR_3 | SINGLE FAMILY RESIDENTIAL |
| FOD5-11/FODM5-11 | DRY-FRESH SUGAR MAPLE - HARDWOOD DECIDUOUS FOREST |
| FODM4-10 | DRY-FRESH HAWTHORN-APPLE DECIDUOUS FOREST |
| MAM2/MAMM1 | GRAMINOID MINERAL MEADOW MARSH |
| MAS2-1/MASM1-1 | CATTAIL MINERAL SHALLOW MARSH |
| MASM1-4 | NARROW-LEAVED SEDGE MINERAL SHALLOW MARSH |
| MASM1-14 | REED CANARY GRASS MINERAL SHALLOW MARSH |
| MEFM1-1 | GOLDENROD FORB MEADOW |
| MEGM3 | DRY-FRESH GRAMINOID MEADOW ECOSITE |
| MEGM3-4 | KENTUCKY BLUE GRASS GRAMINOID MEADOW |
| MEGM3-7 | TIMOTHY GRAMINOID MEADOW |
| THDM2-11 | HAWTHORN DECIDUOUS SHRUB THICKET |
| THDM2-6 | BUCKTHORN DECIDUOUS SHRUB THICKET |
| THDM3-1 | BUCKTHORN DECIDUOUS HEDGEROW THICKET |
| WODM4-4 | DRY-FRESH BLACK WALNUT DECIDUOUS WOODLAND |



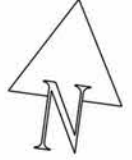
**ECOLOGICAL LAND CLASSIFICATION
ERAMOSA KARST C.A. MASTER PLAN**



| LEGEND | |
|--------|--------------------|
| | HCA PROPERTY |
| | WATERSHED BOUNDARY |
| | ELC AREAS |
| | WATER COURSE |



DRAFT
date: 2024/01/23



CONSERVATION AREA ZONES
ZONES FOLLOW CRITERIA SET OUT IN THE NIAGARA ESCARPMENT PLAN AND NIAGARA PARKS AND OPEN SPACE (NEPOSS) PLANNING MANUAL.

- A ACCESS
- D DEVELOPMENT
- N NATURAL
- NR NATURE RESERVE
- RM RESOURCE MANAGEMENT
- CH CULTURAL HERITAGE

**CONSERVATION AREA ZONES
ERAMOSA KARST C.A. MASTER PLAN**

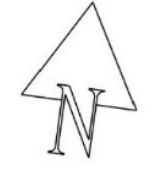
DATE: 2024/01/23

LEGEND

- HCA PROPERTY
- WATERSHED BOUNDARY
- WATER COURSE



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date: 2025/09/04

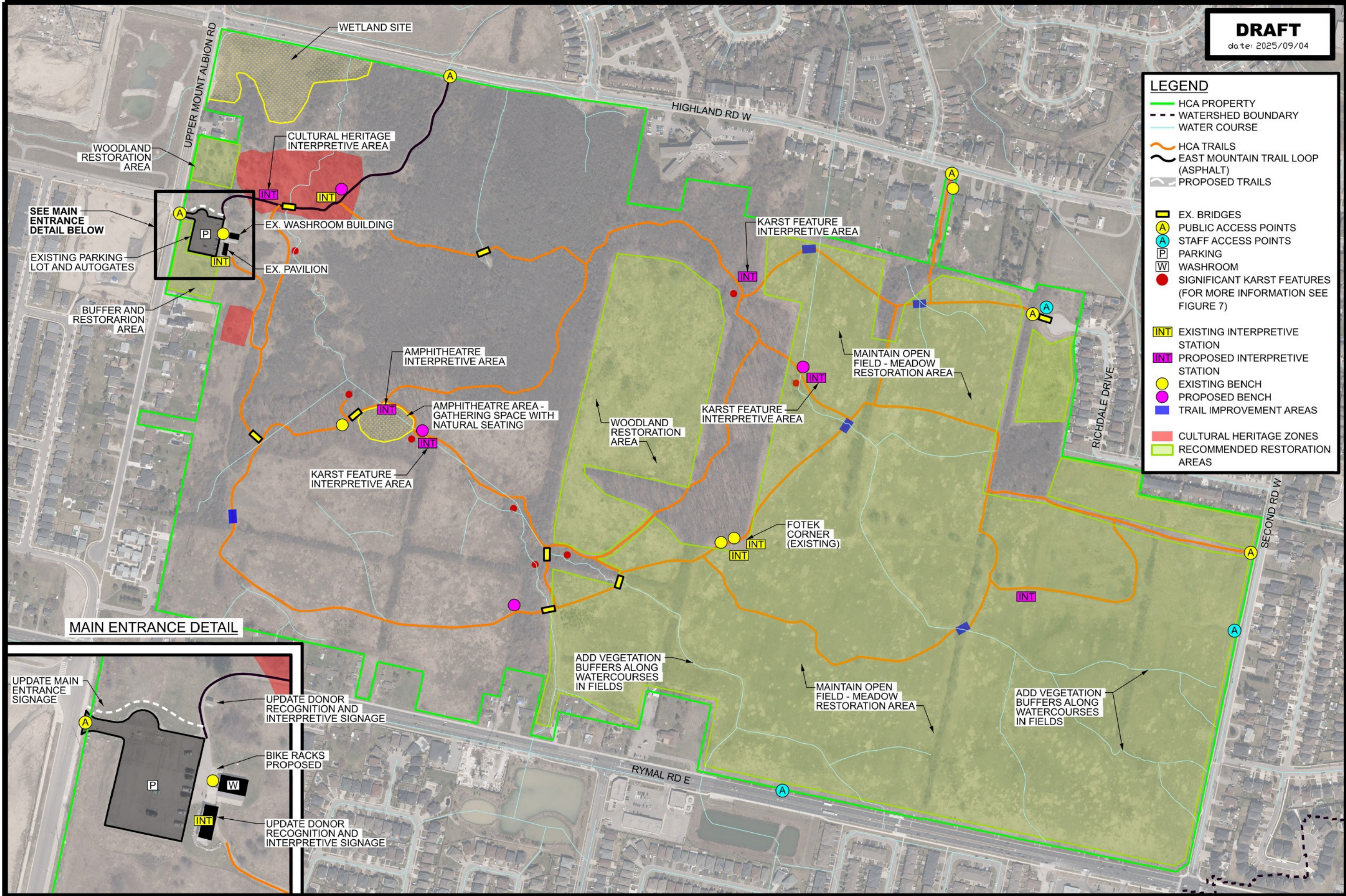


LEGEND

- HCA PROPERTY
- WATERSHED BOUNDARY
- WATER COURSE
- HCA TRAILS
- EAST MOUNTAIN TRAIL LOOP (ASPHALT)
- PROPOSED TRAILS

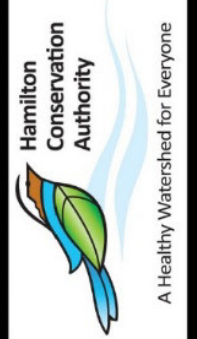
- EX. BRIDGES
- PUBLIC ACCESS POINTS
- STAFF ACCESS POINTS
- PARKING
- WASHROOM
- SIGNIFICANT KARST FEATURES (FOR MORE INFORMATION SEE FIGURE 7)

- INT EXISTING INTERPRETIVE STATION
- INT PROPOSED INTERPRETIVE STATION
- EXISTING BENCH
- PROPOSED BENCH
- TRAIL IMPROVEMENT AREAS
- CULTURAL HERITAGE ZONES
- RECOMMENDED RESTORATION AREAS



SITE CONCEPT
ERAMOSA KARST C.A. MASTER PLAN

DATE: 2025/09/04

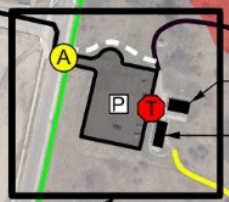
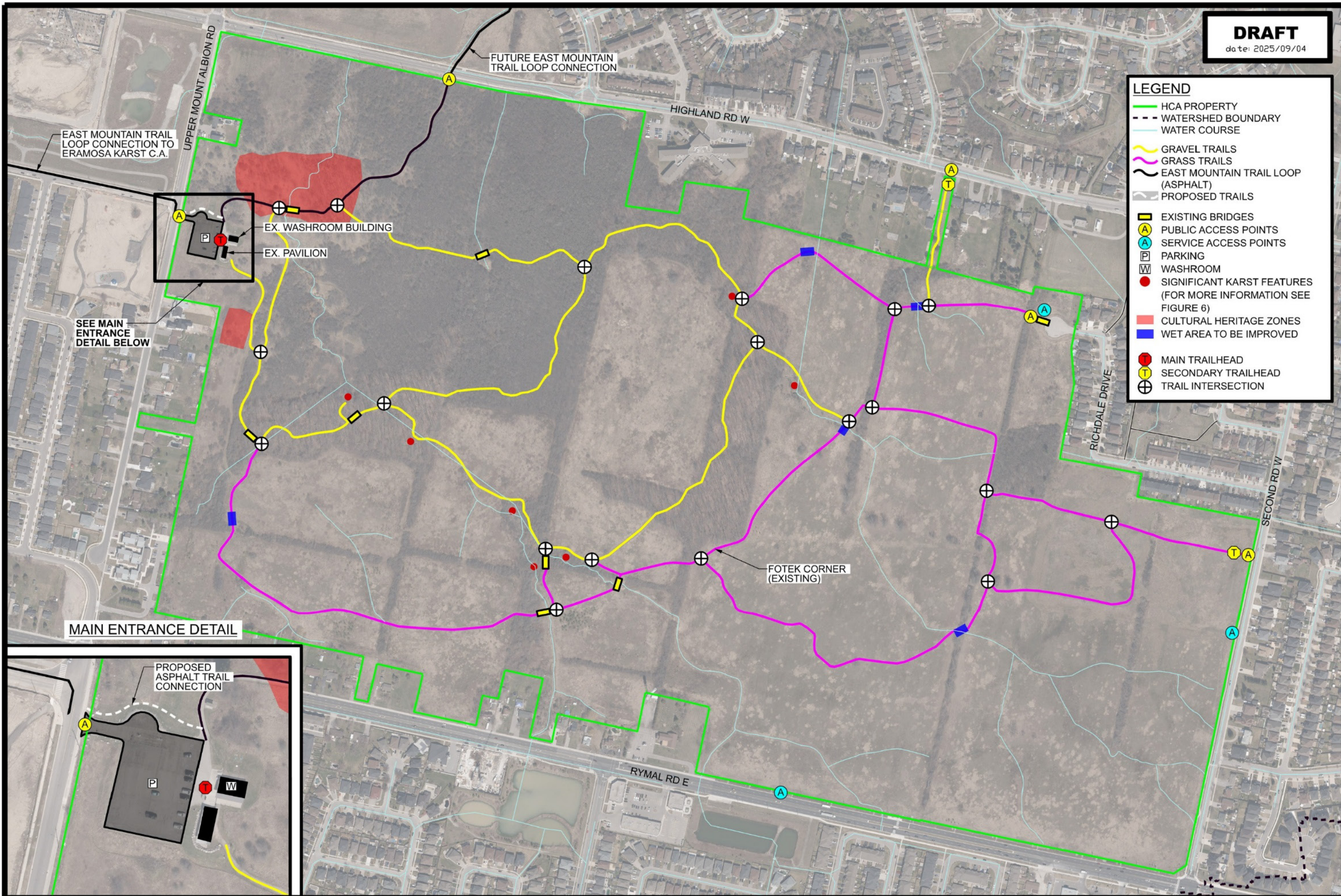


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date: 2025/09/04



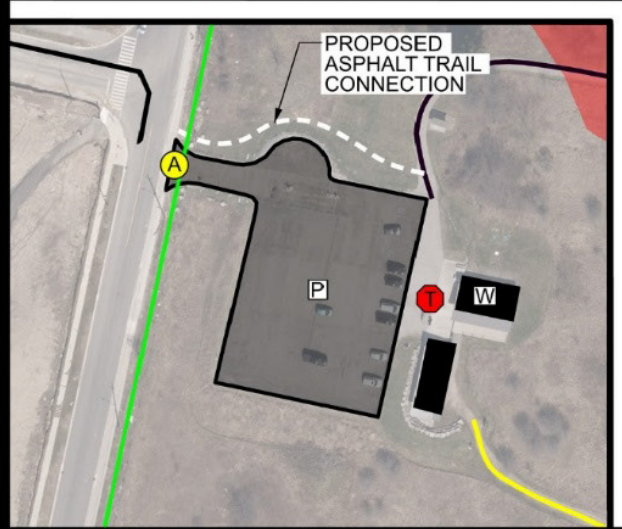
LEGEND

- HCA PROPERTY
- - - WATERSHED BOUNDARY
- WATER COURSE
- GRAVEL TRAILS
- GRASS TRAILS
- EAST MOUNTAIN TRAIL LOOP (ASPHALT)
- PROPOSED TRAILS
- EXISTING BRIDGES
- A PUBLIC ACCESS POINTS
- A SERVICE ACCESS POINTS
- P PARKING
- W WASHROOM
- SIGNIFICANT KARST FEATURES (FOR MORE INFORMATION SEE FIGURE 6)
- CULTURAL HERITAGE ZONES
- WET AREA TO BE IMPROVED
- MAIN TRAILHEAD
- SECONDARY TRAILHEAD
- + TRAIL INTERSECTION



SEE MAIN ENTRANCE DETAIL BELOW

MAIN ENTRANCE DETAIL



TRAILS MASTER PLAN
ERAMOSKA KARST C.A. MASTER PLAN

DATE: 2025/09/04



Appendix 2 – Capital Development Priorities

DRAFT ERAMOSA KARST CAPITAL DEVELOPMENT PRIORITIES: 2025 – 2035

A. Site Concept Improvements *Budget (\$120,000)

| | | |
|----|---------------------------------------|----------|
| A1 | Front Entrance Trail Connection | \$30,000 |
| A2 | Amphitheatre Outdoor Gathering Space | \$25,000 |
| A3 | Replace and Add Interpretive Stations | \$30,000 |
| A4 | Trail Improvements in Wet Areas | \$25,000 |
| A5 | Entrance Sign Improvements | \$10,000 |

B. Conservation Area Improvements *Budget (\$275,000)

| | | |
|-----|------------------------------------|-----------|
| B1 | Perimeter Vegetated Buffers | \$40,000 |
| B2+ | Agricultural Fields Naturalization | \$50,000 |
| B3+ | Natural Areas Restoration | \$30,000 |
| B4+ | Invasive Species Management | \$25,000 |
| B5 | Site Signage | \$15,000 |
| B6 | Site Furnishings | \$15,000 |
| B7 | Bridges and Boardwalks | \$100,000 |

C. Funding Dependant Improvements *Budget TBD

| | | |
|-----|---|-----|
| C1+ | Karst Features Conservation and Restoration | TBD |
|-----|---|-----|

- * Budget costs are in 2025 dollars, projects and budgets to be reviewed annually.
- + Costs subject to ecological findings and recommendations.

Appendix 3 – Estimated Revenue and Expenses

Eramosa Karst: DRAFT Estimated Annual Revenues and Expenses*

| Operation Revenues | Amount | % of Revenues |
|--------------------------------|-------------------|----------------------|
| Admissions (Auto Gate, Passes) | \$ 110,000 | 92 % |
| Miscellaneous+ | \$ 10,000 | 8 % |
| Total Revenues | \$ 120,000 | 100% |

| Operation Expenses | Amount | % of Expenses |
|-------------------------------|-------------------|----------------------|
| Salaries – Wages and Benefits | \$ 57,600 | 48 % |
| Equipment | \$ 24,000 | 20 % |
| Office | \$ 14,400 | 12 % |
| Taxes | \$ 13,200 | 11 % |
| Materials and Supplies | \$ 3,600 | 3 % |
| Utilities | \$ 3,600 | 3 % |
| Maintenance | \$ 2,400 | 2 % |
| Contracts | \$ 1,200 | 1 % |
| Total Expenses | \$ 120,000 | 100% |

*Based on East Hamilton Mountain Operation Revenue and Expenses for 2021 and 2022.

+ Miscellaneous revenues include film revenues, ticketed events and tours.

Average annual revenue and costs estimated for the life of this master plan, with a 40 to 50-car paid parking lot.

Appendix 4 – Public Survey Results Summary

Public Surveys – Summary of Key Comments and Resolutions

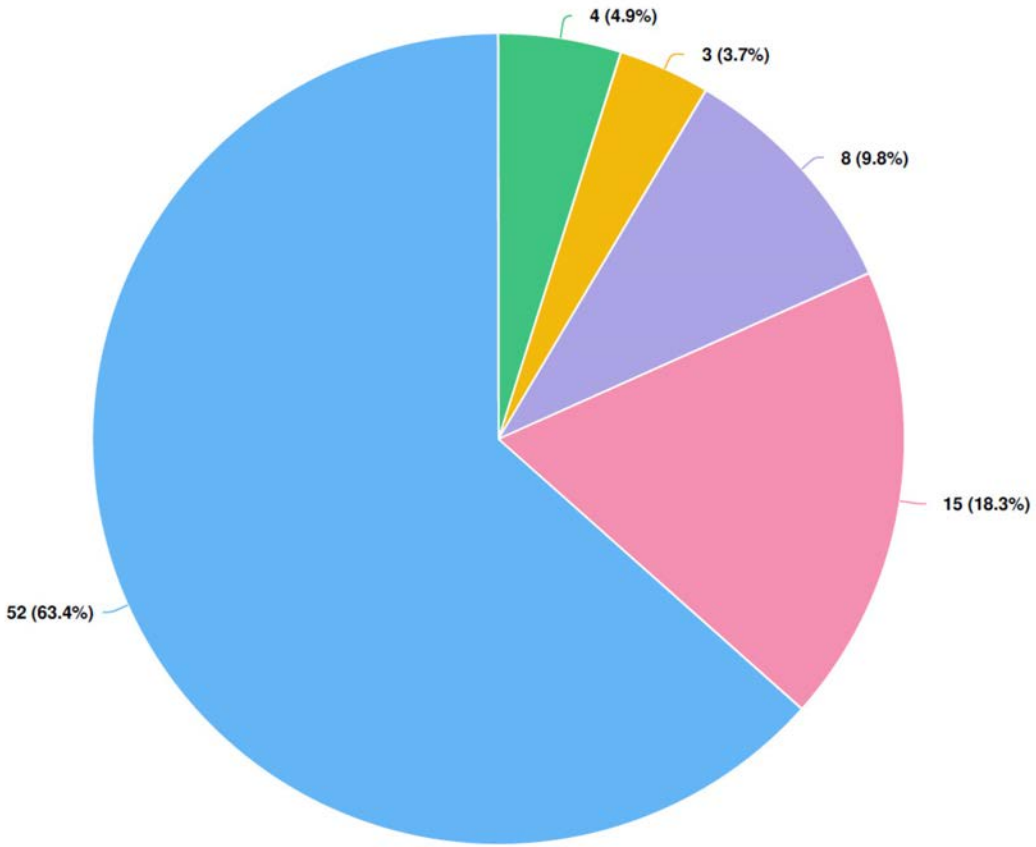
The surveys were made public on HCA’s website for any person who was interested in the project. Information flyers with a QR code and website link for the surveys were posted in the study area. Public engagement was promoted on HCA’s social media platforms, and by direct email to all HCA newsletter subscribers.

A total of 82 surveys were submitted by the public.

Below is a summary of the key comments received in the public surveys and connections to this plan.

| Key Comments Received | Connections to the Plan |
|--|---|
| Question: Do you have any comments or suggestions for us on how we can improve the conservation area and the user experience? | |
| Provide better Trail Wayfinding | <ul style="list-style-type: none"> The most common comments received were to improve the trail signage and wayfinding. HCA is aware of this need and is updating the trail signage and wayfinding on site. New wayfinding signage has been installed as of spring 2024 and will be updated and maintained as needed. |
| Family Friendly comments | <ul style="list-style-type: none"> Appreciation for the washrooms, a green area within the city close to home, trails suitable for children. This plan recommends continued operation and maintenance of all the site features, with improved trail surfacing for the entire trail system for accessibility. |
| Concerns about ticks | <ul style="list-style-type: none"> A number of respondents noted concerns about ticks, with some being discouraged to return or requesting the grass be cut more frequently. HCA recognizes these concerns and provides the public with tick information when visiting an HCA property. This plan provides recommendations for appropriate vegetation clearing and trail maintenance to support site activities and protect the sensitive karst environment. |
| Interpretive and educational information on site | <ul style="list-style-type: none"> Appreciation for the interpretive signage on site was noted, with a desire to learn more about the karst environment. This plan recommends educational and interpretive items be provided on site and in various ways off-site about the karst and the cultural and heritage values of the property. |
| Mountain Biking | <ul style="list-style-type: none"> Requests were submitted from the mountain biking community for this use in the conservation area. This community is being engaged for the 2025 Felker’s Falls Management Plan, this area and other HCA lands will be discussed in this engagement and the outcome noted in the plan. |

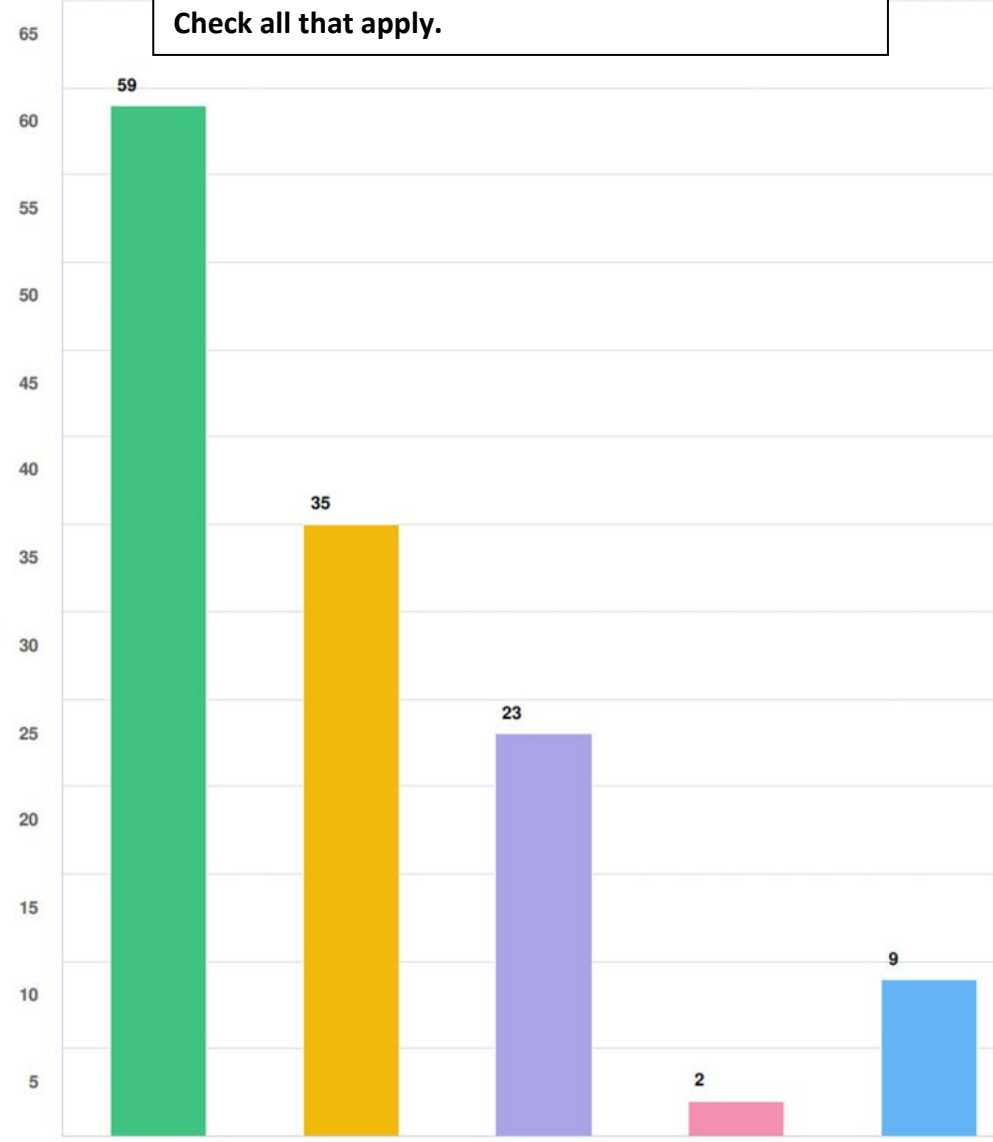
How many times have you visited Eramosa Karst Conservation Area?



Question options

- I have not visited
- I am planning to visit
- One time
- Two to five times
- More than five times

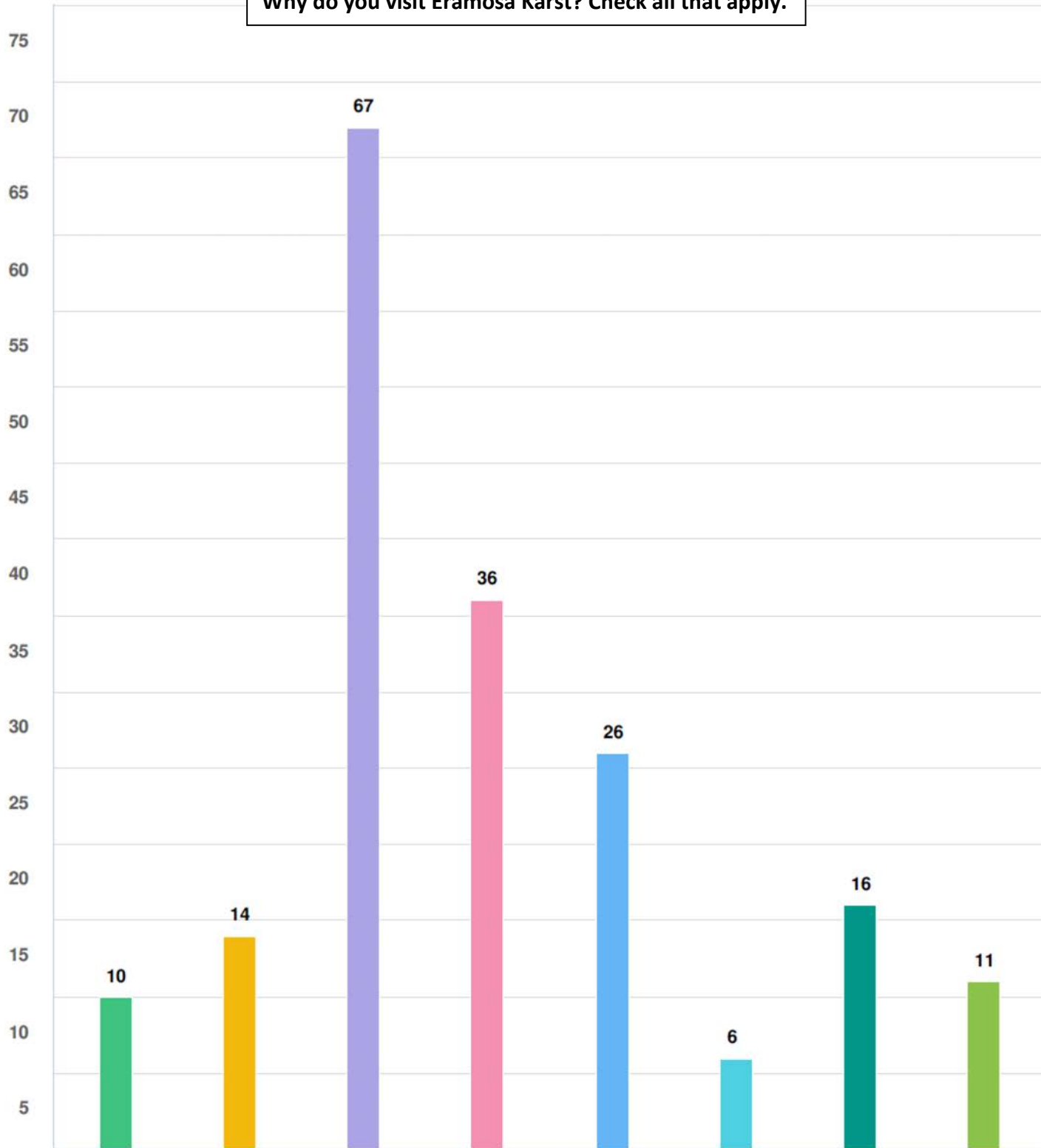
How would you arrive at the conservation area?
Check all that apply.



Question options

- Car
- Bicycle
- Walk-in
- Public transit
- Passing through along the East Mountain Trail Loop

Why do you visit Eramosa Karst? Check all that apply.



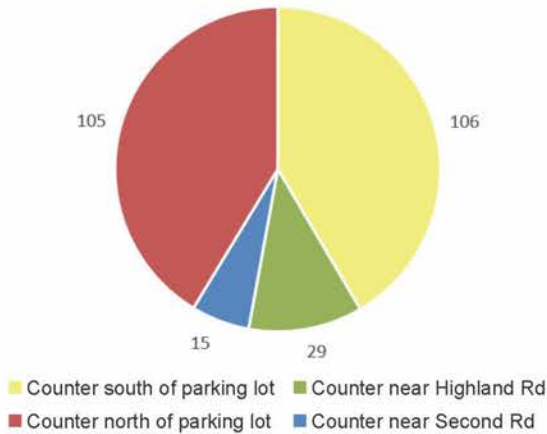
Question options

- Parking
- Washrooms
- Walking/Running
- Cycling
- Dog Walking
- Picnicking
- Education
- Other (please specify)

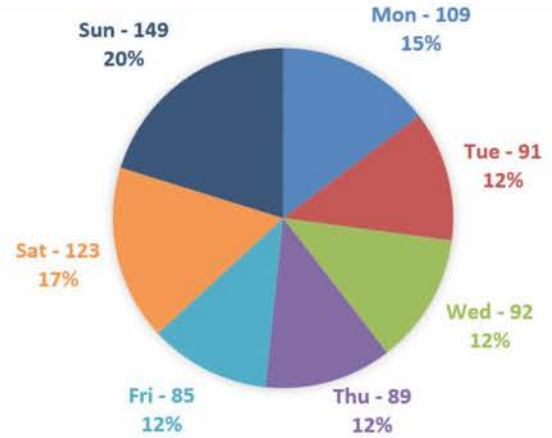
Appendix 5 – Trail and Vehicle Counter Data Summary

Trail Counter Summary - May to October 2023

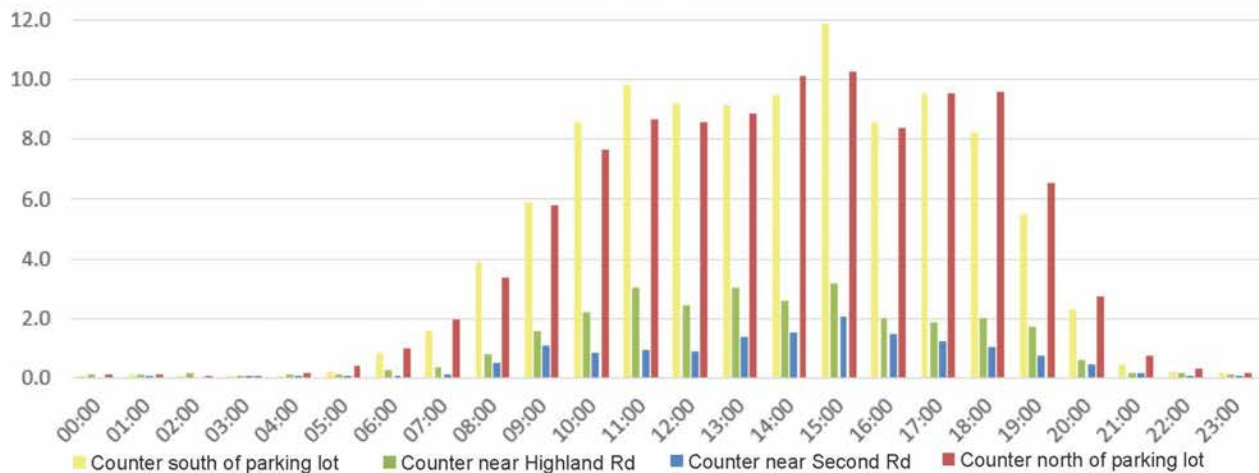
Trail Counters - Average Daily Counts



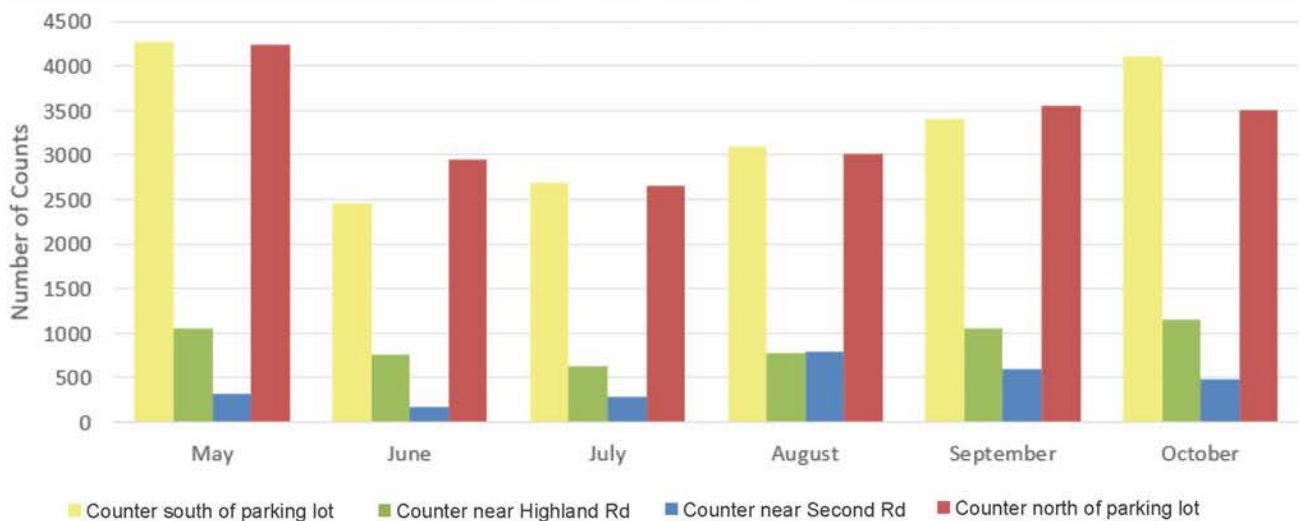
Week Day Averages - Trail Counters Near Parking Lot



24 Hour Average Trend in Visitation



Trail Counters - Monthly Totals



Appendix 6 – Natural Inventory Species Lists

Table 1 - Breeding Bird

Table 2 - Mammals

Table 3 - Butterflies, Dragonflies and Damselflies

Table 4 - Herpetofauna

Table 5 - Plants

Table 6 - Floristic Summary & Assessment

Table 1 – Breeding Birds

| Breeding Birds | | | | | | |
|-----------------------------------|-----|-----------------------------------|-----------|----------|------------------------------|---------------------------|
| Historical ebird data (2012-2023) | NAI | iNaturalist (research grade only) | BBS - 1st | BBS- 2nd | Scientific name | Common name |
| x | x | x | | | <i>Accipiter cooperii</i> | Cooper's Hawk |
| x | | x | | | <i>Accipiter striatus</i> | Sharp-shinned Hawk |
| x | | | | | <i>Actitis macularius</i> | Spotted Sandpiper |
| x | x | | x | x | <i>Agelaius phoeniceus</i> | Red-winged Blackbird |
| | | | | x | <i>Ammodramus savannarum</i> | Grasshopper Sparrow |
| x | x | | x | | <i>Anas platyrhynchos</i> | Mallard |
| x | | | | | <i>Anas rubripes</i> | American Black Duck |
| x | | | | | <i>Anthus rubescens</i> | American Pipit |
| x | x | | | | <i>Archilochus colubris</i> | Ruby-throated Hummingbird |
| x | | | x | | <i>Ardea herodias</i> | Great Blue Heron |
| x | x | | | | <i>Asio otus</i> | Long-eared Owl |
| x | x | | x | | <i>Bombycilla cedrorum</i> | Cedar Waxwing |
| x | x | | x | | <i>Branta canadensis</i> | Canada Goose |
| | x | | | | <i>Bubo virginianus</i> | Great Horned Owl |
| x | | | | | <i>Bucephala albeola</i> | Bufflehead |
| x | x | x | | | <i>Buteo jamaicensis</i> | Red-tailed Hawk |
| x | | | | | <i>Buteo lagopus</i> | Rough-legged Hawk |
| x | | | | | <i>Buteo lineatus</i> | Red-shouldered Hawk |
| x | | | | | <i>Buteo platypterus</i> | Broad-winged Hawk |
| x | | | | | <i>Butorides virescens</i> | Green Heron |
| x | | | | | <i>Calidris alpina</i> | Dunlin |
| x | | | | | <i>Calidris melanotos</i> | Pectoral Sandpiper |
| x | | | | | <i>Cardellina pusilla</i> | Wilson's Warbler |
| x | x | | x | x | <i>Cardinalis cardinalis</i> | Northern Cardinal |
| x | x | x | | | <i>Cathartes aura</i> | Turkey Vulture |
| x | | | | | <i>Catharus fuscescens</i> | Veery |
| x | | x | | | <i>Catharus guttatus</i> | Hermit Thrush |
| x | | x | | | <i>Catharus ustulatus</i> | Swainson's Thrush |
| x | | x | | | <i>Certhia americana</i> | Brown Creeper |
| x | | x | | | <i>Chaetura pelagica</i> | Chimney Swift |
| x | x | | | | <i>Charadrius vociferus</i> | Killdeer |
| x | | | | | <i>Circus hudsonius</i> | Northern Harrier |
| x | | | | | <i>Cistothorus palustris</i> | Marsh Wren |

| | | | | | | |
|---|---|---|---|---|----------------------------------|---------------------------|
| x | | | | | <i>Coccyzus americanus</i> | Yellow-billed Cuckoo |
| x | | | x | | <i>Coccyzus erythrophthalmus</i> | Black-billed Cuckoo |
| x | x | x | | x | <i>Colaptes auratus</i> | Northern Flicker |
| x | | | | | <i>Columba livia</i> | Rock Pigeon |
| x | x | | | x | <i>Contopus virens</i> | Eastern Wood-Pewee |
| x | x | | x | x | <i>Corvus brachyrhynchos</i> | American Crow |
| x | | | x | x | <i>Corvus corax</i> | Common Raven |
| x | x | x | x | x | <i>Cyanocitta cristata</i> | Blue Jay |
| x | | | | | <i>Cygnus columbianus</i> | Tundra Swan |
| x | | x | x | x | <i>Dolichonyx oryzivorus</i> | Bobolink |
| x | x | x | x | x | <i>Dryobates pubescens</i> | Downy Woodpecker |
| x | | | | | <i>Dryobates villosus</i> | Hairy Woodpecker |
| x | x | | x | x | <i>Dumetella carolinensis</i> | Gray Catbird |
| x | | | | x | <i>Empidonax alnorum</i> | Alder Flycatcher |
| x | | | | | <i>Empidonax flaviventris</i> | Yellow-bellied Flycatcher |
| x | x | x | | | <i>Empidonax minimus</i> | Least Flycatcher |
| x | x | | x | x | <i>Empidonax traillii</i> | Willow Flycatcher |
| x | | | | | <i>Eremophila alpestris</i> | Horned Lark |
| x | | | | | <i>Euphagus carolinus</i> | Rusty Blackbird |
| x | | | | | <i>Falco columbarius</i> | Merlin |
| x | | | | | <i>Falco peregrinus</i> | Peregrine Falcon |
| x | x | | | | <i>Falco sparverius</i> | American Kestrel |
| x | | | | | <i>Gavia immer</i> | Common Loon |
| | | | x | | <i>Geothlypis philadelphia</i> | Mourning Warbler |
| x | x | | | x | <i>Geothlypis trichas</i> | Common Yellowthroat |
| x | x | | | | <i>Haemorhous mexicanus</i> | House Finch |
| x | | | | | <i>Haemorhous purpureus</i> | Purple Finch |
| x | | | | | <i>Haliaeetus leucocephalus</i> | Bald Eagle |
| x | x | | x | x | <i>Hirundo rustica</i> | Barn Swallow |
| x | | | | | <i>Hydroprogne caspia</i> | Caspian Tern |
| x | x | | | | <i>Hylocichla mustelina</i> | Wood Thrush |
| x | x | x | | | <i>Icterus galbula</i> | Baltimore Oriole |
| x | x | x | | | <i>Junco hyemalis</i> | Dark-eyed Junco |
| x | | | | | <i>Larus argentatus</i> | Herring Gull |
| x | x | | | | <i>Larus delawarensis</i> | Ring-billed Gull |
| x | | | | | <i>Megaceryle alcyon</i> | Belted Kingfisher |
| | | x | | | <i>Megascops asio</i> | Eastern Screech-Owl |

| | | | | | | |
|---|---|---|---|---|----------------------------------|--------------------------|
| x | | x | x | x | <i>Melanerpes carolinus</i> | Red-bellied Woodpecker |
| x | x | | | | <i>Meleagris gallopavo</i> | Wild Turkey |
| x | | | | | <i>Melospiza georgiana</i> | Swamp Sparrow |
| x | | | | | <i>Melospiza lincolnii</i> | Lincoln's Sparrow |
| x | x | x | x | x | <i>Melospiza melodia</i> | Song Sparrow |
| x | | | | | <i>Mergus merganser</i> | Common Merganser |
| x | | | | | <i>Mergus serrator</i> | Red-breasted Merganser |
| x | x | | | | <i>Mimus polyglottos</i> | Northern Mockingbird |
| x | | | | | <i>Mniotilta varia</i> | Black-and-white Warbler |
| x | x | x | x | | <i>Molothrus ater</i> | Brown-headed Cowbird |
| x | x | | x | x | <i>Myiarchus crinitus</i> | Great Crested Flycatcher |
| x | | x | | | <i>Oreothlypis celata</i> | Orange-crowned Warbler |
| x | | | | | <i>Oreothlypis peregrina</i> | Tennessee Warbler |
| x | | | | | <i>Oreothlypis ruficapilla</i> | Nashville Warbler |
| x | | | | | <i>Pandion haliaetus</i> | Osprey |
| | x | | | | <i>Parkesia noveboracensis</i> | Northern Waterthrush |
| x | x | | x | | <i>Passer domesticus</i> | House Sparrow |
| x | x | x | x | x | <i>Passerculus sandwichensis</i> | Savannah Sparrow |
| x | | | | | <i>Passerella iliaca</i> | Fox Sparrow |
| x | x | x | | x | <i>Passerina cyanea</i> | Indigo Bunting |
| x | | | | | <i>Phalacrocorax auritus</i> | Double-crested Cormorant |
| x | x | x | | | <i>Pheucticus ludovicianus</i> | Rose-breasted Grosbeak |
| x | x | | | | <i>Pipilo erythrophthalmus</i> | Eastern Towhee |
| x | | x | | | <i>Piranga olivacea</i> | Scarlet Tanager |
| x | | | | | <i>Podiceps auritus</i> | Horned Grebe |
| x | x | x | x | x | <i>Poecile atricapillus</i> | Black-capped Chickadee |
| x | | | | | <i>Poliptila caerulea</i> | Blue-gray Gnatcatcher |
| x | x | | | | <i>Poocetes gramineus</i> | Vesper Sparrow |
| x | x | x | | x | <i>Quiscalus quiscula</i> | Common Grackle |
| x | | x | | | <i>Regulus calendula</i> | Ruby-crowned Kinglet |

| | | | | | | |
|---|---|---|---|---|-----------------------------------|-------------------------------|
| x | x | x | | | <i>Regulus satrapa</i> | Golden-crowned Kinglet |
| | x | | | | <i>Riparia riparia</i> | Bank Swallow |
| x | | x | | | <i>Sayornis phoebe</i> | Eastern Phoebe |
| x | | | | | <i>Scolopax minor</i> | American Woodcock |
| x | | | | | <i>Seiurus aurocapilla</i> | Ovenbird |
| x | | x | | | <i>Setophaga americana</i> | Northern Parula |
| x | | x | | | <i>Setophaga caerulescens</i> | Black-throated Blue Warbler |
| x | | x | | | <i>Setophaga castanea</i> | Bay-breasted Warbler |
| x | x | | | | <i>Setophaga coronata</i> | Yellow-rumped Warbler |
| x | | | | | <i>Setophaga discolor</i> | Prairie Warbler |
| x | | | | | <i>Setophaga fusca</i> | Blackburnian Warbler |
| x | x | | | | <i>Setophaga magnolia</i> | Magnolia Warbler |
| x | | x | | | <i>Setophaga palmarum</i> | Palm Warbler |
| x | | | | | <i>Setophaga pensylvanica</i> | Chestnut-sided Warbler |
| x | x | | x | x | <i>Setophaga petechia</i> | Yellow Warbler |
| x | | x | | | <i>Setophaga pinus</i> | Pine Warbler |
| x | x | x | | | <i>Setophaga ruticilla</i> | American Redstart |
| x | | | | | <i>Setophaga striata</i> | Blackpoll Warbler |
| x | | x | | | <i>Setophaga tigrina</i> | Cape May Warbler |
| x | | | | | <i>Setophaga virens</i> | Black-throated Green Warbler |
| x | | | | | <i>Sialia sialis</i> | Eastern Bluebird |
| x | | | | | <i>Sitta canadensis</i> | Red-breasted Nuthatch |
| x | x | | | | <i>Sitta carolinensis</i> | White-breasted Nuthatch |
| x | x | x | | | <i>Sphyrapicus varius</i> | Yellow-bellied Sapsucker |
| x | | | | | <i>Spinus pinus</i> | Pine Siskin |
| x | x | x | x | x | <i>Spinus tristis</i> | American Goldfinch |
| x | | | | x | <i>Spizella pallida</i> | Clay-colored Sparrow |
| x | x | | x | x | <i>Spizella passerina</i> | Chipping Sparrow |
| x | x | x | x | x | <i>Spizella pusilla</i> | Field Sparrow |
| x | x | | | | <i>Spizelloides arborea</i> | American Tree Sparrow |
| x | | x | | | <i>Stelgidopteryx serripennis</i> | Northern Rough-winged Swallow |
| x | | | | | <i>Sterna hirundo</i> | Common Tern |
| x | x | | | | <i>Sturnella magna</i> | Eastern Meadowlark |

| | | | | | | |
|---|---|---|---|---|---------------------------------|------------------------|
| x | x | | x | x | <i>Sturnus vulgaris</i> | European Starling |
| x | x | | x | x | <i>Tachycineta bicolor</i> | Tree Swallow |
| x | | x | | | <i>Thryothorus ludovicianus</i> | Carolina Wren |
| x | x | | x | | <i>Toxostoma rufum</i> | Brown Thrasher |
| x | | | | | <i>Tringa flavipes</i> | Lesser Yellowlegs |
| x | | | | | <i>Tringa melanoleuca</i> | Greater Yellowlegs |
| x | x | | | x | <i>Troglodytes aedon</i> | House Wren |
| x | | | | | <i>Troglodytes hiemalis</i> | Winter Wren |
| x | x | x | x | x | <i>Turdus migratorius</i> | American Robin |
| x | x | | | | <i>Tyrannus tyrannus</i> | Eastern Kingbird |
| | x | | | | <i>Vermivora cyanoptera</i> | Blue-winged Warbler |
| x | x | | | x | <i>Vireo gilvus</i> | Warbling Vireo |
| x | x | | x | x | <i>Vireo olivaceus</i> | Red-eyed Vireo |
| x | | | | | <i>Vireo philadelphicus</i> | Philadelphia Vireo |
| x | | | | | <i>Vireo solitarius</i> | Blue-headed Vireo |
| x | x | | x | x | <i>Zenaida macroura</i> | Mourning Dove |
| x | x | | | | <i>Zonotrichia albicollis</i> | White-throated Sparrow |
| x | | | | | <i>Zonotrichia leucophrys</i> | White-crowned Sparrow |

Table 2 - Mammals

| Mammals (Background and Incidental data Only) | | | | |
|--|--|-------------------|--------------------------------|-----------------------------|
| NAI | iNaturalist (research grade only) | Incidental | Scientific Name | Common Name |
| x | | | <i>Blarina brevicauda</i> | Northern Short-tailed Shrew |
| x | | x | <i>Canis latrans</i> | Coyote |
| x | | | <i>Marmota monax</i> | Woodchuck |
| x | | | <i>Microtus pennsylvanicus</i> | Meadow Vole |
| x | | | <i>Neovison vison</i> | American Mink |
| x | x | | <i>Odocoileus virginianus</i> | White-tailed Deer |
| x | | | <i>Ondatra zibethicus</i> | Muskrat |
| x | | | <i>Peromyscus maniculatus</i> | Deer Mouse |
| x | x | | <i>Procyon lotor</i> | Northern Raccoon |
| x | x | | <i>Sciurus carolinensis</i> | Eastern Gray Squirrel |
| x | x | | <i>Sylvilagus floridanus</i> | Eastern Cottontail |
| x | x | | <i>Tamias striatus</i> | Eastern Chipmunk |
| | x | | <i>Tamiasciurus hudsonicus</i> | Red Squirrel |

Table 3 – Butterflies, Dragonflies and Damselflies

| Butterflies, Dragonflies and Damselflies (Background Data Only) | | |
|--|------------------------------------|------------------------|
| iNaturalist (research grade only) | Scientific Name | Common Name |
| x | <i>Cercyonis pegala</i> | Common Wood-Nymph |
| x | <i>Coenonympha californica</i> | Common Ringlet |
| x | <i>Colias philodice</i> | Clouded Sulphur |
| x | <i>Ctenucha virginica</i> | Virginia Ctenucha |
| x | <i>Cupido comyntas</i> | Eastern Tailed Blue |
| x | <i>Danaus plexippus</i> | Monarch |
| x | <i>Epithea princeps</i> | Prince Baskettail |
| x | <i>Erynnis baptisiae</i> | Wild Indigo Duskywing |
| x | <i>Estigmene acrea</i> | Salt Marsh Moth |
| x | <i>Hyalophora cecropia</i> | Cecropia Moth |
| x | <i>Libellula pulchella</i> | Twelve-spotted Skimmer |
| x | <i>Limenitis arthemis astyanax</i> | Red-spotted Purple |
| x | <i>Lymantria dispar</i> | Gypsy Moth |
| x | <i>Megisto cymela</i> | Little Wood-Satyr |
| x | <i>Nymphalis l-album</i> | Compton Tortoiseshell |
| x | <i>Papilio polyxenes</i> | Black Swallowtail |
| x | <i>Phyciodes tharos</i> | Pearl Crescent |
| x | <i>Plathemis lydia</i> | Common Whitetail |
| x | <i>Polites peckius</i> | Peck's Skipper |
| x | <i>Polygonia comma</i> | Eastern Comma |
| x | <i>Thymelicus lineola</i> | European Skipper |
| x | <i>Vanessa atalanta</i> | Red Admiral |

Table 4 - Herpetofauna

| Herpetofauna (Background Data Only) | | | |
|--|--------------------|-------------------------------------|---|
| NAI | iNaturalist | Scientific Name | Common Name |
| x | x | <i>Anaxyrus americanus</i> | American Toad |
| | x | <i>Hyla versicolor</i> | Gray Treefrog |
| x | x | <i>Lampropeltis triangulum</i> | Eastern Milksnake |
| x | | <i>Lithobates clamitans</i> | Green Frog |
| x | | <i>Lithobates pipiens</i> | Northern Leopard Frog |
| x | | <i>Pseudacris crucifer</i> | Spring Peeper |
| x | | <i>Pseudacris triseriata pop. 2</i> | Western Chorus Frog - Carolinian Population |
| | x | <i>Storeria dekayi</i> | DeKay's Brownsnake |
| | x | <i>Thamnophis sirtalis sirtalis</i> | Eastern Gartersnake |

Table 5 - Plants

| Plants | | | | | | | | |
|----------|--|--|---------------|--------|----------------|--------------------------|-------------|--------|
| ELC 2023 | SCIENTIFIC NAME NHIC | COMMON NAME NHIC | NATIVE_STATUS | S RANK | COSEWIC STATUS | SARA SCHEDULE1 STATUS | SARO STATUS | G RANK |
| x | <i>Acer negundo</i> | Manitoba Maple | N | S5 | --- | --- | --- | G5 |
| x | <i>Acer nigrum</i> | Black Maple | N | S4? | --- | --- | --- | G5 |
| x | <i>Acer platanoides</i> | Norway Maple | I | SNA | --- | --- | --- | GNR |
| x | <i>Acer saccharinum</i> | Silver Maple | N | S5 | --- | --- | --- | G5 |
| x | <i>Acer saccharum</i> | Sugar Maple | N | S5 | --- | --- | --- | G5 |
| x | <i>Acer x freemanii</i> | (<i>Acer rubrum</i> X <i>Acer saccharinum</i>) | N | SNA | --- | --- | --- | GNA |
| x | <i>Achillea millefolium</i> | Common Yarrow | I | SNA | --- | --- | --- | G5 |
| x | <i>Actaea pachypoda</i> | White Baneberry | N | S5 | --- | --- | --- | G5 |
| x | <i>Ageratina altissima</i> <i>var. altissima</i> | Common White Snakeroot | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Agrimonia gryposepala</i> | Hooked Agrimony | N | S5 | --- | --- | --- | G5 |
| x | <i>Agrimonia striata</i> | Woodland Agrimony | N | S4 | --- | --- | --- | G5 |
| x | <i>Agrostis gigantea</i> | Redtop | I | SNA | --- | --- | --- | G4G5 |
| x | <i>Alliaria petiolata</i> | Garlic Mustard | I | SNA | --- | --- | --- | GNR |
| x | <i>Allium vineale</i> | Wild Garlic | I | SNA | --- | --- | --- | GNR |
| x | <i>Ambrosia artemisiifolia</i> | Common Ragweed | N | S5 | --- | --- | --- | G5 |
| x | <i>Anemone virginiana</i> <i>var. virginiana</i> | Tall Anemone | N | S5? | --- | --- | --- | G5T5 |
| x | <i>Apocynum androsaemifolium</i> | Spreading Dogbane | N | S5 | --- | --- | --- | G5 |
| x | <i>Arctium minus</i> | Common Burdock | I | SNA | --- | --- | --- | GNR |
| x | <i>Arisaema triphyllum</i> <i>ssp. triphyllum</i> | Jack-in-the-pulpit | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Asclepias incarnata</i> <i>ssp. incarnata</i> | Swamp Milkweed | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Asclepias syriaca</i> | Common Milkweed | N | S5 | --- | --- | --- | G5 |
| x | <i>Bellis perennis</i> | English Daisy | I | SNA | --- | --- | --- | GNR |
| x | <i>Bromus commutatus</i> | Hairy Brome | I | SNA | --- | --- | --- | GNR |
| x | <i>Bromus inermis</i> | Smooth Brome | I | SNA | --- | --- | --- | G5 |
| x | <i>Campanula rapunculoides</i> | Creeping Bellflower | I | SNA | --- | --- | --- | GNR |
| x | <i>Carex bebbii</i> | Bebb's Sedge | N | S5 | --- | --- | --- | G5 |
| x | <i>Carex blanda</i> | Woodland Sedge | N | S5 | --- | --- | --- | G5 |

| | | | | | | | | |
|---|---|------------------------------|---|-----|-----|-----|-----|------|
| x | <i>Carex pensylvanica</i> | Pennsylvania Sedge | N | S5 | --- | --- | --- | G5 |
| x | <i>Carex vulpinoidea</i> | Fox Sedge | N | S5 | --- | --- | --- | G5 |
| x | <i>Carpinus caroliniana</i> | Blue-beech | N | S5 | --- | --- | --- | G5 |
| x | <i>Carya cordiformis</i> | Bitternut Hickory | N | S5 | --- | --- | --- | G5 |
| x | <i>Carya ovata</i> | Shagbark Hickory | N | S5 | --- | --- | --- | G5 |
| x | <i>Celastrus orbiculatus</i> | Oriental Bittersweet | I | SNA | --- | --- | --- | GNR |
| x | <i>Cichorium intybus</i> | Chicory | I | SNA | --- | --- | --- | GNR |
| x | <i>Cirsium arvense</i> | Canada Thistle | I | SNA | --- | --- | --- | G5 |
| x | <i>Cirsium vulgare</i> | Bull Thistle | I | SNA | --- | --- | --- | GNR |
| x | <i>Cornus racemosa</i> | Gray Dogwood | N | S5 | --- | --- | --- | G5 |
| x | <i>Dactylis glomerata</i> | Orchard Grass | I | SNA | --- | --- | --- | GNR |
| x | <i>Daucus carota</i> | Wild Carrot | I | SNA | --- | --- | --- | GNR |
| x | <i>Dianthus armeria</i> | Deptford Pink | I | SNA | --- | --- | --- | GNR |
| x | <i>Dipsacus fullonum</i> | Common Teasel | I | SNA | --- | --- | --- | GNR |
| x | <i>Elaeagnus umbellata</i> | Autumn Olive | I | SNA | --- | --- | --- | GNR |
| x | <i>Eleocharis obtusa</i> | Blunt Spikerush | N | S5 | --- | --- | --- | G5 |
| x | <i>Eleocharis palustris</i> | Creeping Spikerush | N | S5 | --- | --- | --- | G5? |
| x | <i>Elymus repens</i> | Creeping Wildrye | I | SNA | --- | --- | --- | GNR |
| x | <i>Elymus virginicus</i> <i>var. virginicus</i> | Virginia Wildrye | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Epipactis helleborine</i> | Eastern Helleborine | I | SNA | --- | --- | --- | GNR |
| x | <i>Equisetum arvense</i> | Field Horsetail | N | S5 | --- | --- | --- | G5 |
| x | <i>Erigeron annuus</i> | Annual Fleabane | N | S5 | --- | --- | --- | G5 |
| x | <i>Erythronium americanum</i> <i>ssp. americanum</i> | Yellow Trout-lily | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Euonymus obovatus</i> | Running Strawberry Bush | N | S4 | --- | --- | --- | G5 |
| x | <i>Euthamia graminifolia</i> | Grass-leaved Goldenrod | N | S5 | --- | --- | --- | G5 |
| x | <i>Fagus grandifolia</i> | American Beech | N | S4 | --- | --- | --- | G5 |
| x | <i>Festuca rubra</i> | Red Fescue | N | S5 | --- | --- | --- | G5 |
| x | <i>Fragaria vesca</i> <i>ssp. americana</i> | American Woodland Strawberry | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Fraxinus americana</i> | White Ash | N | S4 | --- | --- | --- | G5 |
| x | <i>Fraxinus pennsylvanica</i> | Green Ash | N | S4 | --- | --- | --- | G5 |
| x | <i>Geranium maculatum</i> | Spotted Geranium | N | S5 | --- | --- | --- | G5 |
| x | <i>Geranium robertianum</i> | Herb-Robert | N | S5 | --- | --- | --- | G5 |
| x | <i>Geum aleppicum</i> | Yellow Avens | N | S5 | --- | --- | --- | G5 |
| x | <i>Geum canadense</i> | White Avens | N | S5 | --- | --- | --- | G5 |

| | | | | | | | | |
|---|--|-------------------------------|---|------|-----|-----|-----|------------|
| x | <i>Glechoma hederacea</i> | Ground Ivy | I | SNA | --- | --- | --- | GNR |
| x | <i>Gleditsia triacanthos</i> | Honey-locust | N | S2? | --- | --- | --- | G5 |
| x | <i>Glyceria striata</i> | Fowl Mannagrass | N | S5 | --- | --- | --- | G5 |
| x | <i>Gnaphalium uliginosum</i> | Low Cudweed | I | SNA | --- | --- | --- | G5 |
| x | <i>Hackelia deflexa</i> | Northern Stickseed | N | S5 | --- | --- | --- | G5 |
| x | <i>Hamamelis virginiana</i> | American Witch-hazel | N | S4S5 | --- | --- | --- | G5 |
| x | <i>Hieracium vulgatum</i> | Common Hawkweed | I | SNA | --- | --- | --- | GNR |
| x | <i>Hordeum jubatum ssp. jubatum</i> | Foxtail Barley | N | S5? | --- | --- | --- | G5T5 |
| x | <i>Hydrophyllum virginianum</i> | Virginia Waterleaf | N | S5 | --- | --- | --- | G5 |
| x | <i>Hypericum perforatum</i> | Common St. John's-wort | I | SNA | --- | --- | --- | GNR |
| x | <i>Impatiens capensis</i> | Spotted Jewelweed | N | S5 | --- | --- | --- | G5 |
| x | <i>Juglans cinerea</i> | Butternut | N | S2? | END | END | END | G4 |
| x | <i>Juglans nigra</i> | Black Walnut | N | S4? | --- | --- | --- | G5 |
| x | <i>Juncus compressus</i> | Flattened Rush | I | SNA | --- | --- | --- | G5 |
| x | <i>Juncus dudleyi</i> | Dudley's Rush | N | S5 | --- | --- | --- | G5 |
| x | <i>Juncus effusus ssp. solutus</i> | Soft Rush | N | S5? | --- | --- | --- | G5T5 |
| x | <i>Juncus tenuis</i> | Path Rush | N | S5 | --- | --- | --- | G5 |
| x | <i>Lapsana communis</i> | Common Nipplewort | I | SNA | --- | --- | --- | GNR |
| x | <i>Leersia oryzoides</i> | Rice Cutgrass | N | S5 | --- | --- | --- | G5 |
| x | <i>Leonurus cardiaca ssp. cardiaca</i> | Common Motherwort | I | SNA | --- | --- | --- | GNRT NR |
| x | <i>Lepidium campestre</i> | Field Peppergrass | I | SNA | --- | --- | --- | GNR |
| x | <i>Leucanthemum vulgare</i> | Oxeye Daisy | I | SNA | --- | --- | --- | GNR |
| x | <i>Ligustrum vulgare</i> | European Privet | I | SNA | --- | --- | --- | GNR |
| x | <i>Lolium arundinaceum</i> | Tall Fescue | I | SNA | --- | --- | --- | GNR |
| x | <i>Lolium perenne</i> | Perennial Ryegrass | I | SNA | --- | --- | --- | GNR |
| x | <i>Lonicera tatarica</i> | Tartarian Honeysuckle | I | SNA | --- | --- | --- | GNR |
| x | <i>Lotus corniculatus</i> | Garden Bird's-foot Trefoil | I | SNA | --- | --- | --- | GNR |
| x | <i>Lycopus americanus</i> | American Water- horehound | N | S5 | --- | --- | --- | G5 |
| x | <i>Lythrum salicaria</i> | Purple Loosestrife | I | SNA | --- | --- | --- | G5 |
| x | <i>Maianthemum canadense</i> | Wild Lily-of-the-valley | N | S5 | --- | --- | --- | G5 |
| x | <i>Medicago lupulina</i> | Black Medic | I | SNA | --- | --- | --- | GNR |
| x | <i>Melilotus albus</i> | White Sweet-clover | I | SNA | --- | --- | --- | G5 |
| x | <i>Melilotus officinalis</i> | Yellow Sweet-clover | I | SNA | --- | --- | --- | GNR |
| x | <i>Menispermum canadense</i> | Canada Moonseed | N | S4 | --- | --- | --- | G5 |

| | | | | | | | | |
|---|------------------------------------|----------------------------|---|-----|-----|-----|-----|------|
| x | <i>Ostrya virginiana</i> | Eastern Hop-hornbeam | N | S5 | --- | --- | --- | G5 |
| x | <i>Oxalis dillenii</i> | Slender Yellow Wood-sorrel | N | S5? | --- | --- | --- | G5 |
| x | <i>Parthenocissus quinquefolia</i> | Virginia Creeper | N | S4? | --- | --- | --- | G5 |
| x | <i>Phalaris arundinacea</i> | Reed Canary Grass | N | S5 | --- | --- | --- | G5 |
| x | <i>Phleum pratense</i> | Common Timothy | I | SNA | --- | --- | --- | GNR |
| x | <i>Phragmites australis</i> | European Reed | I | SNA | --- | --- | --- | G5 |
| x | <i>Physocarpus opulifolius</i> | Eastern Ninebark | N | S5 | --- | --- | --- | G5 |
| x | <i>Pinus strobus</i> | Eastern White Pine | N | S5 | --- | --- | --- | G5 |
| x | <i>Plantago lanceolata</i> | English Plantain | I | SNA | --- | --- | --- | G5 |
| x | <i>Plantago major</i> | Common Plantain | I | SNA | --- | --- | --- | G5 |
| x | <i>Plantago rugelii</i> | Rugel's Plantain | N | S5 | --- | --- | --- | G5 |
| x | <i>Poa compressa</i> | Canada Bluegrass | I | SNA | --- | --- | --- | GNR |
| x | <i>Poa pratensis</i> | Kentucky Bluegrass | I | SNA | --- | --- | --- | G5 |
| x | <i>Podophyllum peltatum</i> | May-apple | N | S5 | --- | --- | --- | G5 |
| x | <i>Polygonum aviculare</i> | Prostrate Knotweed | N | S4? | --- | --- | --- | GNR |
| x | <i>Populus deltoides</i> | Eastern Cottonwood | N | S5 | --- | --- | --- | G5 |
| x | <i>Populus tremuloides</i> | Trembling Aspen | N | S5 | --- | --- | --- | G5 |
| x | <i>Potentilla recta</i> | Sulphur Cinquefoil | I | SNA | --- | --- | --- | GNR |
| x | <i>Prunella vulgaris</i> | Common Self-heal | N | S5 | --- | --- | --- | G5 |
| x | <i>Prunus avium</i> | Sweet Cherry | I | SNA | --- | --- | --- | GNR |
| x | <i>Prunus serotina</i> | Black Cherry | N | S5 | --- | --- | --- | G5 |
| x | <i>Prunus virginiana</i> | Choke Cherry | N | S5 | --- | --- | --- | G5 |
| x | <i>Pyrus communis</i> | Common Pear | I | SNA | --- | --- | --- | G5 |
| x | <i>Quercus alba</i> | White Oak | N | S5 | --- | --- | --- | G5 |
| x | <i>Quercus bicolor</i> | Swamp White Oak | N | S4 | --- | --- | --- | G5 |
| x | <i>Quercus macrocarpa</i> | Bur Oak | N | S5 | --- | --- | --- | G5 |
| x | <i>Quercus rubra</i> | Northern Red Oak | N | S5 | --- | --- | --- | G5 |
| x | <i>Ranunculus fascicularis</i> | Early Buttercup | N | S4 | --- | --- | --- | G5 |
| x | <i>Rhamnus cathartica</i> | Common Buckthorn | I | SNA | --- | --- | --- | GNR |
| x | <i>Rhus typhina</i> | Staghorn Sumac | N | S5 | --- | --- | --- | G5 |
| x | <i>Rosa blanda</i> | Smooth Rose | N | S5 | --- | --- | --- | G5 |
| x | <i>Rosa carolina</i> | Carolina Rose | N | S4 | --- | --- | --- | G5 |
| x | <i>Rosa multiflora</i> | Multiflora Rose | I | SNA | --- | --- | --- | GNR |
| x | <i>Rubus idaeus ssp. idaeus</i> | Common Red Raspberry | I | SNA | --- | --- | --- | G5T5 |
| x | <i>Rubus occidentalis</i> | Black Raspberry | N | S5 | --- | --- | --- | G5 |
| x | <i>Rumex crispus</i> | Curly Dock | I | SNA | --- | --- | --- | GNR |

| | | | | | | | | |
|---|---|------------------------------|---|------|-----|-----|-----|------|
| x | <i>Salix euxina</i> | Crack Willow | I | SNA | --- | --- | --- | GNR |
| x | <i>Sambucus canadensis</i> | Common Elderberry | N | S5 | --- | --- | --- | G5 |
| x | <i>Sambucus racemosa</i> ssp. <i>pubens</i> | Red Elderberry | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Sanguinaria canadensis</i> | Bloodroot | N | S5 | --- | --- | --- | G5 |
| x | <i>Schoenoplectus tabernaemontani</i> | Soft-stemmed Bulrush | N | S5 | --- | --- | --- | G5 |
| x | <i>Solidago caesia</i> | Blue-stemmed Goldenrod | N | S5 | --- | --- | --- | G5 |
| x | <i>Solidago juncea</i> | Early Goldenrod | N | S5 | --- | --- | --- | G5 |
| x | <i>Sonchus arvensis</i> | Field Sow-thistle | I | SNA | --- | --- | --- | GNR |
| x | <i>Symphotrichum urophyllum</i> | Arrow-leaved Aster | N | S4 | --- | --- | --- | G4G5 |
| x | <i>Thalictrum dioicum</i> | Early Meadow-rue | N | S5 | --- | --- | --- | G5 |
| x | <i>Thuja occidentalis</i> | Eastern White Cedar | N | S5 | --- | --- | --- | G5 |
| x | <i>Tilia americana</i> | American Basswood | N | S5 | --- | --- | --- | G5 |
| x | <i>Torilis japonica</i> | Erect Hedge-parsley | I | SNA | --- | --- | --- | GNR |
| x | <i>Toxicodendron radicans</i> | Poison Ivy | N | S5 | --- | --- | --- | G5 |
| x | <i>Trifolium pratense</i> | Red Clover | I | SNA | --- | --- | --- | GNR |
| x | <i>Trillium grandiflorum</i> | White Trillium | N | S5 | --- | --- | --- | G5 |
| x | <i>Triosteum aurantiacum</i> | Orange-fruited Horse-gentian | N | S4S5 | --- | --- | --- | G5 |
| x | <i>Tripleurospermum inodorum</i> | Scentless Chamomile | I | SNA | --- | --- | --- | GNR |
| x | <i>Tussilago farfara</i> | Colt's-foot | I | SNA | --- | --- | --- | GNR |
| x | <i>Typha angustifolia</i> | Narrow-leaved Cattail | I | SNA | --- | --- | --- | G5 |
| x | <i>Ulmus rubra</i> | Slippery Elm | N | S5 | --- | --- | --- | G5 |
| x | <i>Verbena hastata</i> | Blue Vervain | N | S5 | --- | --- | --- | G5 |
| x | <i>Verbena urticifolia</i> | White Vervain | N | S5 | --- | --- | --- | G5 |
| x | <i>Veronica officinalis</i> | Common Speedwell | I | SNA | --- | --- | --- | G5 |
| x | <i>Viburnum lantana</i> | Wayfaring-tree | I | SNA | --- | --- | --- | GNR |
| x | <i>Viburnum lentago</i> | Nannyberry | N | S5 | --- | --- | --- | G5 |
| x | <i>Viburnum rafinesquianum</i> | Downy Arrowwood | N | S5 | --- | --- | --- | G5 |
| x | <i>Vicia cracca</i> | Tufted Vetch | I | SNA | --- | --- | --- | GNR |
| x | <i>Viola canadensis</i> | Canada Violet | N | S5 | --- | --- | --- | G5 |
| x | <i>Viola pubescens</i> | Yellow Violet | N | S5 | --- | --- | --- | G5 |
| x | <i>Viola sororia</i> | Woolly Blue Violet | N | S5 | --- | --- | --- | G5 |
| x | <i>Vitis riparia</i> | Riverbank Grape | N | S5 | --- | --- | --- | G5 |

Table 6 – Floristic Summary and Assessment

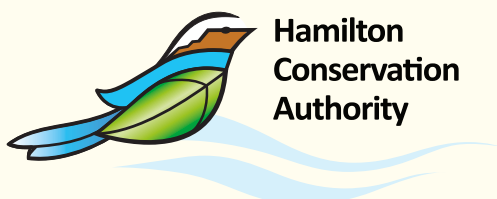
| FLORISTIC SUMMARY & ASSESSMENT | | | | |
|--|---------------------------------|--------------|-----|-----|
| Species Diversity | | | | |
| | Total Species: | 204 | | 163 |
| | Native Species: | 101 | 50% | 62% |
| | Exotic Species | 62 | 30% | 38% |
| | Species ID'd to sp. only | 41 | | |
| | Total Taxa in Region (NAI 2014) | 1496 | | |
| | % Regional Taxa Recorded | 11% | | |
| | Regionally Significant Species | | | |
| | S1-S3 Species | 2 | | |
| | S4 Species | 14 | | |
| | S5 Species | 82 | | |
| Co-efficient of Conservatism and Floral Quality Index | | | | |
| Co-efficient of Conservatism (CC) (average) | | 3.94 | | |
| CC 0 to 3 | lowest sensitivity | 37 | | |
| CC 4 to 6 | moderate sensitivity | 56 | | |
| CC 7 to 8 | high sensitivity | 6 | | |
| CC 9 to 10 | highest sensitivity | 1 | | |
| Floral Quality Index (FQI) | | 39.60 | | |

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**Hamilton
Conservation
Authority**

A Healthy Watershed for Everyone

838 MINERAL SPRINGS ROAD
P.O. BOX 81067
ANCASTER, ONTARIO L9G 4X1
P: 905-525-2181
WWW.CONSERVATIONHAMILTON.CA

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Chippawa Rail Trail Management Plan

Draft - September 2025



A Healthy Watershed for Everyone



Photo 1: Trail Access Point at Nebo Road

Prepared by: Hamilton Region Conservation Authority (HCA)
Photo Credits: HCA Staff



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1.0 APPROVAL STATEMENT

We are pleased to approve the Chippawa Rail Trail Management Plan 2025 as the official policy document for the Hamilton Region Conservation Authority (HCA).

This plan supports HCA’s current Strategic Plan and reflects our Vision of a healthy watershed for everyone and Mission to lead in the conservation of our watershed and connect people to nature.

Moving forward over the next ten years this plan will provide guidance for HCA management of the Chippawa Rail Trail in support of these goals.

Lisa Burnside
Chief Administrative Officer
Hamilton Conservation Authority

Date

Councillor Brad Clark
Chair, Board of Directors
Hamilton Conservation Authority

Date

2.0 INTRODUCTION

2.1 Area Summary

The Chippawa Rail Trail (CRT) is a 15-kilometer multi-use recreational trail located between the City of Hamilton and the Town of Caledonia in Haldimand County. This off-road trail follows the former Canadian National Railway line acquired by the Hamilton Region Conservation Authority (HCA) in 1996. This trail is part of the Niagara section of the Trans Canada Trail.

HCA's naming of the rail trail is based on the former name of the Welland River, Chippawa Creek, that the trail crosses over and the historic name Chippawa, a former village in Welland County, which is situated at the confluence of the Welland and Niagara Rivers south of Niagara Falls. The alternate spelling 'Chippewa' has been adopted by Haldimand County and Trans Canada Trail. The name 'Chippawa' adopted by HCA is used in this plan.

This Management Plan is focused on the 12 km trail owned and managed by HCA between Stone Church Road East and Haldibrook Road in the City of Hamilton. Haldimand County owns and manages the trail corridor south of Haldibrook Road to the Town of Caledonia. The parking lot at Dartnall Road in HCA's Mount Albion Conservation Area serves as a staging area for the north end of the trail in Hamilton.

In 1998 the HCA Board of Directors approved the Chippawa Rail Trail Master Plan which guided the initial construction of the trail from Hamilton to Caledonia. This document updates and replaces that plan.

2.2 Key Items

HCA staff focused on four key items when preparing this Management Plan:

1. Condition of the trail infrastructure.
2. Terrestrial and aquatic ecological review of the trail corridor.
3. Potential linkages to Hamilton Conservation Areas for trail users.
4. Potential linkages to other recreational trails, natural areas, and features.

2.3 Goals and Objectives

This plan provides current information on the HCA managed trail portion, and provides guidance for trail management, development and operation for the next ten years.

2.3.1 HCA Strategic Plan

This Management Plan supports the Vision, Mission and strategic priority areas as outlined in HCA's current Strategic Plan:

Vision

- A healthy watershed for everyone.

Mission

- To lead in the conservation of our watershed and connect people to nature.

Strategic Priority Areas

- **Organizational Excellence** - Focused on our organizational resources to ensure efficient and responsive operations are available to meet the needs of the future.
- **Water Resources Management** - Focused on safeguarding the health of the watershed and protecting people and property from natural hazards.
- **Natural Heritage Conservation** - Focused on the management and conservation of natural areas, which include the forests, wetlands, meadows, and watercourses within the watershed.
- **Connecting People to Nature** - Focused on the conservation of HCA lands and connecting communities to natural areas.

2.3.2 Land Acknowledgement

The HCA joins in stewardship of lands and waters with Indigenous Peoples who have cared for them since time before memory. We acknowledge that the land on which we gather, and the HCA watershed, is part of the Treaty Lands and Territory of the Mississaugas of the Credit First Nation and traditional territory of the Haudenosaunee.

As an organization, we are committed to learning about the shared history and experiences of Indigenous Peoples in Canada and creating relationships based on respect, trust and friendship. In our shared gratitude for every aspect of the natural world, may we create a lasting legacy now and for future generations.

2.3.3 HCA Climate Change Strategy

The goal of HCA's Climate Change Strategy is to work towards achieving net zero status across HCA's operations through the reduction of greenhouse gases (GHG's), while also working to increase our overall adaptive capacity to changing climatic conditions.

HCA Climate Change Strategy - Key Areas of Focus

- Environment and Natural Heritage
- Experience, Education and Awareness
- Partnerships

2.3.4 City of Hamilton Biodiversity Action Plan

The HCA is a dedicated partner of the Hamilton Biodiversity Action Plan. Developing updated Master and Management Plans for HCA owned and managed natural areas directly supports Action 7.6 in the Biodiversity Action Plan. Management Plans help guide the protection of biodiversity in these natural areas and help to inform local decision making.

3.0 BACKGROUND

3.1 Study Area

The Chippawa Rail Trail is located on a 15-kilometer section of the former Canadian National Railway Line and its associated landholdings between the City of Hamilton and the Town of Caledonia in Haldimand County. Stone Church Road in the City of Hamilton is the northern limit of this corridor while Regional Road 66 is the southern limit. The trail is part of the Niagara portion of the Trans Canada Trail and offers connection to the City of Hamilton recreational trail system. See Figure 1, Figure 2 and the appended maps for more information.

3.2 Property History

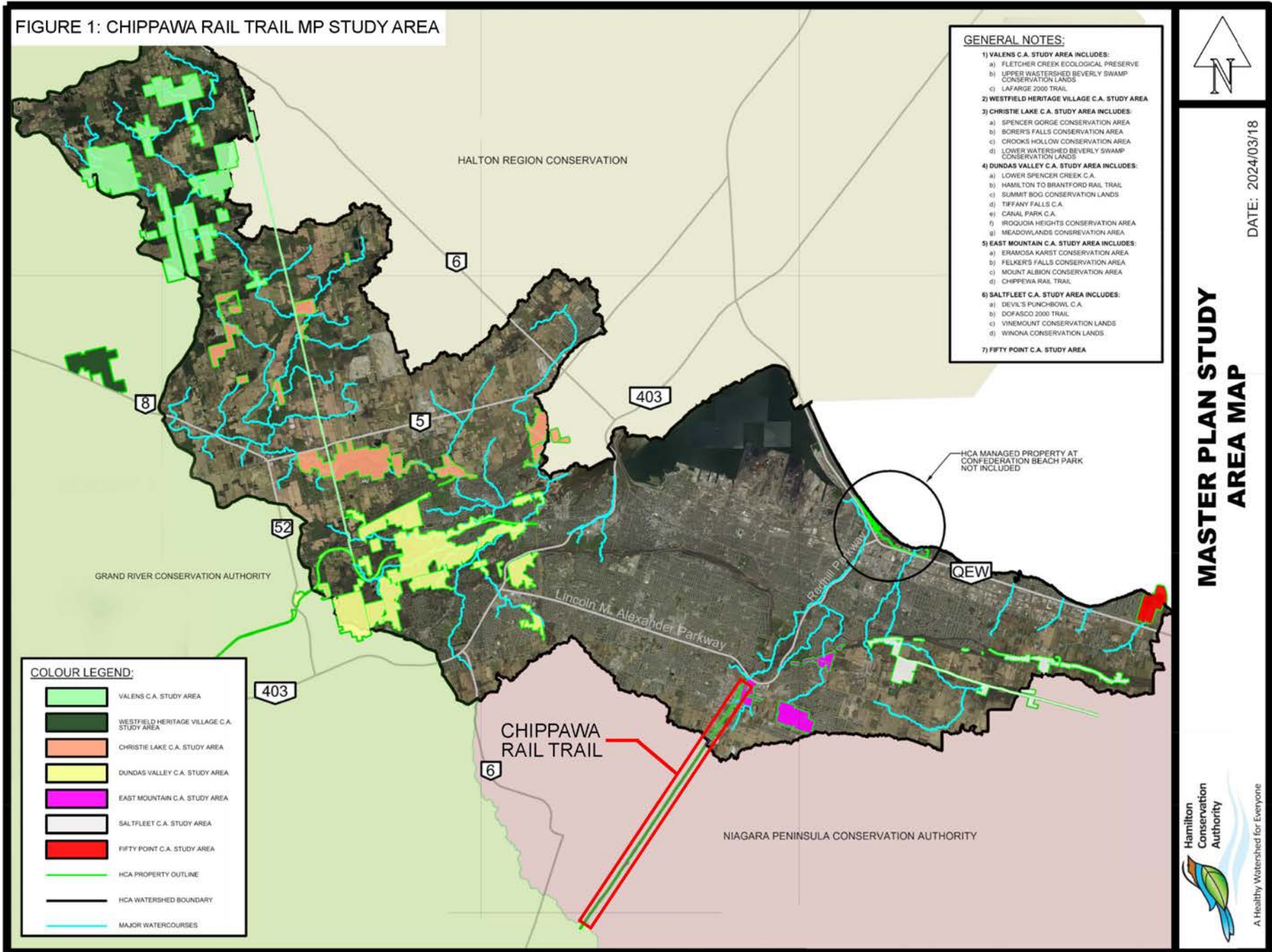
HCA recognizes that these conservation area lands were inhabited by First Nations peoples including the Mississaugas of the Credit First Nation, the Haudenosaunee, and the Huron-Wendat. HCA also recognizes that this area has been, and continues to be, home to many Indigenous peoples including the Métis, Inuit and Urban Indigenous communities.

First envisioned in the 1850's, construction of the Hamilton – Lake Erie Railroad began in 1872. After a few delays in construction, the railway was officially declared open for service in 1873. The rail line ran from Hamilton to Caledonia through Glanford with its first stop at Rymal Station. Renton or Rentonville Station (renamed in 1887 to Glanford Station to reduce confusion with the small town of Renton between Jarvis and Simcoe) was located on Station Road (Miles Road) which served Mount Hope and the surrounding community. Since this stop was at the highest point between Lake Erie and Lake Ontario, heavy freight cars would be shunted to a side track to be picked up by a train with a lighter load. Eight trains daily would travel the line carrying passengers, cattle, and farm produce to Hamilton as well as farm machinery and students to high school in Caledonia. At one time, a post office, a station coal shed, stock pens, loading ramp and an agent's residence were located at Glanford Station. During World War II, stone would be shipped to the station and then taken by truck to the Mount Hope Airport for construction of the runway. In 1887, Glanford Station became a "flag stop" only. The station and associated features were dismantled in the early 1960's after almost 90 years of service to the community.



Photo 2: Telegraph pole along the trail

FIGURE 1: CHIPPEWA RAIL TRAIL MP STUDY AREA



- GENERAL NOTES:**
- 1) **VALENS C.A. STUDY AREA INCLUDES:**
 - a) FLETCHER CREEK ECOLOGICAL PRESERVE
 - b) UPPER WATERSHED BEVERLY SWAMP CONSERVATION LANDS
 - c) LAFARGE 2000 TRAIL
 - 2) **WESTFIELD HERITAGE VILLAGE C.A. STUDY AREA**
 - 3) **CHRISTIE LAKE C.A. STUDY AREA INCLUDES:**
 - a) SPENCER GORGE CONSERVATION AREA
 - b) BOREN'S FALLS CONSERVATION AREA
 - c) CROOKS HOLLOW CONSERVATION AREA
 - d) LOWER WATERSHED BEVERLY SWAMP CONSERVATION LANDS
 - 4) **DUNDAS VALLEY C.A. STUDY AREA INCLUDES:**
 - a) LOWER SPENCER CREEK C.A.
 - b) HAMILTON TO BRANTFORD RAIL TRAIL
 - c) SUMMIT BOG CONSERVATION LANDS
 - d) TIFFANY FALLS C.A.
 - e) CANAL PARK C.A.
 - f) IROQUOIA HEIGHTS CONSERVATION AREA
 - g) MEADOWLANDS CONSERVATION AREA
 - 5) **EAST MOUNTAIN C.A. STUDY AREA INCLUDES:**
 - a) ERAMOSIA KARST CONSERVATION AREA
 - b) FELKER'S FALLS CONSERVATION AREA
 - c) MOUNT ALBION CONSERVATION AREA
 - d) CHIPPEWA RAIL TRAIL
 - 6) **SALTFLEET C.A. STUDY AREA INCLUDES:**
 - a) DEVIL'S PUNCH-BOWL C.A.
 - b) DOFASCO 2000 TRAIL
 - c) VINEMOUNT CONSERVATION LANDS
 - d) WINONA CONSERVATION LANDS
 - 7) **FIFTY POINT C.A. STUDY AREA**

- COLOUR LEGEND:**
- VALENS C.A. STUDY AREA
 - WESTFIELD HERITAGE VILLAGE C.A. STUDY AREA
 - CHRISTIE LAKE C.A. STUDY AREA
 - DUNDAS VALLEY C.A. STUDY AREA
 - EAST MOUNTAIN C.A. STUDY AREA
 - SALTFLEET C.A. STUDY AREA
 - FIFTY POINT C.A. STUDY AREA
 - HCA PROPERTY OUTLINE
 - HCA WATERSHED BOUNDARY
 - MAJOR WATERCOURSES



DATE: 2024/03/18

MASTER PLAN STUDY AREA MAP



There remains a variety of cultural and historical features along and adjacent to the rail trail corridor. From a historical perspective, many of these features relate to the operation of the railway such as telegraph poles, whistle signs, mileage markers and switch boxes. Of significance is the former Harris Grain Elevator located at Rymal Station at the north end of the trail. More information about the Harris Grain Elevator is provided in Section 3.3 Heritage Designation and Historic Buildings.

The Hamilton and Lake Erie Railway was dissolved into the Grand Trunk Railway and this company eventually became the Canadian National Railway. The rail line was abandoned in the early 1990's and was purchased by HCA in December 1996. Funding for this acquisition was obtained from the Hamilton Naturalists' Club, The Conservation Foundation of Hamilton Region, Region of Hamilton-Wentworth, Canada Trust Friends of the Environment and from the national non-profit organization ParticipACTION

Upon acquisition of the corridor, a steering committee was established comprised of adjacent landowners, municipal employees, varied user groups, and HCA staff to assist in the review and creation of a master plan to guide the development, use, and maintenance of a multi-use recreational trail. At the direction of this steering committee, public consultation in the form of open houses, meetings, and site-meetings were held in 1997 to help inform the Master Plan approved by the HCA Board of Directors in 1998.

Trail construction commenced in 1998 from Stone Church Road to the north side of Dickenson Road. By 2000 this first phase was completed, with the road crossing gates and signage for the trail ordered. As well an engineering review of the railroad bridges was conducted, to support the design and installation of pedestrian guards for the bridges. Subsequent work on the bridges and trail was completed between 2000 and 2012 to complete the trail project. During this time the City of Hamilton also implemented road improvement projects at a number of road crossings, most significantly the widening of Dartnall Road in 2008 to 2009. At all the road crossings HCA added trail barriers, and at locations where ATV's were accessing the trail. Repairs to the trail were required in 2012 where it had washed out north of Nebo Road. Garbage removal, graffiti removal at the bridges, and erection of trail barriers through the industrial areas where encroachment was happening also kept HCA staff busy during these early years of trail establishment.

In 2012 discussions began between HCA and Haldimand County surrounding the development and maintenance of the trail south of Haldibrook Road. In 2015, the HCA Board of Directors agreed to transfer the three kilometers of trail corridor south of Haldibrook Road to Haldimand County at no purchase cost. Haldimand County continued to work on the trail south of Haldibrook Road, including the installation of trail kiosks and signage with the support of Trans Canada Trail. At the time that this plan was written, the trail ends 400 meters south of Haldimand Road 66 and the connection to the town of Caledonia has not been completed.

3.3 Heritage Designation and Historic Buildings

The Ontario Heritage Act enables municipalities to protect and manage Ontario's cultural heritage resources. Part IV of the Act provides for municipal designation of individual properties as having cultural heritage value. Properties are designated by a municipal by-law, with reasons for designation or a description of heritage attributes which must be retained to conserve the cultural heritage value. Heritage property designation serves to: recognize the importance of a property to the community; identify and protect the property's cultural heritage value; encourage good stewardship and conservation; and promote knowledge and understanding about the property and the development of the community.

Municipal heritage designation provides long-term protection of a property’s historic value by by-law, and the City offers financial incentives to assist with the conservation, restoration, and rehabilitation of designated heritage properties. The City of Hamilton recently changed its heritage designation process because of provincial amendments to the Ontario Heritage Act and Planning Act. City Cultural Heritage staff have been consulted for the Chippawa Rail Trail, and their comments are incorporated in this plan.

3.3.1 Harris Grain Elevator

The Former Harris Grain Elevator was constructed in 1943. The property was surveyed by the Inventory and Research Working Group of the Hamilton Municipal Heritage Committee and discussed at the Committee meeting in January 2022. From this meeting, the structure was identified as a candidate for designation under Part IV of the Ontario Heritage Act and listed on the City’s Municipal Heritage Register.

Beginning in 2023, a detailed evaluation of the property was undertaken by staff from the City’s Cultural Heritage Department. In April 2024, a staff report was brought to the Hamilton Municipal Heritage Committee and members voted to approve the designation. As of August 16, 2024, the designation process was complete and By-law 24-145 is in place for the property designating 2 Dartnall Road as a property of cultural heritage value.

The structure will be conserved and managed in accordance with the Ontario

Heritage Act and Heritage Permit process. City of Hamilton Cultural Heritage Planning staff will be consulted for any work proposed for the structure as work will likely be subject to the Heritage Permit process.

Rymal Station Heritage is a local non-profit organization that is dedicated to preserving the history of this site and restoring the Harris Grain Elevator. The HCA is open to exploring opportunities for potential partnerships or agreements with Rymal Station Heritage that could benefit this site.

3.3.2 St. George’s Anglican Cemetery

Adjacent to the rail corridor at Rymal Road is St. George’s Anglican Cemetery, circa 1835. An Anglican church, circa 1865, operated at this site for 94 years. In 1974 the church building was donated to the Niagara Peninsula Conservation Authority (NPCA) and moved to the Ball’s Falls Conservation Area. The cemetery site remains open for burials to this day and is in the City of Hamilton’s inventory of heritage properties and cemeteries and burial grounds. Along the rail corridor there are several farm lanes that cross the trail and link farm properties.



Photo 3: Former Harris Grain Elevator

Historically many farmers in this area utilized the railway to get their crops to market in Hamilton and to take their children to school.

3.4 Planning and Development Controls

The trail is located in Ward 6, East Mountain and Ward 11, Glanbrook, and is subject to the planning and development controls of the City of Hamilton. The south boundary of the trail at Haldibrook Road abuts Haldimand County, which manages the continuation of the trail to the town of Caledonia. See Figure 2. Context Map for more details.

The Chippawa Rail Trail corridor is zoned as P4 Open Space in the City of Hamilton’s Urban Hamilton Official Plan and Rural Hamilton Official Plan. Conservation and recreational uses are permitted uses in the Open Space designation and zoning.

The trail corridor is recognized as a Linkage as part of the Natural Heritage System in the City of Hamilton Rural Official Plan. Linkages are natural areas that connect Core Areas and provide opportunity for plant and animal movement. Linkages are to be protected and enhanced wherever possible.

The cultural heritage resources at 2 Dartnall Road, being the former Harris Grain Elevator, are subject to the Ontario Heritage Act.

The following federal and provincial designations are also identified for the property including:

- A portion of the trail is within the Greenbelt Plan – Protected Countryside.
- Federal, provincial and municipal planning and development controls including the Accessibility for Ontarians with Disabilities Act (AODA), 2005, will be referenced when the HCA is implementing projects and programs specified in this Management Plan.
- Provincial Planning Statement (2024) under the Planning Act which have implications for Significant Woodland, Fish habitat, Significant Wildlife Habitat, habitat for Species at Risk.
- Ontario Endangered Species Act which has implications for endangered and threatened species and their habitat observed on the property.
- Canada Migratory Birds Convention Act which protects numerous bird species and their breeding season generally extending between late March to August. Timing of construction activities and especially vegetation clearing must take this into account.
- Ontario Heritage Act governing lands which contain archaeological resources or areas of archaeological potential.
- Ontario Fish and Wildlife Conservation Act.
- Conservation Authorities Act, R.S.O. 1990.
- Ministry of Environment, Conservation and Parks Environmental Protection Act.

The policies of the Niagara Escarpment Plan and guidelines of the NEPOSS 2021 planning manual have been observed in the preparation of this Management Plan. The north end of the trail abuts the Dartnall Road boundary of the Niagara Escarpment Plan Area and the Niagara Escarpment Parks and Open Space System (NEPOSS).

Portions of the trail south of Twenty Road East are in the Niagara Peninsula Conservation Authority (NPCA), and Grand River Conservation Authority (GRCA) watersheds.

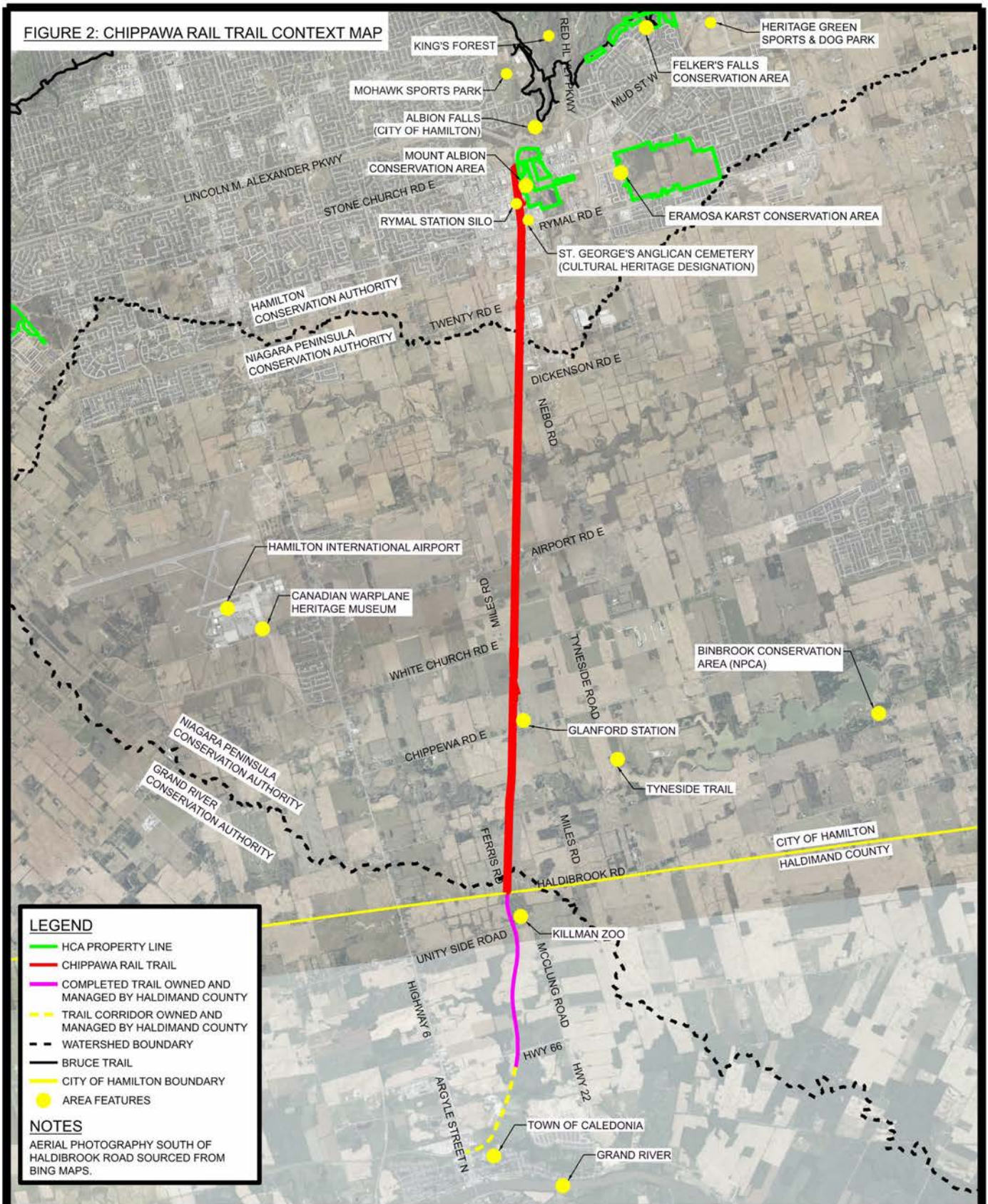
HCA recognizes that certain public infrastructure such as utility corridors, trails or transportation links may be required to cross conservation area lands. There are a number of utility crossings of this trail, as noted in the trail inventory in Section 5. HCA policy for planning review and regulation of these features adheres to the Conservation Authority Act, R.S.O. 1990 c. 27; see Section 6.5 for more information.

During development, this Management Plan has been reviewed by HCA staff in all departments including Capital Projects and Strategic Services, Watershed Management Services, Conservation Area Services and the Hamilton Watershed Stewardship Program. The City of Hamilton Planning and Development, Public Works and Cultural Heritage departments have also been consulted in the preparation of this Management Plan. Representatives from Haldimand County, the NPCA and the GRCA were circulated for comment during the external review of this Management Plan. Rymal Station Heritage, a local non-profit organization that has a strong interest in the former Harris Grain Elevator, was circulated during the external review period and provided comment on the draft plan.



Photo 4: Chippawa Rail Trail

FIGURE 2: CHIPPAWA RAIL TRAIL CONTEXT MAP



CONTEXT MAP
CHIPPAWA RAIL TRAIL MANAGEMENT PLAN

DATE: 2024/06/19



3.5 Conservation Area Zones

Although the Chippawa Rail Trail is not located within the jurisdiction of the Niagara Escarpment Plan (NEP) Area, the policies of the NEP and guidelines of the Niagara Escarpment Parks and Open Space System (NEPOSS) 2021 planning manual have been observed in the preparation of this Management Plan. These zones are intended to help guide future planning, development, and management of the trail. The zone boundaries are shown in more detail in Appendix 1 on Maps 4, 5 and 6 - Conservation Area Zones.

Zones are intended to fulfill a variety of functions in a conservation area, including the following as outlined in the current NEPOSS manual:

- Identification and recognition of the features and attributes (values).
- Protection of key natural heritage and cultural heritage resources.
- Confirmation of the appropriate locations for activities (i.e. directing activities with higher impacts to the least sensitive areas and low impact activities to areas that are more sensitive, if appropriate).
- Delineation of areas based on their requirements for management (e.g. management plan objectives).
- Standardization to support management objectives and actions, based on values (e.g. Nature Reserve Zones supports protection of sensitive natural heritage features and cultural heritage resources).
- Balancing of public use with the preservation of the natural environment.

The five land use zones identified along the Chippawa Rail Trail are:

- Natural Environment Zone
- Access Zone
- Cultural Heritage Zone
- Development Zone
- Resource Management Zone



Photo 5: The rail trail beside the former Harris Grain Elevator

Natural Environment Zone

Natural Environment zones include natural, cultural, and aesthetic landscapes in which minimum development is permitted to support low-intensity recreational activities. The CRT’s natural zones are primarily areas where the trail crosses natural heritage features such as watercourses and significant vegetation communities identified in the ELC mapping.

Table 1. Natural Environment Zone

| Zone | Description | Management Direction | Permitted Uses (subject to management planning) |
|---------------------|--|--|--|
| Natural Environment | <p>Includes scenic landscapes in which minimum development is permitted to support recreational activities that have minimal impacts on the Escarpment environment.</p> <ul style="list-style-type: none"> ➤ Significant woodlands ➤ Significant water courses and associated vegetation buffers | <p>This zone may function as a buffer between Nature Reserve Zones and Development Zones, Cultural Heritage, or Access Zones.</p> <p>Management guidance should maintain and enhance the scenic resources and open landscape character of the environment.</p> | <p>Sustainable recreational activities that have minimal impact on the environment may be permitted.</p> <p>Examples include:</p> <ul style="list-style-type: none"> ➤ Existing recreational trail ➤ Nature appreciation from designated educational interpretive stations. ➤ Temporary scientific research ➤ Conservation practices (e.g. tree maintenance and monitoring, invasive species control, erosion control) <p>Infrastructure required for safety or accessibility may be permitted where there is no feasible alternative.</p> |

Access Zone

Access Zones serve as staging areas to support the use of and access to adjacent land uses and zones. Minimal infrastructure is permitted such as trailhead parking, signage, and visitor amenities.

Access zones are identified along the CRT at all road intersections where visitors can access the trail and at the HCA service access and staging area on Dartnall Road.

Table 2. Access Zone

| Zone | Description | Management Direction | Permitted Uses (subject to management planning) |
|--------|---|--|---|
| Access | <p>Serve as staging areas (e.g. trailheads, parking lots) where minimal facilities support the use of Nature Reserve Zones and relatively undeveloped Natural Environment and Cultural Heritage Zones.</p> <ul style="list-style-type: none"> ➤ Trailheads and trail access points ➤ Service access | <p>Access zones are intended to support the use of and access to adjacent zones.</p> | <p>Infrastructure may be permitted to support the Nature Reserve, Natural Environment, and Cultural Heritage Zone.</p> <p>Examples along the CRT include:</p> <ul style="list-style-type: none"> ➤ Recreational trails ➤ Wayfinding signage ➤ Gates ➤ Trailhead kiosks ➤ Site furnishings (benches, waste receptacles) |

Cultural Heritage Zone

Cultural Heritage zones are intended to protect significant built heritage resources, archaeological resources, and cultural heritage resources. The Chippawa Rail Trail’s Cultural Heritage zone includes the former Harris Grain Elevator between Stone Church Road East and Rymal Road East.

Table 3. Cultural Heritage Zone

| Zone | Description | Management Direction | Permitted Uses (subject to management planning) |
|-------------------|--|--|---|
| Cultural Heritage | <p>This zone includes cultural heritage resources that require management to ensure long-term conservation.</p> <ul style="list-style-type: none"> ➤ Built cultural heritage features | <p>Management guidance will ensure long-term conservation, enhancement and potentially restoration of cultural heritage resources.</p> | <p>Development will ensure long-term conservation of cultural heritage resources.</p> <p>Examples for the CRT include:</p> <ul style="list-style-type: none"> ➤ Interpretive/educational signs ➤ Viewing areas along the established trail ➤ Historical restorations or reconstructions as needed ➤ Research activities |

Development Zone

Development zones provide visitor access, orientation, and operational facilities in the conservation area including areas designed to provide facilities and supporting infrastructure for recreational purposes.

A Development Zone is included along the CRT at Miles Road where a former parking lot is identified for improvement work to make it operational once again.

Table 4. Development Zone

| Zone | Description | Management Direction | Permitted Uses (subject to management planning) |
|-------------|---|---|---|
| Development | <p>Development Zones provide the main visitor access to the conservation area, and facilities and services to support nature appreciation and recreational activities.</p> <p>This zone may include areas designed to provide facilities and supporting infrastructure for recreational purposes.</p> <ul style="list-style-type: none"> ➤ Existing parking lot area to be improved ➤ Visitor amenities | <p>Management guidance should note that recreational uses and development may be accessory or secondary to the protection of natural heritage features and to the conservation of cultural heritage resources such as designated cultural heritage sites and archaeologically significant sites.</p> <p>Retail and visitor facilities should be appropriately scaled for the site.</p> <p>Facility development must be undertaken in a way that will minimize the impact on the Escarpment environment.</p> | <p>Examples of permitted uses that provide access, orientation and operational facilities to support nature appreciation and recreational activities for the CRT include:</p> <ul style="list-style-type: none"> ➤ Roadways ➤ Parking areas ➤ Picnic areas ➤ Recreational trails ➤ Signage |

Resource Management Zone

Resource Management zones provide for sustainable resource management of agricultural lands, previously disturbed sites, forest products, and land that has a long-term resource agreement such as a managed forest.

Much of the CRT is identified as a Resource Management zone due to the sites previous function as a rail line and the close connection and impacts from active agricultural and industrial lands surrounding the majority of the narrow trail corridor.

Table 5. Resource Management Zone

| Zone | Description | Management Direction | Permitted Uses (subject to management planning) |
|---------------------|--|---|---|
| Resource Management | <p>Provides for sustainable resource management of forests, fisheries, watersheds, wildlife, or flood control.</p> <p>Previously disturbed sites (e.g. old farm fields, abandoned quarries) where active measures are being taken to re-establish natural vegetation.</p> <ul style="list-style-type: none"> ➤ Former railway line ➤ Areas impacted by agriculture ➤ Areas impacted by industrial lands | <p>Management guidance should support:</p> <ul style="list-style-type: none"> ➤ Experimenting with alternative resource management practices. ➤ Understanding ecosystem structures and functions. ➤ Activating effective conservation and stewardship practices. | <p>These areas may be used to demonstrate ecologically sustainable resource management practices.</p> <p>Examples along the CRT include:</p> <ul style="list-style-type: none"> ➤ Research and monitoring ➤ Existing recreational trail ➤ Rehabilitation and naturalization projects ➤ Watercourse management ➤ Forest and vegetation management |

4.0 NATURAL AREA INVENTORY

4.1 Natural Features

The trail corridor is traversed by four watercourses located within three major watersheds. The tributaries of these watercourses also cross the rail trail in a number of locations. The watercourses and tributaries are the main natural features located along and adjacent to the trail. These watercourse crossings provide an ecological link from the rail trail to the adjacent natural features associated with the watercourses.

Data reported in this section was collected through field surveys completed along the trail corridor throughout 2023. The trail corridor is vegetated with a variety of tree, shrub, and herbaceous species. Seven vegetation community types were identified, including hedgerows, thickets, and small wetland pockets. 112 native plants and 77 non-native plants were identified along the trail. Eastern wood-pewee, a provincially special concern species, was identified as breeding along the trail corridor, as well as four other locally uncommon birds and one locally rare species. Monarch butterflies as well as Butternut trees both provincially and federally endangered were observed along the trail. Monarchs were noted in all life stages. Honey Locust, an S2 tree species with fewer than 20 populations in the province, was also recorded as a landscape tree along the trail. There were also several locally rare (eight) and uncommon (13) species recorded during field surveys and found in the background research. These include birds, plants and frog species.



Photo 6: Chippawa Trail

The upland areas located between the various ravine and stream courses have soil conditions ideally suited to a variety of agricultural purposes, and as such the natural landscape over the length of the rail trail corridor has been altered. Accordingly, the remaining vegetation is primarily confined to the rail trail corridor. Ten different invasive species were noted along the trail. The most abundant was Common buckthorn in the hedgerows along the trail. Phragmites were also noted in the ditches and small wetland pockets along the trail. Invasive species were more prevalent in the industrial sections of the trail than in the rural more agricultural locations.

There are no designated Environmentally Significant Areas (ESA) located within the limits of the rail trail corridor. However, there are five ESAs in close proximity to the rail trail. These areas include the Red Hill Valley, Hannon Floodplain Forests, Glanford Station West Wetlands, Binbrook Southwest Area, and the Glanford Station Northeast Woods. Except for the Glanford Station Northeast Woods, the remaining adjacent Environmentally Significant Areas are linked to the rail trail corridor via Upper Hannon Creek,

Twenty Mile Creek, and the Welland River. A small section of significant woodland abuts the trail between Dickenson and Airport Road. Significant woodlands for the City of Hamilton mean an area which is ecologically important in terms of features (species composition, age of trees and stand history) and function (contributes to the broader landscape because of its location, size or the amount of forest cover in the planning area) (City of Hamilton, 2019).

4.1.1 Biophysical Inventory Methodology

Biophysical inventories noted in Table 6 completed along the Chippawa Trail consisted of Ecological Land Classification Surveys completed in 2023, botanical inventories and incidental sightings of wildlife. Ecological Land Classification was completed across all sections of the trail and is shown on Maps 1-3 in Appendix 1. Species lists are included in Appendix 5.

Table 6. Summary of Ecological Field Studies at Chippawa Rail Trail Properties

| Survey Type | Dates | |
|--------------------------------------|---|---|
| | Year | Day(s) |
| Floral Inventory | 2023 | concurrent with ELC surveys |
| Ecological Land Classification (ELC) | 2023 | April 27, June 13, July 6,10 and 19, Aug 3 and Oct 10 |
| Fisheries Surveys | 2023 | Sept. 25, and Oct. 5 |
| Incidental wildlife survey | Recorded when encountered during all visits | |

4.1.2 Ecological Land Classification

The Ecological Land Classification (ELC) system for Ontario was used to describe the vegetation communities at Chippawa Rail Trail. The section of the trail starting from Stone Church Road East to Haldibrook Road were surveyed by staff. These were conducted from May to October 2023. Details on the canopy, sub canopy, shrub, and ground layers of each vegetation community were recorded. Vegetation community boundaries were determined using air photo analysis and further refined in the field.

4.1.3 Flora/Botanical Inventory

Botanical inventories were conducted as a part of the Ecological Land Classification surveys of the properties. Specific floristic inventories occurred in the spring of 2023 for spring ephemerals (early spring flowers) and the fall of 2023 to further identify asters and goldenrod species as they bloom late in the season. Species nomenclature is based on the Natural Heritage Information Centre (NHIC) Plant Species list (updated yearly). Species and community ranks are determined provincially by the Ministry of Natural Resources and Forestry Natural Heritage Information Centre Database (Sfranks) and locally via the Hamilton Natural Areas Inventory (Schwetz 2014). Inventories of the Chippawa Rail Trail have been conducted by HCA staff and are summarized in this document.

4.1.4 Fauna Inventory

No specific surveys were conducted for frog calls and other wildlife on the property. All wildlife encounters

were incidental while conducting other aspects of field work. These surveys involved general coverage recording all species observations and signs (e.g. tracks/trails, scat, and burrows, dens, browse and vocalizations). Background data including older survey material from the Natural Areas Inventory (NAI) and iNaturalist (research grade only) was used to develop a list of frogs, birds, butterflies, mammals, and dragonflies that have been recorded by naturalists along the Chippawa Trail over the last 10 years. A summary of the findings is in Appendix 5. A new Natural Areas Inventory is currently underway in Hamilton. Findings of the new NAI will be incorporated in future updates to this Management Plan.

4.1.5 Breeding Bird Surveys

No dedicated Breeding bird surveys were conducted at this property. Incidental sightings were recorded by the staff during ELC field surveys.

4.1.6 Ecological Land Classification Results

Field surveys occurred over seven visits between April and October 2023. This included all HCA-owned properties between Stone Church Road East and Haldibrook Road along the Chippawa Trail. The properties were delineated into 10 vegetation communities, which are detailed below. Mapping of ELC communities can be found on Maps 1-3 in Appendix 1.

Table 7. Ecological Land Classification community descriptions

| Community Type | ELC Code | Community Description |
|---------------------------------|-----------------|---|
| Hedgerow | H1* | Treed Hedgerow equally dominated by Black Walnut and Manitoba Maple |
| | H2* | Treed Hedgerow dominated by Black Walnut |
| Deciduous Thicket | THDM3-2 | Native Shrub Deciduous Hedgerow Thicket Type |
| | THDM4-1 | Dry-Fresh Deciduous Regeneration Thicket Ecosite |
| Graminoid Meadow | MEGM3 | Dry-Fresh Graminoid Meadow Ecosite |
| Deciduous Woodland | WOD5 | Fresh-Moist Deciduous Woodland Ecosite |
| Lowland Deciduous Forest | FOD7-5/ FODM7-5 | Fresh-Moist Black Maple Lowland Deciduous Forest Type |
| Mineral Shallow Marsh | MASM 1-12 | Common Reed Mineral Shallow Marsh Type |
| | MAS2-1/MASM1-1 | Cattail Mineral Shallow Marsh Type |
| Mineral Deciduous Thicket Swamp | SWT2/SWTM3 | Willow Mineral Deciduous Thicket Swamp Ecosite |

*H1 and H2 have deciduous trees but could not be categorized as woodland based on the smaller area and its presence as hedgerow.

4.1.6.1 Hedgerow

Treed Hedgerow equally dominated by Black Walnut and Manitoba Maple (H1)

This hedgerow is in the section between Rymal Road East and Stone Church Road East. In this narrow community Manitoba maple and black walnut are both occasionally present in the canopy and sub-canopy. Hawthorn, white elm, crab apple, pear sp. and common buckthorn can also be found occasionally

present in the sub-canopy. Shrub layer have gray dogwood growing in abundance with occasional staghorn sumac, common buckthorn and hawthorn.

Treed Hedgerow dominated by Black Walnut (H2)

Similar to the above, this hedgerow is also dominated by the deciduous trees growing along the trail length with limited width. This hedgerow type was identified at trail sections on either side of Dickenson Road East, Airport Road East, and on the section between Chippewa Road East and Haldibrook Road. The tree species that are present abundantly here are black walnut in the canopy layer, followed by Manitoba maple present occasionally. Gray dogwood can be found in abundance in the shrub layer.

4.1.6.2 Thicket

Native Shrub Deciduous Hedgerow Thicket Type (THDM3-2)

This community is dominated by gray dogwood which forms a hedgerow along the length of the trail starting from Rymal Road to Haldibrook Road. There are sections of other community types, breaking the continuation of gray dogwood hedgerow. Tree species like black walnut and Manitoba maple can be found in the canopy layer. The gray dogwood had formed dense stands, allowing very few ground cover species to survive. A mix of herbaceous and forb species were found in the ground vegetation where sunlight could penetrate through the gray dogwood and on the edges.

Dry-Fresh Deciduous Regeneration Thicket Ecosite (THDM4-1)

This is a small thicket to the North of intersection of Twenty Road East and Nebo Road. Due to the ash mortality, the canopy cover vanished and gave numerous other species the opportunity to establish. Common buckthorn was the most common occurring species, covering all open spaces.

4.1.6.3 Meadow

Dry-Fresh Graminoid Meadow Ecosite (MEGM3)

This meadow community was found where Miles Road intersects the Chippewa Rail Trail, located to the south-west side of the intersection. Grasses like orchard grass and red top grass were present occasionally. A mix of other grass species, herbaceous and forb species were present in rare amounts. Bebb's willow was found rarely present in the canopy layer.

4.1.6.4 Woodland

Fresh-Moist Deciduous Woodland Ecosite (WOD5)

Moving from Dickenson Road East towards Airport Road East, the hedgerow type of vegetation transitions into a deciduous woodland community. This community is part of a larger woodland, part of which falls on the private property on both sides of the trail. The occasionally occurring tree species found in the canopy layer were American basswood, bitternut hickory, sugar maple, and Manitoba maple. Black walnut and hawthorn were found to be occasional in the sub-canopy. Black maple was one of the rare species found in this community. Shrub layer has gray dogwood in abundance and ground cover has yellow trout lily in the spring and goldenrod sp. in the late summer as abundantly present species.

4.1.6.5 Forest

Fresh-Moist Black Maple Lowland Deciduous Forest Type (FOD7-5/ FODM7-5)

The section between Chippewa Road East and Haldibrook Road has the Welland river passing through it. This area around the creek corridor has a lowland forest ecosystem with black maple occurring

occasionally along with American basswood and hawthorn Sp. in the canopy and sub-canopy has black maple and sweet cherry occurring occasionally. Gray dogwood is the occasionally occurring plant in the shrub layer and ground cover has a mix of grass (bromes sp., orchard grass, reed canary and *Poa pratensis*) and forb species (common milkweed and goldenrod sp.) present as occasional. Some herbaceous species like tall buttercup and woodland strawberry were also found present occasionally.

4.1.6.6 Marsh

Common -Reed Mineral Shallow Marsh Type (MASM 1-12)

Small marshes of Common-Reed were found at scattered location throughout the Chippawa Rail Trail, starting from Stone Church Road East to Haldibrook Road. Common reed was the dominant species in these marshes with some reed canary grass and gray dogwood occurring on the edges.

Cattail Mineral Shallow Marsh Type (MAS2-1/MASM1-1)

Cattail populations were found scattered in different sections of CRT and at some sites it was found bordering the common reed marshes. Reed canary, soft stem bulrush, sedge sp., silky dogwood, and willow sp. were some of the most notable species found in these marshes.

4.1.6.7 Thicket Swamp

Willow Mineral Deciduous Thicket Swamp Ecosite (SWT2/SWTM3)

Twenty Mile Creek passes through the section of the Chippawa Rail Trail (CRT) between Dickenson Road East and Airport Road East. This community was identified along the banks and, on the sandbar, formed downstream from the bridge over CRT. The canopy was sparse and contained white oak and Manitoba maple and shrub layer was dominated by willow sp. Other notable specie found in the aquatic vegetation was Flowering Rush.

4.1.7 Flora/Botanical Inventory Results

Surveys were completed for multiple sections within the Chippawa Trail. These surveys were conducted by staff and 112 native plant species were recorded. The Hamilton NAI (Schwetz 2014) indicates that there are 1496 species of plants in the Hamilton-Wentworth jurisdiction. Percent of regional flora for each area is presented below as well as a summary of the results. Plant species list is found in Appendix 5.

Table 8. Summary of plant species surveys

| | |
|------------------------------|----------|
| Native Plant species | 112 |
| Non-native plant species | 77 |
| Total plants recorded | 189 |
| % of regional flora | 13 |
| Mean CC | 4.04 |
| Floristic Quality Assessment | 42.71 |
| Value assessment (Quality) | Moderate |

The Floristic Quality Index (FQI) and the Native Mean Coefficient of Conservatism (CC) have been calculated for the trail. The CC is a measure of the species specificity of habitat requirements, with a coefficient of 0 indicating a plant tolerant of a wide range of conditions and 10 indicating a plant that has

the most specific habitat requirements. FQI is a measure of vegetation quality and is based on both the habitat fidelity of each species and species richness. The FQI for CRT is moderate.

4.1.8 Fauna Inventory Results

4.1.8.1 Breeding Bird Surveys

No dedicated breeding bird surveys were completed for the trails. Incidental sightings identified 28 species of birds including Eastern wood-pewee, which is considered a species of concern both provincially and federally. Other notable species include the red-tailed hawk, black-billed cuckoo, vesper sparrow, and white-throated sparrow which are uncommon in the City of Hamilton. Incidental sightings by staff also identified Carolina wren, which is a rare species in City of Hamilton.

Data was also collected from the eBird as historical data and iNaturalist (Research Grade Only). This data has identified 18 additional species in the area including the bank swallow and barn swallow, both of which are provincially and federally at-risk species. Common tern, herring gull and turkey vulture were identified by eBird, which are uncommon in the City of Hamilton. Western kingbird was identified by iNaturalist, in September on migration, an unusual bird for this area.

4.1.8.2 Butterflies and Dragonflies

No dedicated surveys were conducted for these two taxa, other than the incidental sightings. Staff identified seven butterfly species across the whole stretch of CRT. An additional four species of butterflies were identified through iNaturalist. Monarch, which is provincially and federally endangered and grapevine epimenis moth, a rare species in the City of Hamilton, were found along at the trail.

4.1.8.3 Mammals

All incidental wildlife encounters were recorded while conducting other aspects of field work. These surveys involved general coverage recording all species observations and signs (e.g. tracks/trails, scat, burrows, dens, browse, and vocalizations). Mammal sightings were also recorded from iNaturalist (Research Grade Only). Four species of mammals were identified including Eastern cottontail, Eastern gray squirrel, Eastern chipmunk, and red squirrel. These species are all common in Ontario and in the City of Hamilton.

4.1.8.4 Herpetofauna

No dedicated frog call surveys were conducted at this site. The data was recorded as incidental sightings by the staff during other field work and background information was collected from iNaturalist (Research Grade Only). Three species of frogs and one species of snakes were identified along the trail. Out of these, pickerel frog was identified and is a rare species in the City of Hamilton.

4.1.9 Significant Ecological Features

4.1.9.1 Natural Heritage Designations - Significant woodlands

A small section of significant woodland is adjacent to the trail between Dickenson and Airport Road. Significant woodlands for the City of Hamilton mean an area which is ecologically important in terms of features (species composition, age of trees and stand history) and function (contributes to the broader landscape because of its location, size or the amount of forest cover in the planning area) (City of

Hamilton, 2019).

4.1.10 Biophysical Inventory – Analysis

4.1.10.1 Species at Risk

Significant Flora

Of the plant species recorded along the trail through 2023 field surveys, five plant species were found to be locally uncommon and five locally rare, see Table 12. Butternut trees, which are endangered provincially (ESA) and federally (SARA), were found along the trail. Honey-locust, a species with an S2 rank (very rare) was found at the edge of the trail section, probably planted as landscape tree. These are presented in table 9 below and in table 11 under species of conservation concern.

Table 9. Provincial and Federal Flora Species at Risk

| Common Name | Scientific Name | SARA Status | ESA Status | Documented |
|-------------|------------------------|-------------|------------|------------|
| Butternut | <i>Juglans cinerea</i> | END | END | Staff |

Significant Fauna

The following four species were recorded along the trail and are at risk either federally (SARA) or provincially (ESA). These species were recorded at CRT at different life stages from migration to breeding as indicated below.

Table 10. Federal and Provincial Fauna Species at Risk

| Common name | Scientific name | SARA status (Schedule 1) | ESA status | Observed | Documented |
|--------------|-------------------------|--------------------------|------------|------------------|------------|
| Barn Swallow | <i>Hirundo rustica</i> | THR | SC | Suitable habitat | eBird |
| Bank swallow | <i>Riparia riparia</i> | THR | THR | Suitable habitat | eBird |
| Monarch | <i>Danaus plexippus</i> | END | END | Breeding | Staff |

The barn swallow (2020) have been reassessed recently by the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC) to Special Concern. Status has not been changed on Schedule 1 of SARA as of the writing of this Master Plan so it will be treated as SAR in this document. Barn and bank swallows were noted in eBird during the breeding season. These species were likely foraging along the edges of the trail using the agricultural fields that are abundant in the area. Monarch butterflies were noted in all life stages along various portions of the trail.

Threatened and endangered species habitat is protected under the Endangered Species Act (provincially) and the Species at Risk Act (federally). Permits may be required for development within the habitat for threatened and endangered species.

4.1.11 Significant Wildlife Habitat

The Significant Wildlife Habitat Technical manual (Ontario 2000) along with the Eco regional criteria tables

for Ecoregion 7E (OMNR 2015) were used to determine and define significant wildlife habitat (SWH) on the Chippawa Rail Trail property. Significant wildlife habitat includes broad categories of habitats for flora and fauna. SWH has been identified under the provincial policy statement for Ontario. No new development is allowed within identified portions of significant wildlife habitat unless there will be no negative impact to the form and function of this habitat type. The broad categories for significant wildlife habitat include seasonal concentration areas of animals, rare vegetation communities or specialized habitat for wildlife, habitats for species of conservation concern and animal movement corridors. As the vegetation along the trail is narrow there was little opportunity for the development of SWH.

4.1.12 Habitat for species of conservation concern

Habitat for species of conservation concern includes wildlife that are listed provincially as species concern or are rare and declining. Table 11 provides a list of the three species located within the CRT properties that are of conservation concern.

Table 11. Species of Conservation Concern

| Common name | Scientific name | SARA status (Schedule 1) | ESA status | Observed | Documented |
|--------------------|------------------------------|--------------------------|------------|----------|-------------|
| Eastern wood-pewee | <i>Contopus virens</i> | SC | SC | Breeding | Staff |
| Honey-locust | <i>Gleditsia triacanthos</i> | | S2* | | Staff |
| Western kingbird | <i>Tyrannus verticalis</i> | | S1B | Unknown | iNaturalist |

Eastern wood-pewee was noted calling within the forested section of the properties, while honey-locust was noted along the trail edges and was likely planted as a landscape tree. There were also a number of locally rare (eight) and uncommon (13) species recorded during field surveys and found in the background research. These include birds, plants, and frog species.

Table 12. Locally rare and uncommon species

| Common Name | Scientific name | City of Hamilton Status |
|---------------------|----------------------------------|-------------------------|
| Carolina wren | <i>Thryothorus ludovicianus</i> | Rare |
| Grapevine epimenis | <i>Psychomorpha epimenis</i> | Rare |
| Pickerel frog | <i>Lithobates palustris</i> | Rare |
| White trout-lily | <i>Erythronium albidum</i> | Rare |
| False sunflower | <i>Heliopsis helianthoides</i> | Rare |
| Great ragweed | <i>Ambrosia trifida</i> | Rare |
| Northern stickseed | <i>Hackelia deflexa</i> | Rare |
| Alpine rush | <i>Juncus alpinoarticulatus</i> | Rare |
| Bank swallow | <i>Riparia riparia</i> | Uncommon |
| Black-billed cuckoo | <i>Coccyzus erythrophthalmus</i> | Uncommon |
| Common tern | <i>Sterna Hirundo</i> | Uncommon |
| Herring gull | <i>Larus argentatus</i> | Uncommon |

| | | |
|------------------------|--|----------|
| Red-tailed hawk | <i>Buteo jamaicensis</i> | Uncommon |
| Turkey vulture | <i>Cathartes aura</i> | Uncommon |
| Vesper sparrow | <i>Pooecetes gramineus</i> | Uncommon |
| White-throated sparrow | <i>Zonotrichia albicollis</i> | Uncommon |
| Gray's sedge | <i>Carex grayi</i> | Uncommon |
| Meadow horsetail | <i>Equisetum pratense</i> | Uncommon |
| Tall blue lettuce | <i>Lactuca biennis</i> | Uncommon |
| Silverweed | <i>Potentilla anserina</i> | Uncommon |
| Hard-stemmed bulrush | <i>Schoenoplectus acutus var. acutus</i> | Uncommon |

4.1.13 Invasive Species along the Chippawa Rail Trail

The species detailed below are a threat to the biodiversity and conservation values in Chippawa Rail Trail. The following section details the invasive species that occur within Chippawa Rail Trail. Recommendations for prioritization for each species are detailed here. Information on implementation of a management strategy is also discussed in Section 7.1.1 Environmental Management.

4.1.13.1 Common buckthorn

Common buckthorn (*Rhamnus cathartica*) is a small tree or shrub that was introduced to Ontario from Eurasia. It was widely planted in farm hedgerows and fencerows as a wind break. It can survive in a wide range of conditions making it very good at invading a variety of habitats (Anderson, 2012a). Birds and small mammals feed on the berries of this plant, which has caused it to spread. Common buckthorn is widespread throughout the Chippawa Rail Trail. The focus should begin on all fruiting female trees. These fruiting females can be treated with herbicides and the remaining smaller stems removed through volunteer events and work days. In areas where a large number of common buckthorn are removed, or in areas of large ash die-off, native trees and shrubs should be planted to prevent invasion by another invasive species.

4.1.13.2 Phragmites

This species of common reed from Eurasia is a perennial grass. It is not clear how it was transported to North America. Phragmites (*Phragmites australis*) is an aggressive plant that spreads quickly and outcompetes other native species in wetland habitats (Nichols, 2020). It forms large monocultures that decrease plant biodiversity and create poor habitat for wildlife. Phragmites can be found in small fragments throughout the trail section. All the phragmites populations are found in the ditches along the trail and mostly in the trail sections with high impact from adjacent properties. It is difficult to control phragmites at this site where re-introduction can occur from adjacent industrial properties onto the CRT. In addition, some populations are on both private lands and public lands.

4.1.13.3 Honeysuckle species

There are four main species of invasive honeysuckle (*Lonicera*) in Ontario which can be difficult to identify due to their tendency towards hybridization, and the lack of identifying characteristics (flowers and fruits) throughout much of the field season (Tassie and Sherman, 2014). These plants have been brought to North America for three centuries from Europe and Asia as an ornamental. Invasive honeysuckles can rapidly reproduce, grow quickly, and outcompete beneficial vegetation including our native honeysuckles. Their

fruits are attractive to birds and mammals, which aid their spread. Hand pulling and weed wrenching smaller shrubs should be conducted in the fall as not to disturb the growth of any nearby spring ephemerals. Cutting and girdling larger shrubs should always be paired with the application of herbicide to newly exposed woody material to prevent excessive suckering come next season. The first step will be to identify and map the honeysuckle populations in the spring to ensure only the invasive honeysuckles will receive treatment.

4.1.13.4 Canada Thistle

Another perennial plant of waste places and fields, the Canada thistle (*Cirsium arvense*) has been in North America since the early settlers (MDA, n.d.a). It is mostly a pest to crops but can invade and take over other nearby meadows. The plant is a prolific seeder producing up to 5000 seeds a season, however the seeds don't spread very far. It is through vegetative cloning of the root that allows this plant to spread and push out other species. It is very important to follow clean equipment protocol as even the smallest piece of root can regrow. It can be found in all the open areas along the trail. The most common control method is tilling prior to flower bud break, to deplete the root reserves (MDA, n.d.a).

4.1.13.5 Dame's Rocket

This Eurasian biennial wildflower was introduced to North America in the 1600s and has since invaded many moist woodlands and open spaces (Johnson, 2010). The plant spreads through abundant seed production during its three month long blooming period. Dame's rocket (*Hesperis matronalis*) can be found in small numbers throughout the CRT. The plants can be pulled relatively easily from moist soil before the seeds mature in the spring. Depletion of the seed bank can take many years.

4.1.13.6 Erect Hedge Parsley

Erect hedge parsley (*Torilis japonica*) was introduced from Eurasia in 1917 for reasons unknown (Kendall, 2021). It is a small biennial plant with parsley or carrot like leaves and small clusters of white flowers. The seeds of this plant have a hooked coat, which allows them to stick onto passing people or wildlife and spread to new areas. Erect hedge parsley can grow in almost any habitat, and produces up to 7000 seeds per plant, making it a threat to numerous native ecosystems. Erect hedge parsley can be found throughout the trail sections in few numbers. Hand pulling of sporadic plants can be performed between April and July before seeds start to develop and mature. For smaller patches, covering the plants with a black tarp to cook them in the sun and prevent photosynthesis is an effective strategy.

4.1.13.7 Tree of Heaven

Tree of heaven (*Ailanthus altissima*) a native of China and Taiwan was introduced as ornamental and is believed to have the most rapid growth of any tree types in North America. This tree has the ability to reproduce vegetatively, high seed production and germination rate. Tree of heaven is an allelopathic tree which means it releases chemicals into the soil which are harmful for other plants. All these characteristics make this species highly invasive and a threat to the biodiversity. It is also a preferred host for the invasive spotted lanternfly, which is a potential threat to fruit and grape industry (ISC).

At the Chippawa Rail Trail, there is a small population of tree of heaven found on the side of the trail in three trail sections. One spot was at the start of the trail near Stone Church Road East. The second location with tree of heaven was between Twenty Road East and Dickenson Road East. The last population was

found between Miles Road and Chippewa Road East. Only shrub size and young trees were found during the surveys, which have probably been introduced from adjacent properties as no mother tree was found near these populations. This population should be mapped to plan a treatment method. Treatment generally includes a basal bark chemical application. Hand pulling or cutting is not recommended as it forces Tree of Heaven to sucker extensively creating many trees where there was only one.

4.1.13.8 Glossy Buckthorn

Glossy Buckthorn (*Rhamnus frangula*) is a member of the Buckthorn family that mainly grows in wet areas, but can be found growing alongside common buckthorn in other habitats (Anderson, 2012a). This is a non-native tree species introduced from Eurasia about 100 years ago (NCC, n.d.). This species forms dense thickets that shade out native species. They produce a dark berry that ripens in late summer and is eaten by birds. The birds disperse the seeds. It is very invasive due to its high seed production and tolerance for varied growing conditions. Glossy buckthorn is growing in swamp areas along the Chippewa Rail Trail. Glossy Buckthorn is not as established as common buckthorn in these areas. It will be important to begin the removal process for this species. It tends to be a weak plant and is easily pulled when small. Herbicide treatment can follow the same methodology as common buckthorn since they are closely related and will likely be treated concurrently.

4.1.13.9 Reed Canary Grass

The Reed Canary Grass (*Phalaris arundinacea*) that has become invasive in Ontario is thought to be a Eurasian cultivar brought to Ontario as forage for cattle (Anderson 2012c). It displaces native wetland plants and can decrease biodiversity. This plant can grow in a range of habitats and spreads quickly in wetlands. It spreads by both seeds and rhizomes. This species can be shaded out through the addition of trees and shrubs to invaded areas. Mulch can also be used to suppress the growth of reed canary grass. Areas invaded with reed canary grass can be planted with trees and shrubs. These plantings will need to be monitored a few times during the growing season to remove any grass that grows onto them to prevent smothering. Wood chips could be used in conjunction with planting to suppress the reed canary grass and giving the trees and shrubs space to grow. Alternatively, herbicide can be applied in the early growing season (Anderson, 2012c). Reed canary grass populations can be found in ditches, in swamps and lower areas along CRT. Mostly it was found growing with phragmites population, filling up the gaps in the groundcover.

4.1.13.10 Cut – leaved Teasel

A perennial plant that occurs in a variety of habitats including meadows, waste areas and roadsides. Cut-leaved teasel (*Dipsacus laciniatus*) has high seed production and can spread and take over areas. In its first year it is a large rosette and by its second year can grow up to 2m high, shading out other meadow species (MDA, n.d.b). It can be found in open areas and edges of gray dogwood thickets along the CRT. Annual cutting of these plants can occur in the spring to damage the taproot since its full removal can be difficult (MDA, n.d.b). Alternatively, the plant responds well to annual herbicide treatment during the main growing season. Eradication can be achieved in three to five years when the seed bank is depleted.

4.2 Aquatic Inventory

Ravine and stream courses cross the trail corridor in four main locations. These are associated with the Grand River, Welland River, Twenty Mile Creek, and Upper Hannon Creek. For this Management Plan, only the Welland River, Twenty Mile Creek, and Upper Hannon Creek (Red Hill Creek Tributary) will be discussed as the Grand River system falls within the Haldimand County jurisdiction of the trail. The tributaries of the watercourses also cross the rail corridor in various locations. These areas generally have not been developed due to the topography and hazardous conditions associated with these physical features. Natural features found in these areas immediately adjacent to the trail corridor have largely been retained. The ravine and stream courses present opportunities for habitat maintenance and enhancement. The ravine and stream courses on neighbouring privately owned lands present opportunities for habitat connectivity and enhancement. Private landowners who are interested in contributing to the health and vitality of these natural areas are encouraged to reach out to Hamilton Watershed Stewardship Program staff.

4.2.1 Welland River

The trail crosses over the Welland River in the headwaters area between Chippewa Road and Haldibrook Road upstream of the Binbrook Reservoir. This location is downstream of the legacy contamination from the Hamilton Airport Firefighting training facility so fish would not be considered edible due to contamination with Perfluorooctane Sulfonate (PFOS). The creek here is wide and shallow due to the influence of the bridge and agriculture of the area. The species captured were a mix of warm and coolwater species with a mix of tolerant and intermediate tolerance for environmental degradation, which corresponds to the conditions observed at the site during the survey. All are common species except the tadpole madtom which is an uncommon species. Additionally, at this site Mississippi grass shrimp (*Palaemon kadiakensis*) were also captured. This species is mostly found in the Mississippi River Watershed but does also occur narrowly in Ontario. It does seem to occur in the Welland River and is currently considered native.

Table 13. Welland River Aquatic Species

| Waterbody | Date | Common Name | Scientific Name | Thermal Regime | Tolerance |
|---------------|-----------------|------------------|--------------------------------|----------------|--------------|
| Welland River | October 5, 2023 | Pumpkinseed | <i>Lepomis gibbosus</i> | warm | intermediate |
| Welland River | October 5, 2023 | Green sunfish | <i>Lepomis cyanellus</i> | warm | tolerant |
| Welland River | October 5, 2023 | Bluntnose minnow | <i>Pimephales notatus</i> | warm | intermediate |
| Welland River | October 5, 2023 | Golden shiner | <i>Notemigonus crysoleucas</i> | cool | intermediate |
| Welland River | October 5, 2023 | Brown bullhead | <i>Ameiurus nebulosus</i> | warm | intermediate |
| Welland River | October 5, 2023 | Tadpole madtom | <i>Noturus gyrinus</i> | warm | intermediate |
| Welland River | October 5, 2023 | Johnny darter | <i>Etheostoma nigrum</i> | cool | tolerant |

4.2.2 Twenty Mile Creek

The trail crosses over the headwaters of Twenty Mile Creek between Dickenson Road and Airport Road. The crossing structure is a large concrete rail bridge. The creek here is wide and shallow due to the influence of the bridge and agriculture of the area. The species captured were a mix of warm and coolwater species with a mix of tolerant and intermediate tolerance for environmental degradation, which corresponds to the conditions observed at the site during the survey. All are common species; however, the Iowa darter is notable as they are rare in HCA's Watershed with only one previous capture as part of the Aquatic Resource Monitoring Program (ARMP) in Lower Spencer Creek in 2016.

Table 14. Twenty Mile Creek Aquatic Species

| Waterbody | Date | Common Name | Scientific Name | Thermal Regime | Tolerance |
|-------------------|--------------------|-------------------|----------------------------|----------------|--------------|
| Twenty Mile Creek | September 28, 2023 | Central mudminnow | <i>Umbra limi</i> | cool | tolerant |
| Twenty Mile Creek | September 28, 2023 | Iowa darter | <i>Etheostoma exile</i> | cool | intermediate |
| Twenty Mile Creek | September 28, 2023 | Bluntnose minnow | <i>Pimephales notatus</i> | warm | intermediate |
| Twenty Mile Creek | September 28, 2023 | Johnny darter | <i>Etheostoma nigrum</i> | cool | tolerant |
| Twenty Mile Creek | September 28, 2023 | Bluegill sunfish | <i>Lepomis macrochirus</i> | warm | intermediate |
| Twenty Mile Creek | September 28, 2023 | Pumpkinseed | <i>Lepomis gibbosus</i> | warm | intermediate |
| Twenty Mile Creek | September 28, 2023 | Green sunfish | <i>Lepomis cyanellus</i> | warm | tolerant |

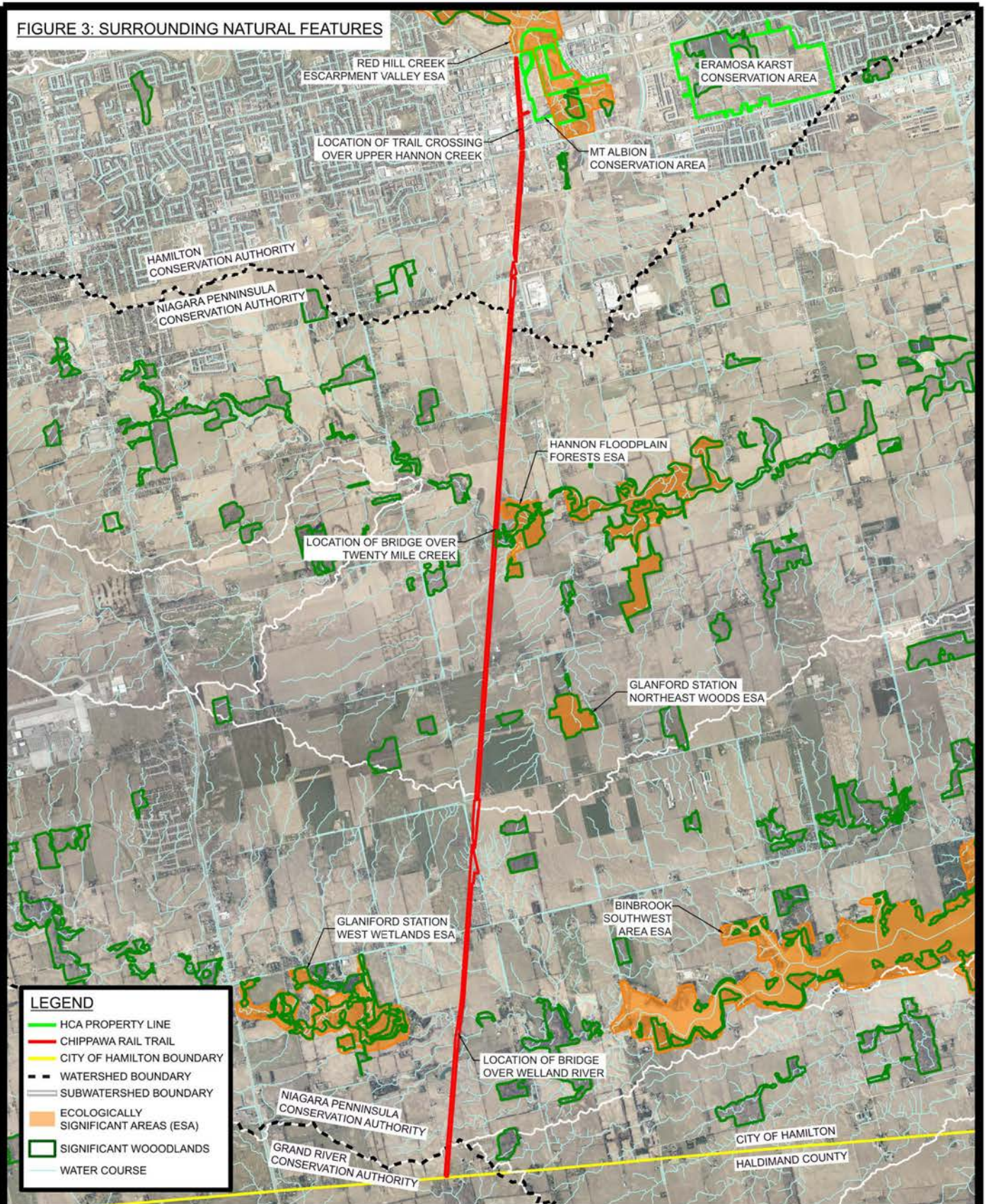
4.2.3 Upper Hannon Creek

The trail crosses a tributary of Upper Hannon Creek between Stonechurch Road and Rymal Road. It also interacts with some headwater drainage features in area of the Twenty Road and Nebo Road intersection. The creek has been altered in this area to support the stormwater system outfall approximately 135m upstream. The species captured were a mix of warm and coolwater species with all of an intermediate tolerance for environmental degradation, which corresponds to the conditions observed at the site. All are common species. By far, brook stickleback is the most numerous species present in this system and is the only one regularly caught as part of the ARMP surveys.

Table 15. Upper Hannon Creek Aquatic Species

| Waterbody | Date | Common Name | Scientific Name | Thermal Regime | Tolerance |
|--------------------|-------------|-------------------|---------------------------|----------------|--------------|
| Upper Hannon Creek | Aug 3, 2021 | Brook stickleback | <i>Culaea inconstans</i> | cool | intermediate |
| Upper Hannon Creek | Aug 7, 2015 | Bluntnose minnow | <i>Pimephales notatus</i> | warm | intermediate |
| Upper Hannon Creek | Aug 7, 2013 | Pumpkinseed | <i>Lepomis gibbosus</i> | warm | intermediate |

FIGURE 3: SURROUNDING NATURAL FEATURES

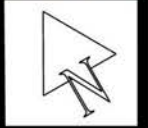


LEGEND

- HCA PROPERTY LINE
- CHIPPAWA RAIL TRAIL
- CITY OF HAMILTON BOUNDARY
- - - WATERSHED BOUNDARY
- SUBWATERSHED BOUNDARY
- █ ECOLOGICALLY SIGNIFICANT AREAS (ESA)
- █ SIGNIFICANT WOODLANDS
- WATER COURSE



SURROUNDING NATURAL FEATURES
CHIPPAWA RAIL TRAIL MANAGEMENT PLAN
 DATE: 2024/04/03



5.0 CONSERVATION AREA MANAGEMENT

5.1 Trail Infrastructure and Inventory

The following trail infrastructure review was conducted by HCA staff in the summer of 2023. See Appendix 2 for a summary of the recommended trail infrastructure capital projects noted in this review.

Of significance are the existing bridges that were built to facilitate the operation of the railway. These bridges are still in place, and during the construction of the recreational trail safety railings were installed to secure them for public use. These railings will continue to be assessed during annual bridge inspections to ensure their integrity. Brush clearing and trail improvements are recommended for the two bridge crossings on the trail. A number of culverts are also located within the rail trail corridor and convey tributaries associated with the major watercourses in the study area. These features are highlighted in the following review.

The property boundary between the rail trail corridor and adjacent properties is identified with a standard wire farm fence. The condition of the fencing ranges from poor to good, and in some locations is absent or obscured by vegetation and the naturalization of the corridor. The inventory notes where maintenance of fencing or boundary establishment needs to be undertaken to secure the trail corridor from unauthorized access.

The Killman Zoo, fronting on Unity Road, is located outside the study area for this Management Plan. This facility functions as a regional tourist attraction operating in the spring and summer months and brings potential visitors to the rail trail. This attraction was taken into consideration with the trail recommendations noted in this plan.

There are eight road crossings located along the HCA owned portion of the rail trail corridor. Of these crossings, Rymal Road, Nebo Road, Twenty Road East and White Church Road East are very busy thoroughfares. The safety of trail users at road crossings is a significant concern and is studied further in this inventory.

In general, the trail infrastructure is in good condition. Lesser-used portions of the trail have some vegetation encroachment onto the trail, but overall the trail surface is in good condition. There are only a few benches along the trail that are aging and need to be replaced. Accommodating accessible rest areas at various points along the trail is recommended, and installation of site furnishings at rest areas could be potential donor projects (tribute benches, bike racks etc.). Trail gates and barriers are in place at or near road crossings to block motorized vehicles from accessing the trail. All of the wood posts and signage at these locations are showing wear and replacement is recommended in priority sequence for public safety



Photo 7: Trail Bridge over Welland River

and wayfinding. Municipal road crossings could also be improved with crosswalks for pedestrian safety.

The following trail inventory provides a description of the trail conditions and features between each road crossing. The inventory begins at the north end of the trail.

5.1.1 Stone Church Road East to Rymal Road East

The north end of the trail is located at the intersection of Stone Church Road East and Dartnall Road. Trail identification signage is needed here. Mount Albion Conservation Area is on the opposite side of Dartnall Road. The parking lot at Mount Albion C.A. is the designated parking lot and trailhead for the Chippawa Rail Trail. A trail connection exists from the parking lot to the CRT via the internal trails at Mount Albion that exit onto Stone Church Road East, and cyclists may also bike along Dartnall Road to access the trail. Potential improvements to the trail connection are discussed in the 2025 Mount Albion C.A. Master Plan.



Photo 8: Chippawa Rail Trail parking lot on Dartnall Road

The former Harris Grain Elevator is a significant feature located along this section of the trail. For information about this structure, see Section 3.3. The structure is frequently subject to graffiti and vandalism. Developing a management plan for this cultural heritage site should be considered a priority. Some restoration of this feature will be required over the life of this plan. HCA staff will consult with City of Hamilton Cultural Heritage Planning staff on restoration work, as such work will likely be subject to the Heritage Permit process. Next to the grain elevator site is a gated laneway and works yard used by HCA staff to access and maintain the trail.

This section of trail is surrounded by industrial and commercial land uses. The trail crosses over Hannon Creek north of Rymal Road.

5.1.2 Rymal Road East to Twenty Road East

This section of trail is also bordered by industrial land uses. The trail crosses a hydro corridor at the midpoint of this section. Vehicle tracks can be seen crossing the trail within the hydro corridor.

The trail crosses Nebo Road at a very narrow angle just north of the intersection of Nebo Road and Twenty Road East. A small triangle of property is created before the trail then crosses Twenty Road. These are busy roads and the angle of the crossing does not offer good site lines. It is recommended that the Nebo Road crossing be reviewed as the City of Hamilton is planning road and sidewalk work around the intersection.

This section contains higher amounts of invasive species than other sections due to the industrial nature of the area. There are topsoil piles and old equipment piles close to the property line and some even

spilling over the property boundary. Installing fences or a coniferous treed barrier to limit encroachment as well as the movement of invasive species into CRT areas is recommended.

5.1.3 Twenty Road East to Dickenson Road East

Between Twenty Road East and Dickenson Road East, the trail crosses into the Niagara Peninsula Conservation Authority (NPCA) watershed. The surrounding land uses transition from industrial to agricultural on the west side of the trail. Some encroachment can be seen from the industrial properties along the east side of the trail. The trail crosses another hydro corridor and vehicle tracks can be seen crossing the trail.

Similar to the section noted above, there are higher amounts of invasive species than other sections due to the industrial nature of the area. Installing fences or a coniferous treed barrier to limit encroachment and invasive species into CRT areas is recommended.



Photo 9: Chippawa Trail in early spring at Twenty Road access point

5.1.4 Dickenson Road East to Airport Road East

This is the longest section of trail between road crossings at 2.8 kilometers. This section of the trail is surrounded by agricultural land use and some natural areas. Crossings connecting farm fields are seen at two locations in this trail section. The raised elevation of the trail provides good views of the surrounding landscape.



Photo 10: View from the bridge over Twenty Mile Creek

The trail crosses Twenty Mile Creek and is bordered by the Hannon Floodplain Forest ESA. The railroad bridge over Twenty Mile Creek is one of the two major water crossings along the trail and a recommended location for a rest area and interpretive signage. There is an existing interpretive sign about the connection between agriculture and the creek that could be updated. The railings on the bridge should be reviewed further to make sure they remain safe and secure.

Three benches with tribute plaques are located in close proximity to each other at the mid-point of this section. It is recommended that more benches be added along the trail and these existing benches be reviewed.

5.1.5 Airport Road East to White Church Road East

This section of trail passes between agricultural fields. A

farm vehicle crossing is located along a hedgerow perpendicular to the trail. A utility corridor for a natural gas pipeline crosses the trail at the midpoint of this section. Due to the higher elevation of White Church Road, the trail slopes up to the road at the crossing. This area has some of the steepest slopes along the trail.

5.1.6 White Church Road East to Chippewa Road East

There is a short (500m) section of trail between White Church Road and Miles Road. As noted above, the trail slopes up to the White Church Road crossing. The trail crosses Miles Road at a sharp angle.

The section between Miles Road and Chippewa Road East is the site of the former Glanford Station that served the railway. For information about Glanford Station, see Section 3.2. HCA owns a parcel of land fronting on the west side of Miles Road where a parking lot for the trail was formerly operated. Gates, fencing and armour stone barriers are in place from this parking lot. The lot had previously been closed due to insufficient staffing needed to maintain it. Now that the HCA has developed a staff unit to focus on East Mountain properties including the trail, this plan supports re-establishing this parking area to serve the trail. There is also opportunity for ecological restoration through naturalization plantings on this parcel. The ground is compacted and has non-native grass and forb species. Tilling the compacted area is recommended followed by invasive species removals (manual or chemical) and enhancement plantings. Native species such as gray dogwood, which is already flourishing around this area, can be planted. Sowing a cover crop can help prepare the soil for native species plantation.



Photo 11: Land parcel adjacent to the rail trail where a parking lot was located. Miles Road can be seen in the distance.

There is a hydro corridor crossing the trail south of the parking lot. There are a few residential properties on Miles Road that back onto the trail corridor next to the parking area, and an industrial/commercial property at the Chippewa and Nebo Road intersection. There is some encroachment from these properties into the trail corridor that should be reviewed further.

5.1.7 Chippewa Road East to Haldibrook Road

This is the southern-most section of trail owned and managed by the HCA. This section has the second major watercourse crossing, a stone railroad bridge over the Welland River. This bridge would be a good location for a rest area and interpretive signage. About 300 meters north of Haldibrook Road, the trail crosses into the Grand River Conservation Authority watershed.



Photo 12: Section of trail between Chippewa and Haldibrook Road

On the south side of Haldibrook Road there is a trailhead kiosk with map and information indicating that visitors are entering the Haldimand County managed trail section. It is recommended that this type of trailhead signage be added on the north side of Haldibrook Road to create an HCA trailhead, along with wayfinding signage along the length of the trail.

The Killman Zoo is located on the south side of Haldibrook Road, the main entrance is located on Unity Side Road. This is a source of visitation to the area likely brings visitors to the trail as well.

5.1.8 Trail Access Agreements

HCA owns and manages the rail trail corridor for passive recreational use. Our infrastructure review notes there are locations where adjacent landowners are observed using the trail to access their land. The current access agreements are subject to review by HCA on a case by case basis. Unauthorized motor vehicle activity anywhere along the trail is also subject to review and trespassing enforcement by HCA.

Ontario Hydro has right-of-way access for their powerlines that cross the trail at three locations: between Rymal and Twenty Road, between Twenty Road and Dickenson Road, and between White Church Road (Hwy 65) and Chippewa Road. See the appended maps for more information.

South of Twenty Road East, approximately 9km of the trail is located within the Niagara Peninsula Conservation Authority (NPCA) watershed. 300 meters north of Haldibrook Road, the trail enters the Grand River Conservation Authority (GRCA) watershed. These boundaries are shown on Figure 2 and the maps in Appendix 1. At the time of trail construction these agencies were agreeable to the development of the trail within their watershed.

5.2 Trail Counters and Visitation

Two trail counters were installed in May 2023 to gather visitor data for this plan. Due to technical issues, tampering and naturally occurring obstructions, only data collected from the beginning of August to the end of October 2023 is viable for review. One trail counter was installed near Haldibrook Road and the other was installed by the former Harris Grain Elevator. The trail counters use an infrared sensor to count pedestrians and cyclists passing by them. See Appendix 4 for a graphic summary of the counter data that was collected. Trends that were captured include:

- On average, visitation was slightly higher on Saturdays and Sundays than weekdays.

- On average, visitation was highest between 9am and 2pm.
- Over the season, the total number of counts at each site were similar.
- There were no spikes in visitation at long weekends, holidays or during the fall colour season.

5.3 Connections to Hamilton Conservation Areas

The Chippawa Rail Trail connects to Mount Albion Conservation Area, which provides the primary parking and trailhead staging area for the trail. From this location, access to other HCA East Mountain Conservation Areas such as Eramosa Karst and Felker’s Falls is possible.

Within the City of Hamilton, other trails within walking or cycling distance of the Chippawa Rail Trail include:

- Trans Canada Trail
- The Bruce Trail
- Red Hill Valley Trail
- Ontario Waterfront Trail along the shore of Lake Ontario
- East Mountain Trail Loop
- The Niagara Escarpment Rail Trail

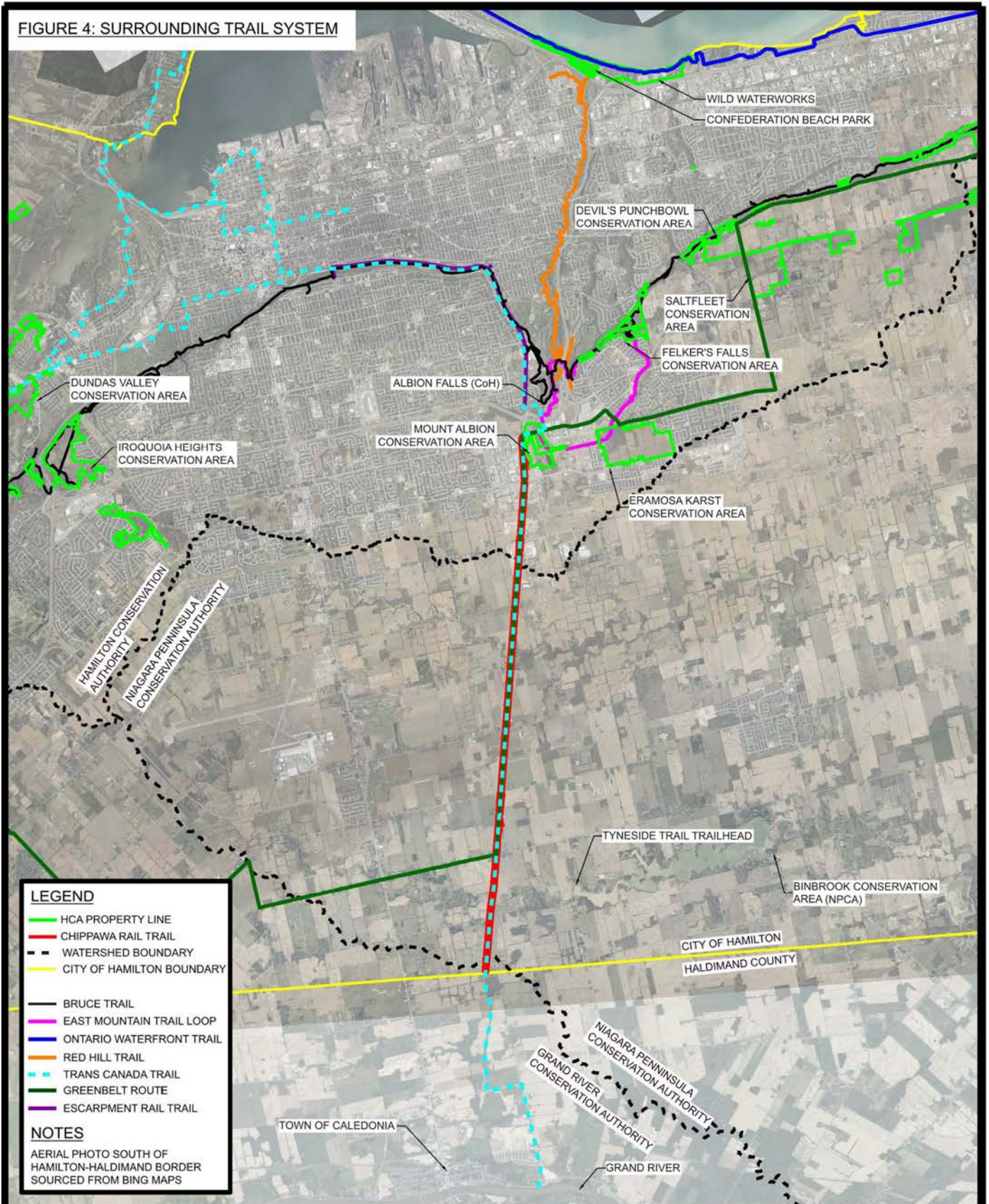
See Figure 4. for locations of nearby trails and natural areas.

Public transportation offered by the City of Hamilton allows for hikers and cyclists to reach the Chippawa Rail Trail. Bus stops near the north end of the CRT and Mount Albion Conservation Area are located along Stone Church Road, Rymal Road, Twenty Road, and in the Red Hill Business Park.



Photo 13: Directional Trail Sign

FIGURE 4: SURROUNDING TRAIL SYSTEM



LEGEND

- HCA PROPERTY LINE
- CHIPPAWA RAIL TRAIL
- - - WATERSHED BOUNDARY
- CITY OF HAMILTON BOUNDARY
- BRUCE TRAIL
- EAST MOUNTAIN TRAIL LOOP
- ONTARIO WATERFRONT TRAIL
- RED HILL TRAIL
- TRANS CANADA TRAIL
- GREENBELT ROUTE
- ESCARPMENT RAIL TRAIL

NOTES

AERIAL PHOTO SOUTH OF HAMILTON-HALDIMAND BORDER SOURCED FROM BING MAPS



SURROUNDING TRAIL SYSTEM CHIPPAWA RAIL TRAIL MANAGEMENT PLAN

DATE: 2024/04/05



6.0 MANAGEMENT PRACTICES

6.1 Natural Heritage Conservation

The Chippawa Rail Trail is an important recreational trail from a local and regional perspective, providing a safe off-road route connecting the City of Hamilton and Haldimand County. This trail is also important from a national perspective as part of the Niagara section of the Trans Canada Trail, and for the historic role the railway played in the development of Canadian communities and the landscape.

The trail corridor is in close proximity to five Environmentally Significant Areas and a significant woodland abuts the trail in one section. No trail impacts to these areas are anticipated for the lifespan of this Management Plan. No new trail development other than routine maintenance of the trail surface, bridges, culverts and trail gates and wayfinding signage is proposed. Specific capital projects proposed in this Management Plan, such as the parking lot at the Glanford Station trail node, will require further site evaluation to determine areas suitable for site development.



Photo 14: View of Welland River from trail bridge

It should be noted that invasive species will need to be monitored and managed along the trails, and that trail mowing and maintenance should include clean equipment protocols to discourage the movement of invasive species. See section 4.1 for more information on the natural areas review and recommendations.

Private property owners adjacent to the trail who are interested in enhancing wildlife habitat or improving water quality through conservation projects on their lands should reach out to HCA or Hamilton Watershed Stewardship Program (HWSP) staff who may be able to provide technical and financial assistance to applicable projects.

6.2 Cultural Heritage Management

The Cultural Heritage Zone set out in this plan is shown on Map 2 Conservation Area Zones in Appendix 1. Incompatible resource uses and recreational activities will be restricted or prohibited where necessary to protect cultural heritage resources in this zone. The structures associated with the Harris Grain Elevator in this zone will be reviewed for public safety. More detailed studies are to be conducted by HCA as necessary to determine appropriate maintenance, repair or restoration programs for this area.

Capital projects recommended for this zone will require approval by the HCA Board of Directors, and may require approval from the City of Hamilton.

No archaeological studies have been completed by HCA along the Chippawa Rail Trail. Management strategies for any archaeological sites found in the future may range from allowing the sites to remain

without interference, to research, excavation, and rehabilitation. Archaeological and historical artifacts may only be removed, and heritage landscapes altered, as part of an HCA approved cultural heritage research or management plan. Protection and management will be undertaken in consultation with all governing agencies and First Nations.

6.3 Water Management

No new trail development is proposed that could adversely affect water resources. Should maintenance or replacement of culverts and bridges along the trail be required, HCA will adhere to federal, provincial and local policies and regulations. See section 4.2 for more information.

6.4 Conservation Area Experience

The Rymal Spur Rail Trail Master Plan Steering Committee assisted HCA in the development of the 1998 Master Plan. This committee was comprised of 13 individuals representing adjacent landowners, local municipalities, potential trail user groups, and the Niagara Peninsula and Grand River Conservation Authorities. The steering committee was an integral part of the development of the plan, which guided the construction of the trail seen today. Key values of the plan included:

- Accentuating the recreational and environmental importance of this rail trail from a local, regional and national perspective
- Offering recreational benefits supporting health and well-being
- Providing educational benefit through identifying and interpreting the historic and natural features of the trail.

This Management Plan supports this original vision for the trail and the trail linkages within the City of Hamilton and beyond. The trail use is primarily directed towards bicyclists and walkers, with the main parking area in Hamilton located at Mount Albion Conservation Area. Secondary access and limited roadside parking occur near some of the trail gates, however for public safety HCA is not recommending parking at the trail gates. The original 1998 Master Plan proposed creating nodal areas at Stone Church Road and Glanford Station with parking, interpretive information, benches and picnic facilities. The Stone Church Road nodal area is served by Mount Albion Conservation Area, more information on this area can be found in the current Mount Albion Master Plan.

The Glanford Station node was developed where the trail crosses Miles Road, but this area was subsequently closed due to vandalism concerns and limited staff capacity at that time to enforce security in this area of HCA's watershed. This site offers potential to be re-opened and provide a small off-road parking area. It is recommended that HCA investigate this further and evaluate this option for traffic and visitor management with municipal partners. For the other road crossings, when offsite parking is found to be causing traffic and safety issues, HCA will enlist the assistance of municipal agencies for traffic control. Traffic control will be evaluated on a case by case basis by all agencies involved.

The 1998 Master Plan proposed rest areas located at the bridges along the trail. These rest areas were to include benches and simple interpretive signage in order to provide the trail user with an area to take a short break and experience the view of the landscape and adjacent watercourse. This plan recommends

capital development to provide these rest areas at the two bridges in this study area, as well as improving the bridge railings and approaches for public safety and to restrict unauthorized off-trail access to the creeks that is causing some slope erosion. Interpretive information pertaining to watersheds and watershed management, proposed in the original Master Plan, could also be provided at these rest areas.

Currently, three benches are provided at one location along the trail. It is recommended that HCA further develop a bench program for the trail, identifying suitable locations for benches and site amenities (for example wayfinding and educational signs, bike racks etc.) for trail users to take breaks and experience trail features such as historical railroad elements and the surrounding landscape. The benches could be added to HCA's memorial bench program, and donors could also be considered for site furnishings for rest areas on the trail. See section 5.1 for more information.

6.5 Education and Environmental Awareness

A new interpretive signage program is recommended for the trail, to provide educational information on the history and natural features of the area. The addition of rest areas for the trail is recommended in Sections 5.1 and 6.3. Rest areas could also serve as interpretive educational stations. The trail-head staging area at Mount Albion Conservation Area is a prime location where educational information can be offered. Should secondary parking and staging facilities be provided at Glanford Station, educational information about the history of the site should be offered here as well. Further study of design options is recommended, as well as considering community donors and partnerships for interpretive features and programs.

The Former Harris Grain Elevator site located between Stone Church Road and Rymal Road is another recommended location for an interpretive station. Benches and interpretive signage about the history of the structures and the site could be provided here for the public. Additional interactive and educational features could be explored.

The existing wooden trail signs at the road crossings will need updating during the life of this plan to HCA's current sign standards. During the roll-out of new signage, communicating educational information to the public with these installations is recommended. See Section 5.0 for more information on the features provided at the road crossings.

New digital technological opportunities are also recommended to promote and describe the trail and its features. Currently the HCA website provides a trail map and information on trail etiquette guidelines, rules and regulations. A trail brochure is recommended to be posted on the HCA website, with links to this Management Plan when posted on the website. Educational information could also be provided by mobile digital applications for self-guided use on the trail (for example, story-telling apps).

6.6 Public Infrastructure – Utilities, Trails and Transportation

Public infrastructure such as utility corridors (watermains, storm and sanitary sewers, natural gas or oil pipelines, hydro and communication corridors), trails (footpaths, boardwalks) and transportation links may cross conservation area lands.

These uses may also have associated rights-of-way, land use agreements, licenses of occupation, permits

etc. that are to be considered in the management of the trail corridor and when implementing items from this management plan.

When new public infrastructure projects are proposed within conservation authority owned lands, such uses will be subject, but not limited to, the following criteria:

- The need for the project, area of construction disturbance, and potential site disruption such as soil erosion, flooding, and vegetation loss.
- To maintain or where possible improve or restore key ecological linkages, habitat, and wildlife movement corridors.
- The potential public benefits of the project for research, education, or recreation.

HCA may require detailed environmental assessments, studies, and Resource Management Plans in order to support such uses.

6.7 Management Guidelines

6.7.1 Permitted Uses

Permitted passive recreation activities include walking, dog-walking, hiking, bicycling (with restrictions on e-bikes noted below), winter snowshoeing, and geocaching. The use of the trail for commuting purposes is encouraged.

The Accessibility for Ontarians with Disabilities Act (AODA) proposes improving access to trails for persons with a disability. Persons requiring use of a motorized wheelchair are permitted access to the Chippawa Rail Trail. The ability of a wheelchair to negotiate the trail will depend upon the trail surface, the existing terrain, and weather conditions.

The 1998 Chippawa Rail Trail Master Plan recognizes horseback riding as a permitted use. The trail infrastructure accommodates equestrian use. There is always the potential for conflict between equestrians and other user groups, especially cyclists. Signage alerting other users to yield to horses should be added. It is recommended that equestrian use be monitored to determine if it should continue to be permitted on this trail. Horseback riding may be restricted from portions of the trail, or the entire trail pending this review and at HCA's management discretion considering trail user safety.



Photo 15: Bicycles on the Chippawa Trail

For power-assisted bicycles, HCA follows the provincial regulations for pedal-assist electric bikes that look and operate like a bicycle with an electric motor that provides additional assistance. An e-bike that is designed to be propelled primarily by muscular power and to travel on two or three wheels, operating at speeds less than 30km/hour are permitted on bike trails owned and maintained by HCA. E-bikes that meet provincial requirements are allowed on roads and highways where conventional bicycles are currently permitted. The regulations also permit exceptions where e-bikes may not be used including municipal roads and sidewalks where bicycles are banned under municipal bylaws, bike paths, bike trails, or bike lanes. Currently e-bikes that could be described as a scooter-like vehicle that is not designed to be propelled primarily by muscular power are not permitted on the Chippawa Rail Trail and HCA recreational trails. These types of vehicles are typically heavier and have more mass than typical bicycles, are operated like a low speed motorcycle rather than pedaled, and are capable of speeds greater than 30km/hr. It is recommended that HCA further review e-bike use and permissions with the City of Hamilton and Haldimand County for the trail should e-bike use be found to be causing concerns for public safety of trail users, or conflicts between trail users in the community on HCA trails.

6.7.2 Restricted Uses

The use of motorized vehicles is not permitted on the trail, with the exception of maintenance and emergency vehicles, motorized wheelchairs, and pedal-assist bicycles noted previously. Hunting and trapping are not permitted on or from the trail corridor. No open fires or camping are permitted. Unauthorized property access and encroachment are not permitted and will be addressed by HCA on a case by case basis.

6.7.3 Agreements

The management of the trail section within the City of Hamilton will be carried out by HCA. The remainder of the trail south of Haldibrook Road will continue to be managed by Haldimand County. Some portions of the trail are accessed by adjacent landowners to reach agricultural fields on either side of the trail. HCA may require updated access agreements for continued use, on a case by case basis.

HCA values the community support from area residents and landowners, businesses, service clubs, and volunteer organizations that currently or could contribute to the trail in a variety of ways. HCA will continue to nurture existing support and welcomes new opportunities for trail partnerships.

Rymal Station Heritage is a local non-profit organization with an interest in restoring the physical structure of the Harris Grain Elevator and preserving the history of the site. HCA has been aware of this group's keen interest in the site over the years. HCA will continue to engage with Rymal Station Heritage and remain open to opportunities for potential partnerships or agreements.

6.8 Maintenance Guidelines

6.8.1 Vegetation Clearing

The rail trail corridor is approximately 30 meters wide. The existing trail is intended to be 3m wide with a clearing width beyond the trail edge of 1m. Vegetation is to be removed within this clearing width as necessary to ensure safe sight lines, reduce hazards, control invasive species and prevent

encroachment of vegetation onto the trail. The area beyond the trail clearing width shall be left to naturalize, and any clearing shall only be done on a site-specific basis subject to review by HCA. Where there is no threat to the public, snag trees and fallen logs will be left in place as important habitat features. Ditch clearing and improvement work may occasionally be required. Best management practices are to be followed so that maintenance activities, equipment, and tools do not spread invasive species.

6.8.2 Fencing

Buffer fencing should be added along some of the trail sections bordering on industrial land uses to help eliminate encroachment. These recommended areas are identified on the maps in Appendix 1. Fencing is only to be considered on a site-specific basis by HCA in accordance with requirements of the provincial Line Fences Act.

6.8.3 Lighting

The trail will not be lit and is intended to only be open sunrise to sunset. The addition of lighting will be considered at the Mount Albion parking lot along with other development proposed in the current Master Plan.

6.8.4 Garbage Collection

Garbage cans may be made available by HCA at conservation area trail-head parking lots if demand warrants. Garbage cans will not be provided along the trail route. Trail users are encouraged to practice 'pack in-pack out' trail etiquette.

6.8.5 Washrooms

Currently no washrooms are provided along the trail. Information signs may be used to direct trail users to conservation area parking areas and washrooms.

6.8.6 Winter Maintenance

There will be no snow removal along the trail.

6.8.7 Signage

The original signage developed for the trail reflects the historic use of the rail trail corridor by the Canadian National Railway. The green and gold heritage colours of the Canadian National Railway were also considered in signage and promotional materials for the trail. This historic colour scheme will be considered by HCA when new signage is designed for the trail.

Five types of signs are permitted along the trail: information, designation/direction, regulatory, warning, and interpretive. Information signs are intended to provide general information about the use, identify the trail and may include a map. Designation/direction and regulatory signs are to be placed along the trail at each road crossing. Warning signs will be placed where there are anticipated safety concerns, such as

areas with quarrying and agricultural activities.

Interpretive signs may be provided along the trail as part of a planned educational program. All signs are to follow standard formats of HCA. Most signs will include the HCA logo and trail name in addition to the information being conveyed.

6.8.8 Road Crossings

The trail crosses eight roads within the HCA owned section between Stone Church Road and Haldibrook Road. All road intersections shall be signed for vehicle traffic and trail users. Gate structures shall be maintained at each road crossing to prevent unauthorized motor vehicle access to the trail and provide a visual warning for the trail user prior to crossing the road. Vegetation shall be pruned as necessary to provide sight lines for trail user safety.

Traffic volumes and the risk to pedestrian safety shall be monitored by HCA and in consultation with the City of Hamilton. Future traffic volumes may warrant additional design measures for public safety. Public safety features such as road crosswalks are subject to review and approval by the City.



Photo 16: Chippawa Trail Sign at road crossing

6.8.9 Watercourses

Trail maintenance at watercourse crossings is to be reviewed by HCA with the City, with adjacent conservation authorities for portions of the trail in their watersheds, and with adjacent landowners if applicable. This consultation is to be conducted when features such as culverts, bridges and associated structures require maintenance or replacement.

6.8.10 Invasive Species

Invasive species currently present alongside the trail observed by HCA staff have been discussed in Section 4.1 above. It is recommended to map the invasive species along the Chippawa Trail to prioritize the control and management. Invasive species are widespread throughout the trail starting from Stone Church Road East to Haldibrook Road. Species like Phragmites, Tree-of-Heaven, Common Buckthorn, Glossy Buckthorn, Reed Canary grass and Cut-leaf-teasel were identified during the surveys. A prioritization plan should be developed to focus removals of invasive species.

6.8.11 Water Wells

The trail corridor should be reviewed to locate and decommission any unused water wells in accordance with Ontario Water Wells Regulation 903. It is possible that wells may have been drilled along the corridor to support the rain line when it was in use.

7.0 SUMMARY

7.1 Implementation Priorities

7.1.1 Environmental Management

From our ecological reviews of natural areas adjacent to the trail, key recommendations for the next ten years include invasive species management, restoration of the Miles Road parking lot parcel and buffering the industrial land uses.

- Conduct mapping of invasive species along the trail.
- Control of priority invasive species (buckthorns, Phragmites, tree of heaven) discussed in Section 4.1 should occur in priority from Haldibrook Road to Stone Church Road, moving from rural to industrial areas.
- Replanting along the trail as invasive species are controlled to restore natural regenerating ecosystems.
- Buffers or fencing should be considered along the industrial section to help prevent the encroachment of invasive species, industrial waste and increase biodiversity along the trail.

7.1.2 Trail Infrastructure Improvements

The following improvements are recommended for the recreational trail. These improvements support a safe visitor experience and protect adjacent lands and natural areas:

- Continue to provide trailhead amenities and parking at Mount Albion Conservation Area.
- Investigate providing additional parking and trailhead amenities along the trail through the re-opening of the parking lot at the Glanford Station trail node.
- Secure the former Harris Grain Elevator from vandalism and provide cultural heritage interpretive information at this location. With the recent Cultural Heritage Designation, HCA staff will consult with City of Hamilton Cultural Heritage Planning staff on restoration work. Work will likely be subject to the Heritage Permit process.
- Implement a trail wayfinding signage replacement program.
- Improve trail surfacing along the trail as needed.
- Provide rest areas along the trail with site furnishings and educational interpretive signage.
- Improve the two major bridge crossings for public safety and to provide rest areas with interpretive signage.
- Review all watercourse crossings regularly to maintain infrastructure and include an ecological review for safe fish passage.

7.1.3 Conservation Area Connection Improvements:

The following improvements are recommended to improve trail connections and linkages to HCA

Conservation Areas.

- Provide trail wayfinding signage along the trail to identify road names at crossings and nearby places of interest.
- Add trailhead signage at Haldibrook Road to compliment the Haldimand County trail kiosk on the south side of the road.
- In partnership with the City of Hamilton, investigate potential connection improvements to the trailhead and parking lot at Mount Albion Conservation Area.
- Include maps at trailheads showing the locations of nearby natural areas and trail connections.



Photo 17: Chippawa Trail bridge over Twenty Mile Creek

8.0 APPENDIX CONTENTS

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| APPENDIX 1 | Mapping |
| APPENDIX 2 | Capital Development Priorities |
| APPENDIX 3 | Summary of Survey Results |
| APPENDIX 4 | Summary of Trail Counter Data |
| APPENDIX 5 | Natural Inventory Species Lists |
| APPENDIX 6 | References |

Appendix 1 – Mapping

Map 1 - Ecological Land Classification 1

Map 2 - Ecological Land Classification 2

Map 3 - Ecological Land Classification 3

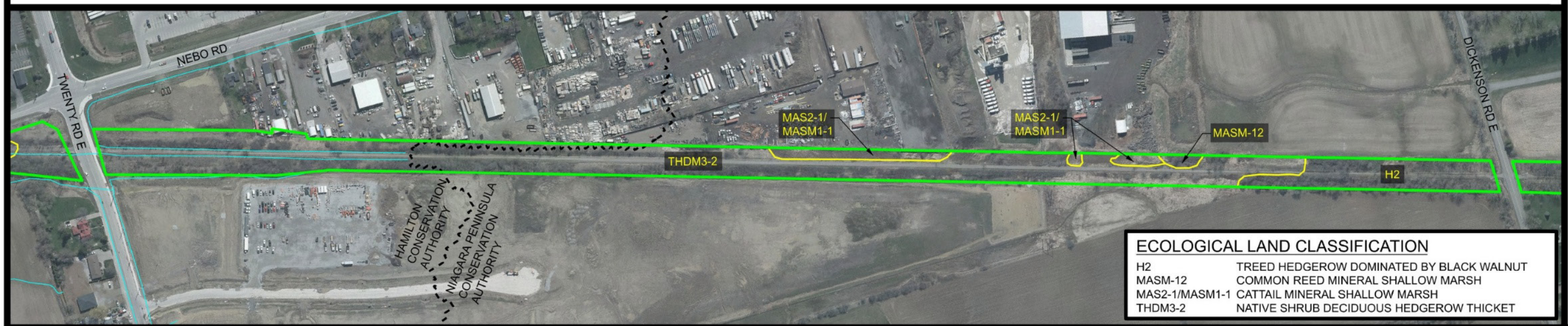
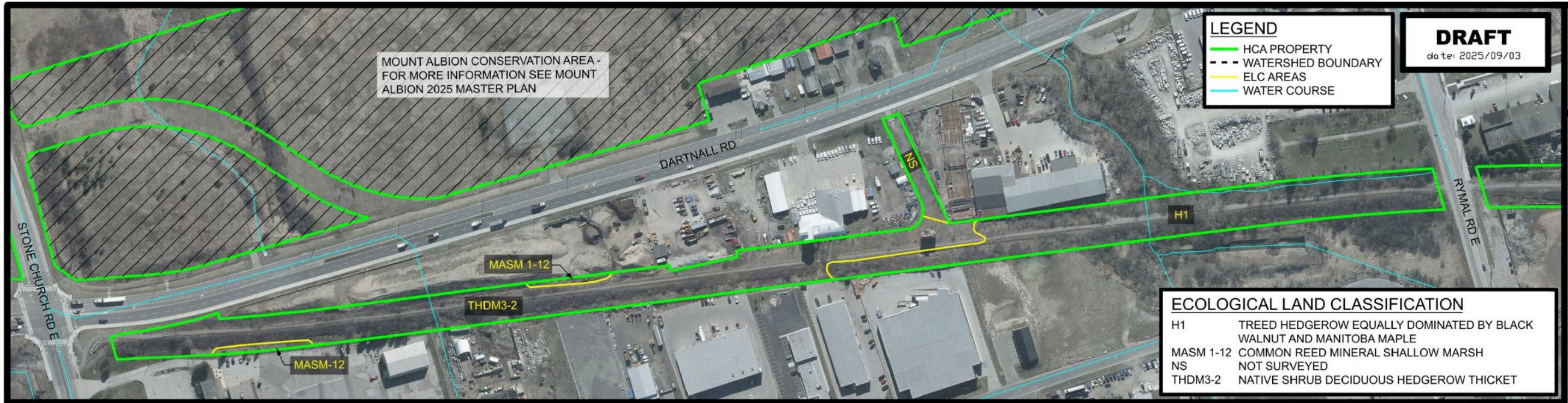
Map 4 - Conservation Area Zones Map 1

Map 5 - Conservation Area Zones Map 2

Map 6 - Conservation Area Zones Map 3

Map 7 - Trail Features and Concepts

Map 8 - Trail Concept Details



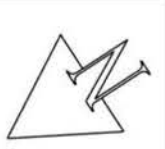
**ECOLOGICAL LAND CLASSIFICATION
 CHIPPAWA RAIL TRAIL MANAGEMENT PLAN**
 DATE: 2025/09/03





LEGEND
 — HCA PROPERTY
 — ELC AREAS
 — WATER COURSE

DRAFT
 date: 2023/10/20



ECOLOGICAL LAND CLASSIFICATION

| | |
|------------|--|
| H2 | TREED HEDGEROW DOMINATED BY BLACK WALNUT |
| SWT2/SWTM3 | WILLOW MINERAL DECIDUOUS THICKET SWAMP ECOSITE |
| WOD5 | FRESH-MOIST DECIDUOUS WOODLAND ECOSITE |



ECOLOGICAL LAND CLASSIFICATION

| | |
|---------|--|
| H2 | TREED HEDGEROW DOMINATED BY BLACK WALNUT |
| THDM3-2 | NATIVE SHRUB DECIDUOUS HEDGEROW THICKET |
| WOD5 | FRESH-MOIST DECIDUOUS WOODLAND ECOSITE |



ECOLOGICAL LAND CLASSIFICATION

| | |
|---------|--|
| H2 | TREED HEDGEROW DOMINATED BY BLACK WALNUT |
| THDM3-2 | NATIVE SHRUB DECIDUOUS HEDGEROW THICKET |

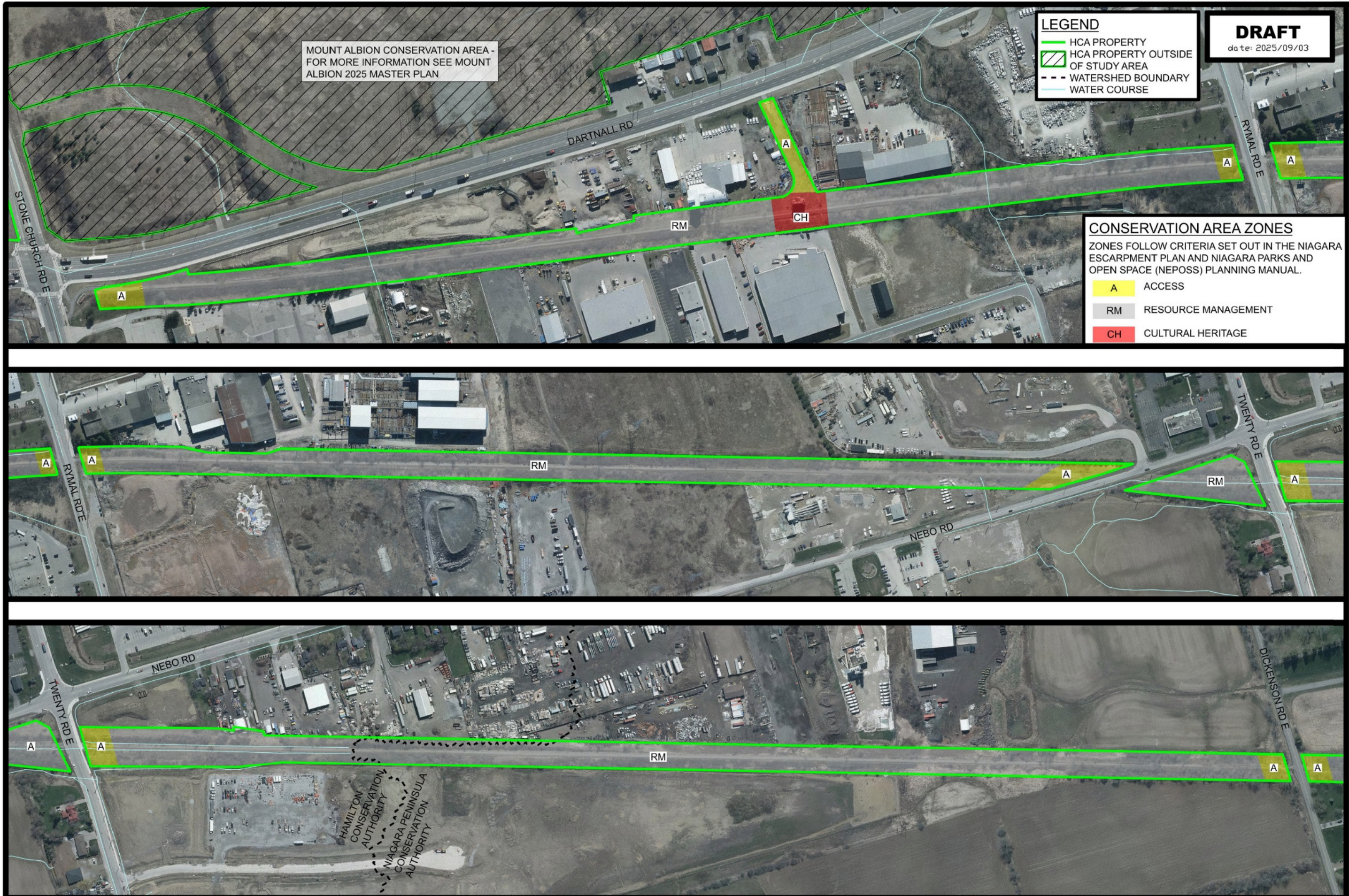
**ECOLOGICAL LAND CLASSIFICATION
 CHIPPAWA RAIL TRAIL MANAGEMENT PLAN**
 DATE: 2023/10/20





**ECOLOGICAL LAND CLASSIFICATION
CHIPPEWA RAIL TRAIL MANAGEMENT PLAN**
DATE: 2023/10/20





LEGEND

- HCA PROPERTY
- HCA PROPERTY OUTSIDE OF STUDY AREA
- - - WATERSHED BOUNDARY
- WATER COURSE

DRAFT
date: 2025/09/03



CONSERVATION AREA ZONES
ZONES FOLLOW CRITERIA SET OUT IN THE NIAGARA ESCARPMENT PLAN AND NIAGARA PARKS AND OPEN SPACE (NEOSS) PLANNING MANUAL.

| | |
|----|---------------------|
| A | ACCESS |
| RM | RESOURCE MANAGEMENT |
| CH | CULTURAL HERITAGE |

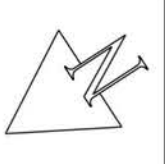
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CHIPPAWA RAIL TRAIL MANAGEMENT PLAN
DATE: 2025/09/03





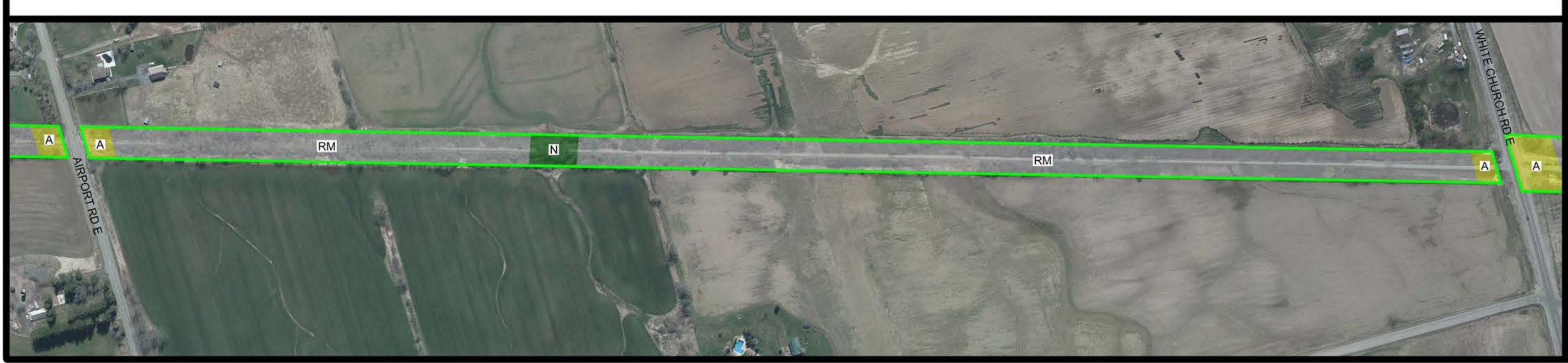
LEGEND
 — HCA PROPERTY
 — WATER COURSE

DRAFT
 date: 2024/01/23



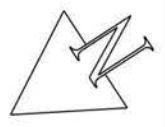
CONSERVATION AREA ZONES
 ZONES FOLLOW CRITERIA SET OUT IN THE NIAGARA ESCARPMENT PLAN AND NIAGARA PARKS AND OPEN SPACE (NEPOSS) PLANNING MANUAL.

| | |
|----|---------------------|
| A | ACCESS |
| RM | RESOURCE MANAGEMENT |
| N | NATURAL |



CONSERVATION AREA ZONES
CHIPPAWA RAIL TRAIL MANAGEMENT PLAN
 DATE: 2024/01/23





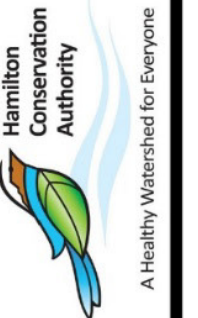
DATE: 2024/01/23

CONSERVATION AREA ZONES
CHIPPAWA RAIL TRAIL MANAGEMENT PLAN



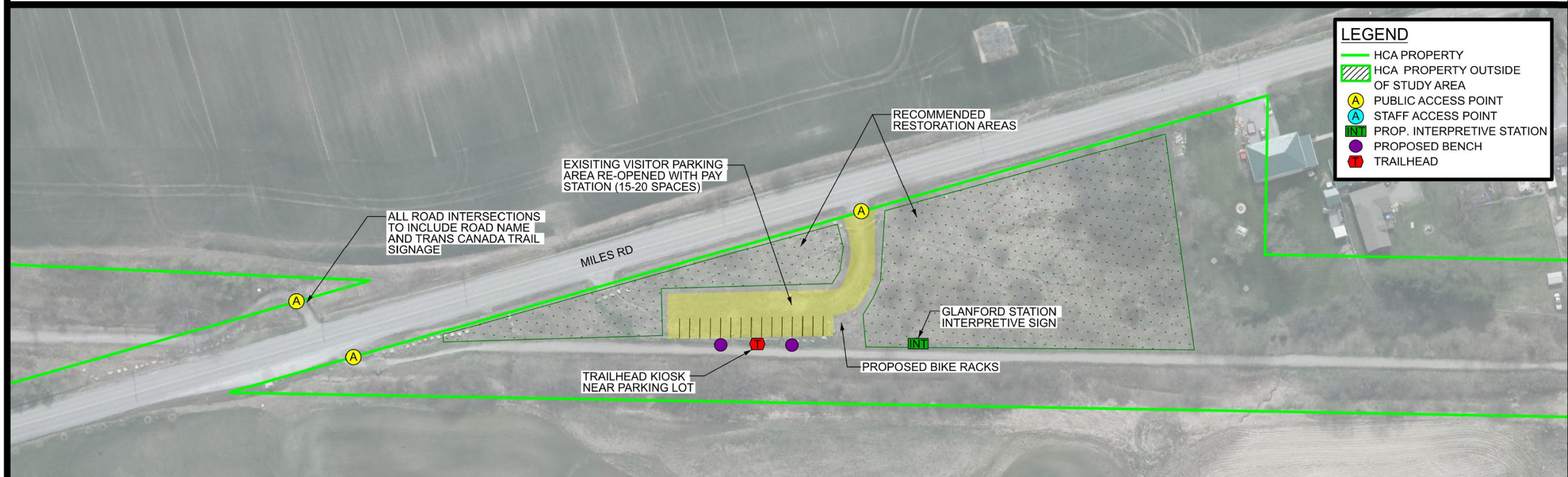
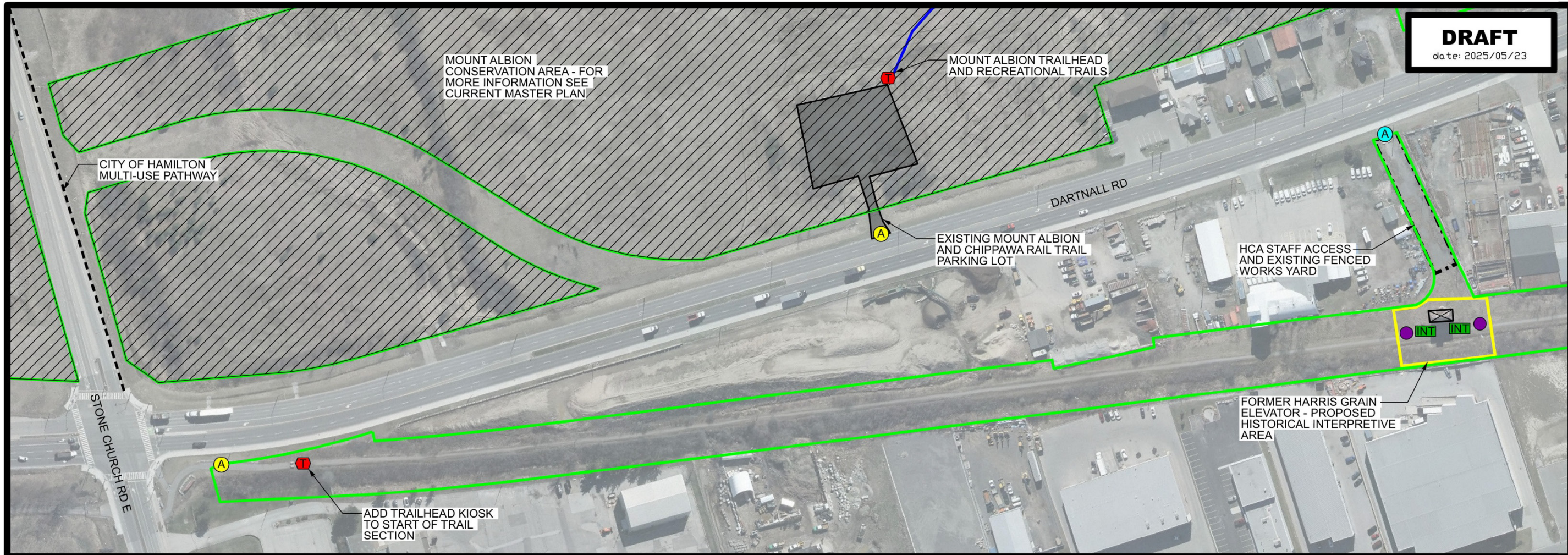
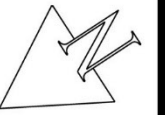


**TRAIL FEATURES AND CONCEPTS
CHIPPAWA RAIL TRAIL MANAGEMENT PLAN**



DATE: 2025/05/23

DRAFT
date: 2025/05/23



SITE CONCEPT DETAILS
CHIPPAWA RAIL TRAIL MANAGEMENT PLAN

DATE: 2025/05/23



Appendix 2 – Capital Development Priorities

DRAFT CHIPPAWA RAIL TRAIL CAPITAL DEVELOPMENT PRIORITIES: 2025 – 2035

A. Site Concept Improvements *Budget (\$105,000)

| | | |
|-----|---|----------|
| A1# | Harris Grain Elevator Maintenance and Safety Improvements | \$30,000 |
| A2 | Glanford Station Parking Lot & Trail Node | \$75,000 |

B. Trail Infrastructure Improvements *Budget (\$622,500)

| | | |
|-----|---|-----------|
| B1 | Trail Wayfinding Signage | \$30,000 |
| B2 | Interpretive Signs | \$17,500 |
| B3 | Rest Areas – Benches & Site Furnishings | \$50,000 |
| B4 | Barrier Fencing and Planted Buffers | \$90,000 |
| B5 | Gravel Trail Improvements | \$300,000 |
| B6 | Maintaining Bridge Crossings | \$100,000 |
| B7 | Culvert Replacement and Maintenance | \$25,000 |
| B8+ | Invasive Species Management | \$10,000 |

C. Funding Dependant Improvements *Budget (TBD)

| | | |
|-----|-----------------------------------|-----|
| C1# | Harris Grain Elevator Restoration | TBD |
|-----|-----------------------------------|-----|

- * Budget costs are in 2025 dollars, projects and budgets to be reviewed annually.
- # Subject to City of Hamilton involvement and approval.
- + Cost subject to ecological findings and recommendations.

Appendix 3 – Summary of Survey Results

Public Surveys – Summary of Key Comments and Resolutions

The surveys were made public on HCA’s website for any person who was interested in the project. Information flyers with a QR code and website link for the surveys were posted in the study area. Public engagement was promoted on HCA’s social media platforms, and by direct email to all HCA newsletter subscribers.

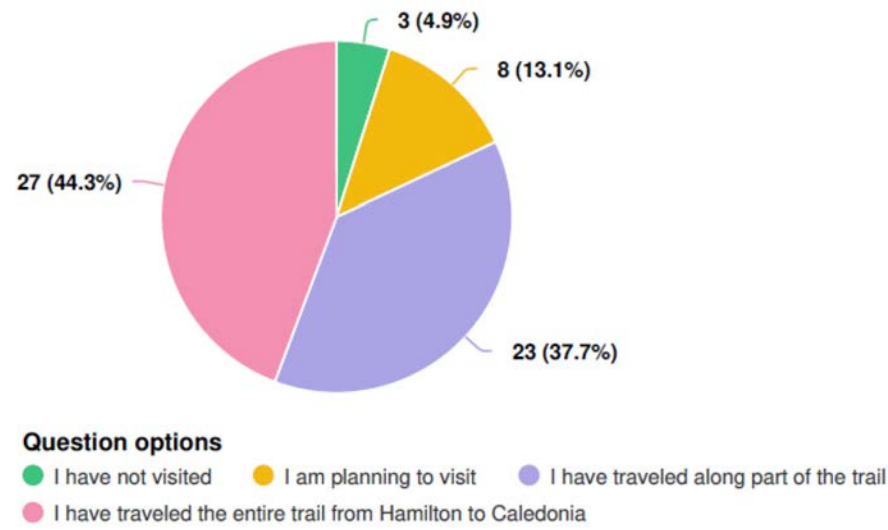
A total of 61 surveys were submitted by the public.

Following is a summary of the key comments received and solutions included in the plan.

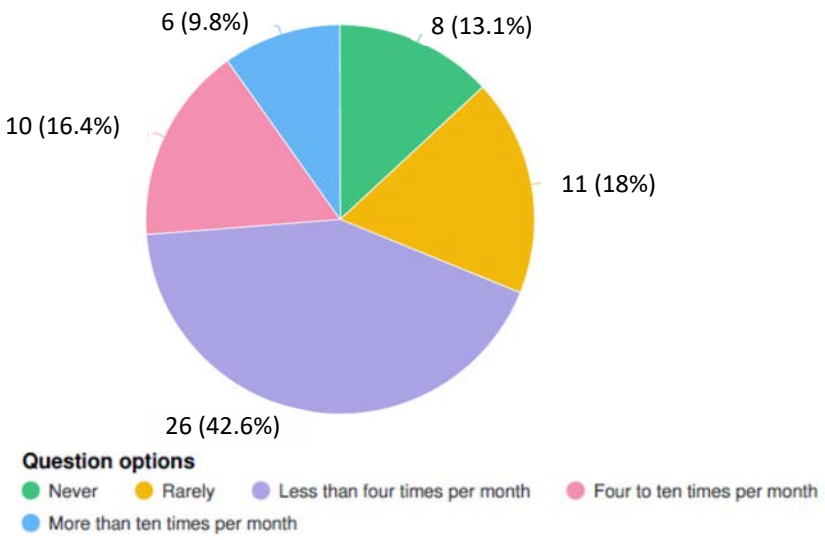
| Key Comments Received | Solutions Included in the Plan |
|---|---|
| Question: Where do you enter the trail and how far do you travel along the trail? | |
| Entering from Stone Church Road | <ul style="list-style-type: none"> This area was noted as a popular trail starting point, however the Mount Albion parking lot as a starting point was only mentioned a couple of times. The need for trailhead connection improvements are noted in the 2025 Mount Albion Master Plan to support trail use. |
| Other access points including Albion Falls, Escarpment Trail, Miles Road, Caledonia | <ul style="list-style-type: none"> Visitors enter at various points on foot or by bicycle, with some parking vehicles along roadways near the trail. Roadside parking is discussed in the plan, with recommendations to review this use with the City of Hamilton. |
| Visit Parts of the Trail | <ul style="list-style-type: none"> 11 out of 48 respondents indicated that they travel segments of the trail regularly. Most users in this group are on the trail for about 1 to 2 hours. |
| Visit the Entire Trail | <ul style="list-style-type: none"> 16 out of 48 respondents indicated that they regularly travel the trail from end to end. This response, as well as the trail attendance counts recorded in the plan support the popularity of this trail with the cycling community. |
| Question: Do you have any comments or suggestions for us to improve the Chippawa Rail Trail? | |
| Improve Parking at the trail entrances for safety and convenience entering the trail. | <ul style="list-style-type: none"> The Glanford Station Trail Node is proposed in this plan to re-open and help provide more safe parking along the trail. Parking along the roadways will be reviewed with City staff during our stakeholder engagement, to help finalize comments in the plan about this item. |

| | |
|--|--|
| <p>Improve Road Crosswalks for public safety, particularly at Rymal Road</p> | <ul style="list-style-type: none"> • Road crossing improvements are noted in the plan, to be discussed further with the City of Hamilton staff during our stakeholder engagement. |
| <p>Resolve Problems caused by some trail users</p> | <ul style="list-style-type: none"> • E-bike speed complaints were submitted. Guidance on e-bike use on the trail will be noted in the plan, along with the need for HCA to monitor this use with Haldimand County and the City of Hamilton. • Complaints of horse droppings on the trail, horse riders not cleaning up the trail. The plan recommends HCA review in more detail horse riding on the trail. • Unauthorized mini bikes and ATVs enter the trail. The trail inventory in the plan notes locations where evidence of this activity is visible, as a starting point for further HCA investigation and strategies for restricting this unauthorized use. |
| <p>Improve trail features</p> | <ul style="list-style-type: none"> • Provide garbage cans at all entry points. Garbage cans are currently recommended for the trail parking lot areas. Secondary locations will be considered by HCA in the operational plan. HCA will also work with the community to conduct trail clean-ups. • Provide more information about trail distances and conditions. Improvements to trail signage and wayfinding are identified in this plan, to help guide future signage projects and installations. • Provide portable washrooms. Washroom facilities are noted as a future capital item in the 2023 Mount Albion Master Plan for the trail-head parking lot. • Provide more cycling infrastructure such as water refill and repair stand stations. These items will be considered with the trailheads at Mount Albion and Miles Road. |
| <p>Extend trail all the way to the Grand River</p> | <ul style="list-style-type: none"> • Seven comments were submitted expressing disappointment that the Caledonia end of the trail does not connect to the Grand River. We will discuss these comments with Haldimand County staff in our stakeholder engagement. Outcomes from this engagement will be included in the finalized plan. |
| <p>Mountain Bike Comments</p> | <ul style="list-style-type: none"> • Members of the mountain bike community submitted comments encouraging HCA to work more with this community. The mountain bike community is being engaged for the 2023 Felker’s Falls Management Plan, this trail and other HCA lands will be discussed in this engagement and the outcome noted in the plans. |

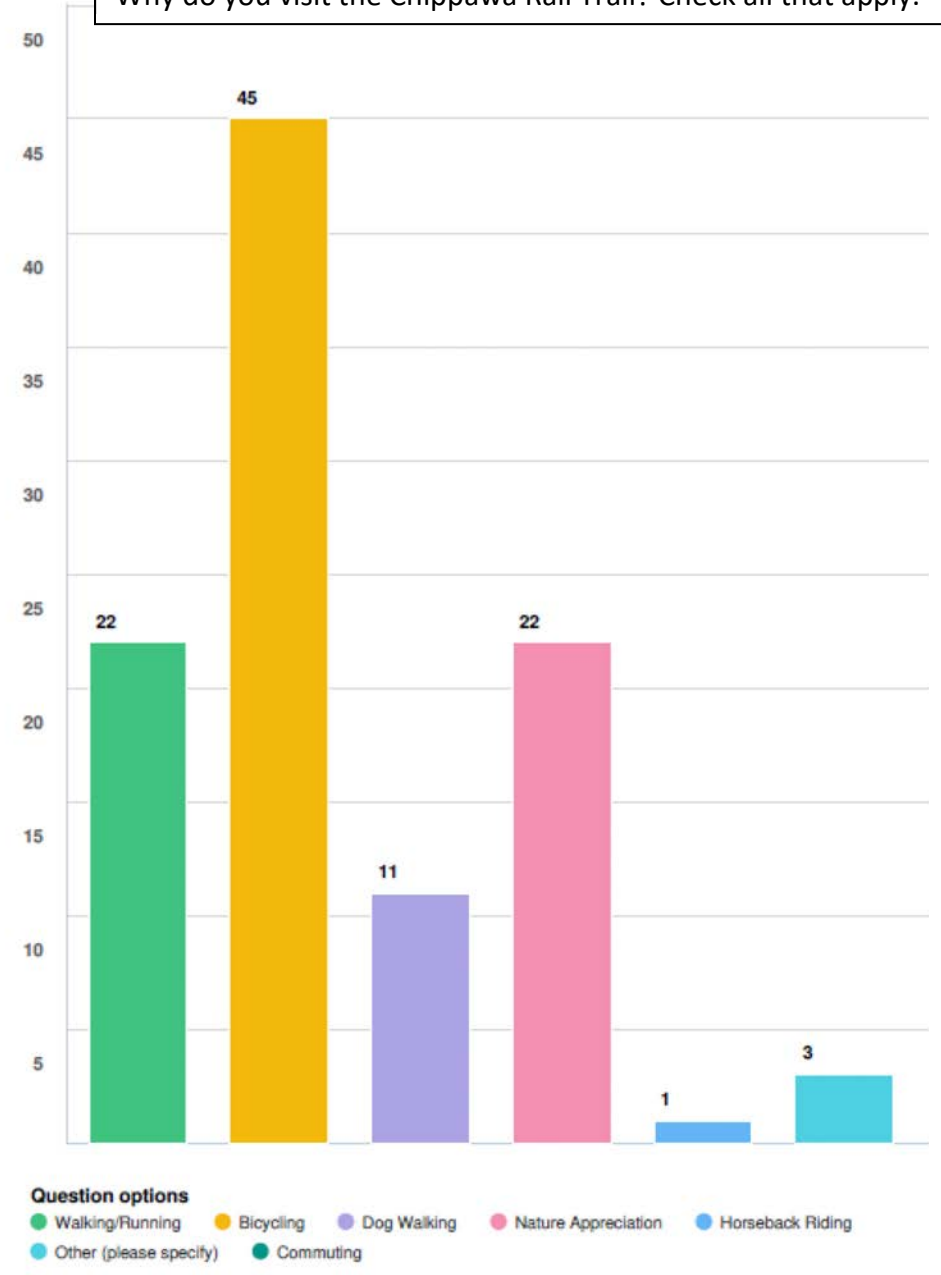
Have you visited the Chippawa Rail Trail?



How often have you or members of your family used the Chippawa Trail?



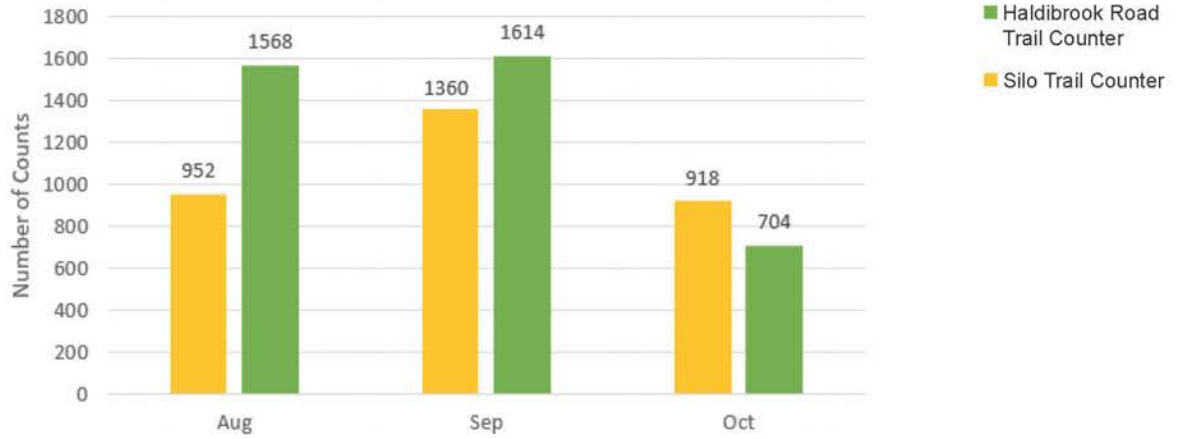
Why do you visit the Chippawa Rail Trail? Check all that apply.



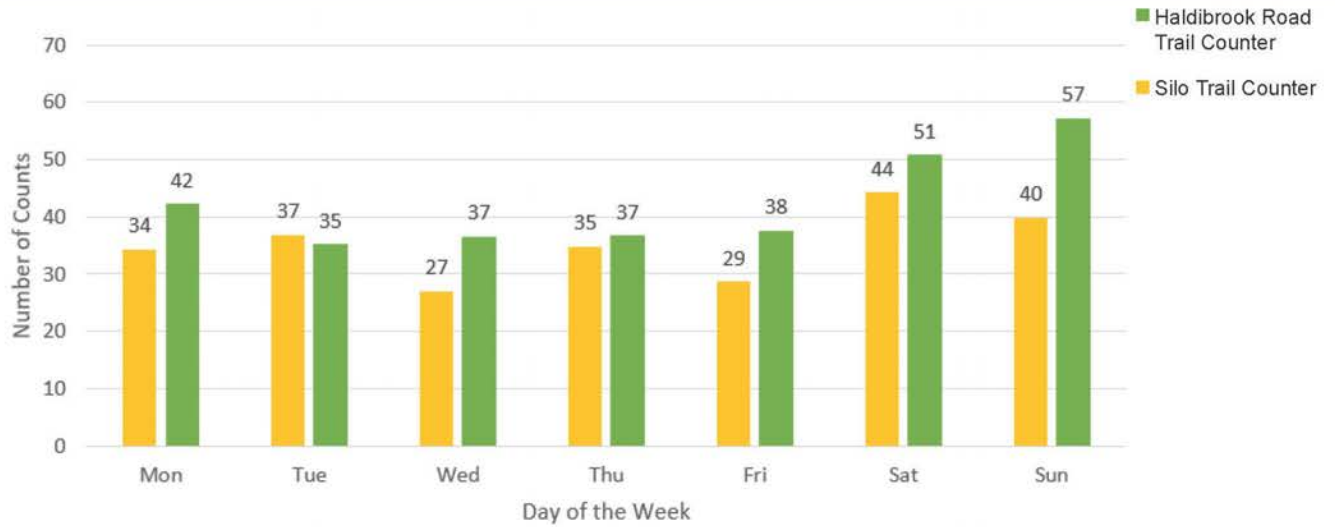
Appendix 4 – Trail Counter Data Summary

Trail Counter Summary

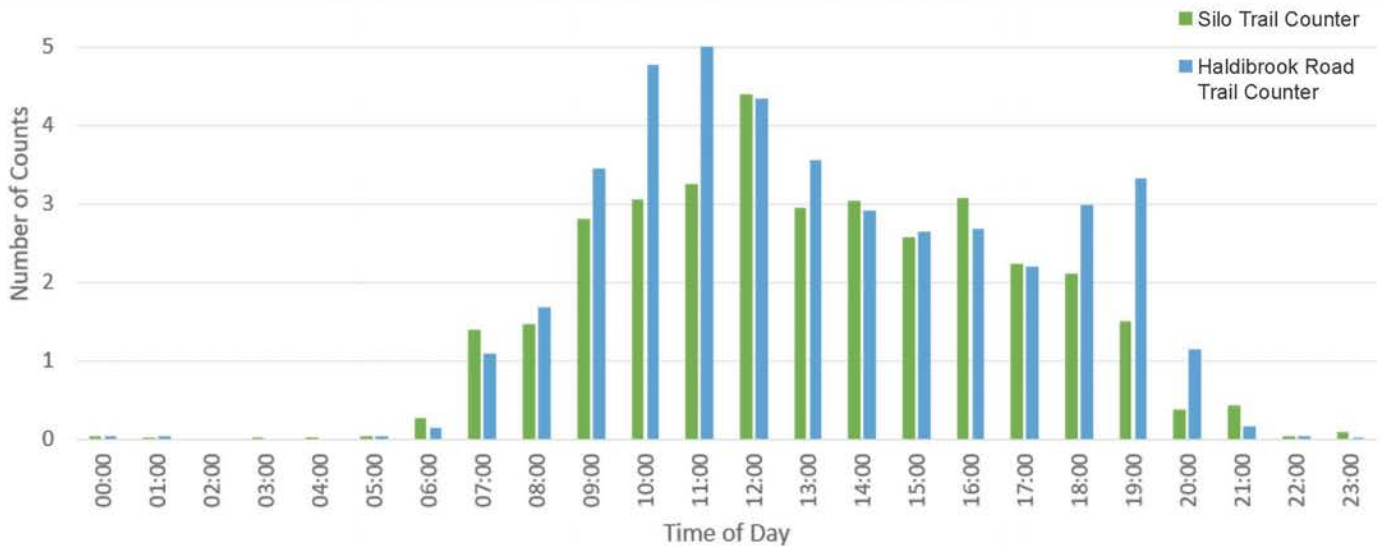
Chippawa Rail Trail - Monthly Averages



Chippawa Rail Trail - Week Day Averages



Chippawa Rail Trail - Average Counts Over 24 Hours



Appendix 5 – Natural Inventory – Species List

Table 1 - Breeding Birds

Table 2 - Mammals

Table 3 - Butterflies, Dragonflies and Damselflies

Table 4 - Herpetofauna

Table 5 – Plants

Table 6 - Floristic Summary & Assessment

Appendix 5 Table 1 – Breeding Birds

| Breeding Birds | | | | |
|-----------------------------------|-------------|------------|----------------------------------|-------------------------|
| Historical ebird data (2012-2023) | iNaturalist | Incidental | Scientific name | Common name |
| x | | x | <i>Agelaius phoeniceus</i> | Red-winged Blackbird |
| x | | x | <i>Buteo jamaicensis</i> | Red-tailed Hawk |
| x | | x | <i>Cardinalis cardinalis</i> | Northern Cardinal |
| x | | | <i>Cathartes aura</i> | Turkey Vulture |
| x | | x | <i>Charadrius vociferus</i> | Killdeer |
| | | x | <i>Coccyzus erythrophthalmus</i> | Black-billed Cuckoo |
| | | x | <i>Colaptes auratus</i> | Northern Flicker |
| | | x | <i>Contopus virens</i> | Eastern Wood-Pewee |
| x | | x | <i>Corvus brachyrhynchos</i> | American Crow |
| x | | x | <i>Cyanocitta cristata</i> | Blue Jay |
| x | | | <i>Dryobates pubescens</i> | Downy Woodpecker |
| x | | x | <i>Dumetella carolinensis</i> | Gray Catbird |
| x | | | <i>Empidonax traillii</i> | Willow Flycatcher |
| x | | | <i>Geothlypis trichas</i> | Common Yellowthroat |
| x | | | <i>Haemorhous mexicanus</i> | House Finch |
| x | | | <i>Hirundo rustica</i> | Barn Swallow |
| x | | | <i>Junco hyemalis</i> | Dark-eyed Junco |
| x | | | <i>Larus argentatus</i> | Herring Gull |
| | x | | <i>Meleagris gallopavo</i> | Wild Turkey |
| x | | x | <i>Melospiza melodia</i> | Song Sparrow |
| | | x | <i>Molothrus ater</i> | Brown-headed Cowbird |
| x | | x | <i>Passer domesticus</i> | House Sparrow |
| | | x | <i>Passerina cyanea</i> | Indigo Bunting |
| | | x | <i>Pheucticus ludovicianus</i> | Rose-breasted Grosbeak |
| x | | | <i>Poecile atricapillus</i> | Black-capped Chickadee |
| | | x | <i>Pooecetes gramineus</i> | Vesper Sparrow |
| x | | x | <i>Quiscalus quiscula</i> | Common Grackle |
| x | | | <i>Riparia riparia</i> | Bank Swallow |
| x | | | <i>Setophaga petechia</i> | Yellow Warbler |
| x | | | <i>Sitta carolinensis</i> | White-breasted Nuthatch |
| x | x | x | <i>Spinus tristis</i> | American Goldfinch |
| | | x | <i>Spizella passerina</i> | Chipping Sparrow |
| | | x | <i>Spizella pusilla</i> | Field Sparrow |
| x | | | <i>Spizelloides arborea</i> | American Tree Sparrow |
| x | | | <i>Sterna hirundo</i> | Common Tern |
| x | x | x | <i>Sturnus vulgaris</i> | European Starling |

| | | | | |
|---|---|---|---------------------------------|------------------------|
| x | | | <i>Tachycineta bicolor</i> | Tree Swallow |
| | | x | <i>Thryothorus ludovicianus</i> | Carolina Wren |
| | | x | <i>Troglodytes aedon</i> | House Wren |
| x | | x | <i>Turdus migratorius</i> | American Robin |
| | x | | <i>Tyrannus tyrannus</i> | Eastern Kingbird |
| | x | | <i>Tyrannus verticalis</i> | Western Kingbird |
| | x | x | <i>Vireo gilvus</i> | Warbling Vireo |
| | | x | <i>Vireo olivaceus</i> | Red-eyed Vireo |
| x | x | x | <i>Zenaida macroura</i> | Mourning Dove |
| | | x | <i>Zonotrichia albicollis</i> | White-throated Sparrow |

Appendix 5 Table 2 - Mammals

| Mammals (Background and Incidental Data Only) | | | |
|--|-------------------|--------------------------------|-----------------------|
| iNaturalist | Incidental | Scientific name | Common name |
| x | x | <i>Sylvilagus floridanus</i> | Eastern Cottontail |
| | x | <i>Sciurus carolinensis</i> | Eastern Gray Squirrel |
| | x | <i>Tamias striatus</i> | Eastern Chipmunk |
| | x | <i>Tamiasciurus hudsonicus</i> | Red Squirrel |

Appendix 5 Table 3 – Butterflies, Dragonflies and Damselflies

| Butterflies, Dragonflies and Damselflies (Background and Incidental Data Only) | | | |
|---|-------------------|------------------------------|---------------------------|
| iNaturalist | Incidental | Scientific name | Common name |
| | x | <i>Alypia octomaculata</i> | Eight-spotted Forester |
| x | | <i>Celastrina neglecta</i> | Summer Azure |
| x | | <i>Coenonympha tullia</i> | Common Ringlet |
| | x | <i>Ctenucha virginica</i> | Virginia Ctenucha |
| | x | <i>Danaus plexippus</i> | Monarch |
| x | | <i>Lymantria dispar</i> | Gypsy Moth |
| | x | <i>Nymphalis antiopa</i> | Mourning Cloak |
| | x | <i>Papilio glaucus</i> | Eastern Tiger Swallowtail |
| x | x | <i>Pieris rapae</i> | Cabbage White |
| x | | <i>Polygonia comma</i> | Eastern Comma |
| | x | <i>Psychomorpha epimenis</i> | Grapevine Epimenis |

Appendix 5 Table 4 - Herpetofauna

| Herpetofauna (Background and Incidental Data Only) | | | |
|---|-------------------|-------------------------------------|---------------------|
| iNaturalist | Incidental | Scientific name | Common name |
| x | x | <i>Anaxyrus americanus</i> | American Toad |
| x | | <i>Lithobates clamitans</i> | Green Frog |
| | x | <i>Lithobates palustris</i> | Pickerel Frog |
| x | | <i>Thamnophis sirtalis sirtalis</i> | Eastern Gartersnake |

Appendix 5 Table 5 - Plants

| Plants | | | | | | | | |
|----------|--|----------------------|---------------|--------|----------------|-----------------------|-------------|--------|
| ELC 2023 | SCIENTIFIC NAME | COMMON NAME | NATIVE STATUS | S RANK | COSEWIC STATUS | SARA SCHEDULE1 STATUS | SARO STATUS | G RANK |
| x | <i>Acer negundo</i> | Manitoba Maple | N | S5 | --- | --- | --- | G5 |
| x | <i>Acer nigrum</i> | Black Maple | N | S4? | --- | --- | --- | G5 |
| x | <i>Acer platanoides</i> | Norway Maple | I | SNA | --- | --- | --- | GNR |
| x | <i>Acer saccharinum</i> | Silver Maple | N | S5 | --- | --- | --- | G5 |
| x | <i>Acer saccharum</i> | Sugar Maple | N | S5 | --- | --- | --- | G5 |
| x | <i>Achillea millefolium</i> | Common Yarrow | I | SNA | --- | --- | --- | G5 |
| x | <i>Agrostis gigantea</i> | Redtop | I | SNA | --- | --- | --- | G4G5 |
| x | <i>Ailanthus altissima</i> | Tree-of-heaven | I | SNA | --- | --- | --- | GNR |
| x | <i>Ambrosia artemisiifolia</i> | Common Ragweed | N | S5 | --- | --- | --- | G5 |
| x | <i>Ambrosia trifida</i> | Great Ragweed | N | S5 | --- | --- | --- | G5 |
| x | <i>Anemonastrum canadense</i> | Canada Anemone | N | S5 | --- | --- | --- | G5 |
| x | <i>Anemone virginiana</i> <i>var. virginiana</i> | Tall Anemone | N | S5? | --- | --- | --- | G5T5 |
| x | <i>Apocynum androsaemifolium</i> | Spreading Dogbane | N | S5 | --- | --- | --- | G5 |
| x | <i>Arctium minus</i> | Common Burdock | I | SNA | --- | --- | --- | GNR |
| x | <i>Arisaema triphyllum</i> <i>ssp. triphyllum</i> | Jack-in-the-pulpit | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Asarum canadense</i> | Canada Wild-ginger | N | S5 | --- | --- | --- | G5 |
| x | <i>Asclepias syriaca</i> | Common Milkweed | N | S5 | --- | --- | --- | G5 |
| x | <i>Asparagus officinalis</i> | Garden Asparagus | I | SNA | --- | --- | --- | G5? |
| x | <i>Butomus umbellatus</i> | Flowering-rush | I | SNA | --- | --- | --- | G5 |
| x | <i>Campanula rapunculoides</i> | Creeping Bellflower | I | SNA | --- | --- | --- | GNR |
| x | <i>Carex albursina</i> | White Bear Sedge | N | S5 | --- | --- | --- | G5 |
| x | <i>Carex gracillima</i> | Graceful Sedge | N | S5 | --- | --- | --- | G5 |
| x | <i>Carex vulpinoidea</i> | Fox Sedge | N | S5 | --- | --- | --- | G5 |
| x | <i>Carya cordiformis</i> | Bitternut Hickory | N | S5 | --- | --- | --- | G5 |
| x | <i>Carya ovata</i> | Shagbark Hickory | N | S5 | --- | --- | --- | G5 |
| x | <i>Celastrus orbiculatus</i> | Oriental Bittersweet | I | SNA | --- | --- | --- | GNR |

| | | | | | | | | |
|---|---|-----------------------------|---|-----|-----|-----|-----|------|
| x | <i>Cichorium intybus</i> | Chicory | I | SNA | --- | --- | --- | GNR |
| x | <i>Cirsium arvense</i> | Canada Thistle | I | SNA | --- | --- | --- | G5 |
| x | <i>Cirsium vulgare</i> | Bull Thistle | I | SNA | --- | --- | --- | GNR |
| x | <i>Clinopodium vulgare</i> | Field Basil | N | S5 | --- | --- | --- | G5 |
| x | <i>Convallaria majalis</i> | European Lily-of-the-valley | I | SNA | --- | --- | --- | G5 |
| x | <i>Cornus alternifolia</i> | Alternate-leaved Dogwood | N | S5 | --- | --- | --- | G5 |
| x | <i>Cornus obliqua</i> | Pale Dogwood | N | S5 | --- | --- | --- | G5 |
| x | <i>Cornus racemosa</i> | Gray Dogwood | N | S5 | --- | --- | --- | G5 |
| x | <i>Cornus sericea</i> | Red-osier Dogwood | N | S5 | --- | --- | --- | G5 |
| x | <i>Crataegus monogyna</i> | English Hawthorn | I | SNA | --- | --- | --- | G5 |
| x | <i>Dactylis glomerata</i> | Orchard Grass | I | SNA | --- | --- | --- | GNR |
| x | <i>Daucus carota</i> | Wild Carrot | I | SNA | --- | --- | --- | GNR |
| x | <i>Dianthus armeria</i> | Deptford Pink | I | SNA | --- | --- | --- | GNR |
| x | <i>Dipsacus fullonum</i> | Common Teasel | I | SNA | --- | --- | --- | GNR |
| x | <i>Dipsaculaciniatus</i> | Cut-leaved Teasel | I | SNA | --- | --- | --- | GNR |
| x | <i>Draba verna</i> | Spring Draba | I | SNA | --- | --- | --- | GNR |
| x | <i>Echinocystis lobata</i> | Wild Mock-cucumber | N | S5 | --- | --- | --- | G5 |
| x | <i>Echium vulgare</i> | Common Viper's Bugloss | I | SNA | --- | --- | --- | GNR |
| x | <i>Elaeagnus umbellata</i> | Autumn Olive | I | SNA | --- | --- | --- | GNR |
| x | <i>Elymus repens</i> | Creeping Wildrye | I | SNA | --- | --- | --- | GNR |
| x | <i>Elymus virginicus var. virginicus</i> | Virginia Wildrye | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Epilobium hirsutum</i> | Hairy Willowherb | I | SNA | --- | --- | --- | GNR |
| x | <i>Epipactis helleborine</i> | Eastern Helleborine | I | SNA | --- | --- | --- | GNR |
| x | <i>Equisetum arvense</i> | Field Horsetail | N | S5 | --- | --- | --- | G5 |
| x | <i>Equisetum pratense</i> | Meadow Horsetail | N | S5 | --- | --- | --- | G5 |
| x | <i>Erigeron annuus</i> | Annual Fleabane | N | S5 | --- | --- | --- | G5 |
| x | <i>Erigeron philadelphicus</i> | Philadelphia Fleabane | N | S5 | --- | --- | --- | G5 |
| x | <i>Erythronium albidum</i> | White Trout-lily | N | S4 | --- | --- | --- | G5 |
| x | <i>Erythronium americanum ssp. americanum</i> | Yellow Trout-lily | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Euonymus obovatus</i> | Running Strawberry Bush | N | S4 | --- | --- | --- | G5 |
| x | <i>Euthamia graminifolia</i> | Grass-leaved Goldenrod | N | S5 | --- | --- | --- | G5 |
| x | <i>Fallopia convolvulus</i> | Black Bindweed | I | SNA | --- | --- | --- | GNR |
| x | <i>Fragaria vesca ssp.</i> | American Woodland | N | S5 | --- | --- | --- | G5T5 |

| | | | | | | | | |
|---|------------------------------------|------------------------|---|------|-----|-----|-----|------|
| | <i>americana</i> | Strawberry | | | | | | |
| x | <i>Fragaria virginiana</i> | Wild Strawberry | N | S5 | --- | --- | --- | G5 |
| x | <i>Frangula alnus</i> | Glossy Buckthorn | I | SNA | --- | --- | --- | GNR |
| x | <i>Fraxinus americana</i> | White Ash | N | S4 | --- | --- | --- | G5 |
| x | <i>Fraxinus pennsylvanica</i> | Green Ash | N | S4 | --- | --- | --- | G5 |
| x | <i>Galium aparine</i> | Cleavers | N | S5 | --- | --- | --- | G5 |
| x | <i>Galium mollugo</i> | Smooth Bedstraw | I | SNA | --- | --- | --- | GNR |
| x | <i>Galium verum</i> | Yellow Bedstraw | I | SNA | --- | --- | --- | GNR |
| x | <i>Geranium maculatum</i> | Spotted Geranium | N | S5 | --- | --- | --- | G5 |
| x | <i>Glechoma hederacea</i> | Ground Ivy | I | SNA | --- | --- | --- | GNR |
| x | <i>Gleditsia triacanthos</i> | Honey-locust | N | S2? | --- | --- | --- | G5 |
| x | <i>Hackelia deflexa</i> | Northern Stickseed | N | S5 | --- | --- | --- | G5 |
| x | <i>Hackelia virginiana</i> | Virginia Stickseed | N | S5 | --- | --- | --- | G5 |
| x | <i>Heliopsis helianthoides</i> | False Sunflower | N | S4S5 | --- | --- | --- | G5 |
| x | <i>Hesperis matronalis</i> | Dame's Rocket | I | SNA | --- | --- | --- | G4G5 |
| x | <i>Hieracium vulgatum</i> | Common Hawkweed | I | SNA | --- | --- | --- | GNR |
| x | <i>Hydrophyllum virginianum</i> | Virginia Waterleaf | N | S5 | --- | --- | --- | G5 |
| x | <i>Hypericum perforatum</i> | Common St. John's-wort | I | SNA | --- | --- | --- | GNR |
| x | <i>Impatiens capensis</i> | Spotted Jewelweed | N | S5 | --- | --- | --- | G5 |
| x | <i>Juglans cinerea</i> | Butternut | N | S2? | END | END | END | G4 |
| x | <i>Juglans nigra</i> | Black Walnut | N | S4? | --- | --- | --- | G5 |
| x | <i>Juncus alpinoarticulatus</i> | Alpine Rush | N | S5 | --- | --- | --- | G5 |
| x | <i>Juncus dudleyi</i> | Dudley's Rush | N | S5 | --- | --- | --- | G5 |
| x | <i>Juncus effusus ssp. solutus</i> | Soft Rush | N | S5? | --- | --- | --- | G5T5 |
| x | <i>Juncus nodosus</i> | Knotted Rush | N | S5 | --- | --- | --- | G5 |
| x | <i>Juniperus virginiana</i> | Eastern Red Cedar | N | S5 | --- | --- | --- | G5 |
| x | <i>Lactuca biennis</i> | Tall Blue Lettuce | N | S5 | --- | --- | --- | G5 |
| x | <i>lamium galeobdolon</i> | Yellow Archangel | I | SNA | --- | --- | --- | GNR |
| x | <i>Laportea canadensis</i> | Wood Nettle | N | S5 | --- | --- | --- | G5 |
| x | <i>Larix laricina</i> | Tamarack | N | S5 | --- | --- | --- | G5 |
| x | <i>Leersia oryzoides</i> | Rice Cutgrass | N | S5 | --- | --- | --- | G5 |
| x | <i>Leucanthemum vulgare</i> | Oxeye Daisy | I | SNA | --- | --- | --- | GNR |
| x | <i>Ligustrum vulgare</i> | European Privet | I | SNA | --- | --- | --- | GNR |
| x | <i>Lolium pratense</i> | Meadow Fescue | I | SNA | --- | --- | --- | G5 |

| | | | | | | | | |
|---|---|----------------------------|---|-----|-----|-----|-----|------|
| x | <i>Lonicera tatarica</i> | Tartarian Honeysuckle | I | SNA | --- | --- | --- | GNR |
| x | <i>Lotus corniculatus</i> | Garden Bird's-foot Trefoil | I | SNA | --- | --- | --- | GNR |
| x | <i>Lythrum salicaria</i> | Purple Loosestrife | I | SNA | --- | --- | --- | G5 |
| x | <i>Medicago lupulina</i> | Black Medic | I | SNA | --- | --- | --- | GNR |
| x | <i>Melilotus albus</i> | White Sweet-clover | I | SNA | --- | --- | --- | G5 |
| x | <i>Melilotus officinalis</i> | Yellow Sweet-clover | I | SNA | --- | --- | --- | GNR |
| x | <i>Monarda fistulosa</i> | Wild Bergamot | N | S5 | --- | --- | --- | G5 |
| x | <i>Oxalis stricta</i> | Upright Yellow Wood-sorrel | N | S5 | --- | --- | --- | G5 |
| x | <i>Parthenocissus quinquefolia</i> | Virginia Creeper | N | S4? | --- | --- | --- | G5 |
| x | <i>Parthenocissus vitacea</i> | Thicket Creeper | N | S5 | --- | --- | --- | G5 |
| x | <i>Persicaria virginiana</i> | Virginia Smartweed | N | S4 | --- | --- | --- | G5 |
| x | <i>Phalaris arundinacea</i> | Reed Canary Grass | N | S5 | --- | --- | --- | G5 |
| x | <i>Phleum pratense</i> | Common Timothy | I | SNA | --- | --- | --- | GNR |
| x | <i>Phragmites australis</i> ssp. <i>Australis</i> | European Reed | I | SNA | --- | --- | --- | G5T5 |
| x | <i>Pilosella caespitosa</i> | Meadow Hawkweed | I | SNA | --- | --- | --- | GNR |
| x | <i>Pinus strobus</i> | Eastern White Pine | N | S5 | --- | --- | --- | G5 |
| x | <i>Plantago lanceolata</i> | English Plantain | I | SNA | --- | --- | --- | G5 |
| x | <i>Plantago major</i> | Common Plantain | I | SNA | --- | --- | --- | G5 |
| x | <i>Plantago rugelii</i> | Rugel's Plantain | N | S5 | --- | --- | --- | G5 |
| x | <i>Poa pratensis</i> ssp. <i>pratensis</i> | Kentucky Bluegrass | I | SNA | --- | --- | --- | G5T5 |
| x | <i>Podophyllum peltatum</i> | May-apple | N | S5 | --- | --- | --- | G5 |
| x | <i>Populus balsamifera</i> | Balsam Poplar | N | S5 | --- | --- | --- | G5 |
| x | <i>Populus deltoides</i> | Eastern Cottonwood | N | S5 | --- | --- | --- | G5 |
| x | <i>Populus deltoides</i> ssp. <i>deltoides</i> | Eastern Cottonwood | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Populus tremuloides</i> | Trembling Aspen | N | S5 | --- | --- | --- | G5 |
| x | <i>Potentilla anserina</i> | Silverweed | N | S5 | --- | --- | --- | G5 |
| x | <i>Potentilla argentea</i> | Silvery Cinquefoil | I | SNA | --- | --- | --- | GNR |
| x | <i>Potentilla recta</i> | Sulphur Cinquefoil | I | SNA | --- | --- | --- | GNR |
| x | <i>Prunella vulgaris</i> | Self-heal | I | SNA | --- | --- | --- | G5 |
| x | <i>Prunus avium</i> | Sweet Cherry | I | SNA | --- | --- | --- | GNR |
| x | <i>Prunus serotina</i> | Black Cherry | N | S5 | --- | --- | --- | G5 |
| x | <i>Prunus virginiana</i> | Choke Cherry | N | S5 | --- | --- | --- | G5 |
| x | <i>Pyrus communis</i> | Common Pear | I | SNA | --- | --- | --- | G5 |
| x | <i>Quercus alba</i> | White Oak | N | S5 | --- | --- | --- | G5 |
| x | <i>Quercus bicolor</i> | Swamp White Oak | N | S4 | --- | --- | --- | G5 |

| | | | | | | | | |
|---|--|------------------------|---|-----|-----|-----|-----|-------|
| x | <i>Quercus macrocarpa</i> | Bur Oak | N | S5 | --- | --- | --- | G5 |
| x | <i>Quercus rubra</i> | Northern Red Oak | N | S5 | --- | --- | --- | G5 |
| x | <i>Ranunculus acris</i> | Tall Buttercup | I | SNA | --- | --- | --- | G5 |
| x | <i>Rhamnus cathartica</i> | Common Buckthorn | I | SNA | --- | --- | --- | GNR |
| x | <i>Rhus typhina</i> | Staghorn Sumac | N | S5 | --- | --- | --- | G5 |
| x | <i>Ribes cynosbati</i> | Prickly Gooseberry | N | S5 | --- | --- | --- | G5 |
| x | <i>Robinia pseudoacacia</i> | Black Locust | I | SNA | --- | --- | --- | G5 |
| x | <i>Rosa blanda</i> | Smooth Rose | N | S5 | --- | --- | --- | G5 |
| x | <i>Rosa multiflora</i> | Multiflora Rose | I | SNA | --- | --- | --- | GNR |
| x | <i>Rosa virginiana</i> | Virginia Rose | N | SU | --- | --- | --- | G5 |
| x | <i>Rubus bifrons</i> | Himalayan Blackberry | I | SNA | --- | --- | --- | G5 |
| x | <i>Rubus idaeus ssp. idaeus</i> | Common Red Raspberry | I | SNA | --- | --- | --- | G5T5 |
| x | <i>Rubus occidentalis</i> | Black Raspberry | N | S5 | --- | --- | --- | G5 |
| x | <i>Rumex crispus</i> | Curly Dock | I | SNA | --- | --- | --- | GNR |
| x | <i>Salix alba</i> | White Willow | I | SNA | --- | --- | --- | G5 |
| x | <i>Salix bebbiana</i> | Bebb's Willow | N | S5 | --- | --- | --- | G5 |
| x | <i>Salix eriocephala</i> | Heart-leaved Willow | N | S5 | --- | --- | --- | G5 |
| x | <i>Salix euxina</i> | Crack Willow | I | SNA | --- | --- | --- | GNR |
| x | <i>Salix petiolaris</i> | Meadow Willow | N | S5 | --- | --- | --- | G5 |
| x | <i>Sambucus canadensis</i> | Common Elderberry | N | S5 | --- | --- | --- | G5 |
| x | <i>Sanguinaria canadensis</i> | Bloodroot | N | S5 | --- | --- | --- | G5 |
| x | <i>Saponaria officinalis</i> | Bouncing-bet | I | SNA | --- | --- | --- | GNR |
| x | <i>Schoenoplectus acutus var. acutus</i> | Hard-stemmed Bulrush | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Schoenoplectus tabernaemontani</i> | Soft-stemmed Bulrush | N | S5 | --- | --- | --- | G5 |
| x | <i>Scirpus cyperinus</i> | Cottongrass Bulrush | N | S5 | --- | --- | --- | G5 |
| x | <i>Securigera varia</i> | Common Crown-vetch | I | SNA | --- | --- | --- | GNR |
| x | <i>Silene vulgaris</i> | Bladder Campion | I | SNA | --- | --- | --- | GNR |
| x | <i>Solanum dulcamara</i> | Bittersweet Nightshade | I | SNA | --- | --- | --- | GNR |
| x | <i>Solidago altissima var. altissima</i> | Eastern Tall Goldenrod | N | S5 | --- | --- | --- | G--T5 |
| x | <i>Solidago caesia</i> | Blue-stemmed Goldenrod | N | S5 | --- | --- | --- | G5 |
| x | <i>Solidago flexicaulis</i> | Zigzag Goldenrod | N | S5 | --- | --- | --- | G5 |
| x | <i>Solidago juncea</i> | Early Goldenrod | N | S5 | --- | --- | --- | G5 |
| x | <i>Sparganium eurycarpum</i> | Broad-fruited Burreed | N | S5 | --- | --- | --- | G5 |
| x | <i>Symphotrichum cordifolium</i> | Heart-leaved Aster | N | S5 | --- | --- | --- | G5 |

| | | | | | | | | |
|---|---|-----------------------|---|-----|-----|-----|-----|------|
| x | <i>Symphyotrichum ericoides</i> var. <i>ericoides</i> | White Heath Aster | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Symphyotrichum lanceolatum</i> ssp. <i>lanceolatum</i> | Panicled Aster | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Symphyotrichum novae-angliae</i> | New England Aster | N | S5 | --- | --- | --- | G5 |
| x | <i>Symphyotrichum puniceum</i> var. <i>puniceum</i> | Swamp Aster | N | S5 | --- | --- | --- | G5T5 |
| x | <i>Symphyotrichum urophyllum</i> | Arrow-leaved Aster | N | S4 | --- | --- | --- | G4G5 |
| x | <i>Thalictrum pubescens</i> | Tall Meadow-rue | N | S5 | --- | --- | --- | G5 |
| x | <i>Thuja occidentalis</i> | Eastern White Cedar | N | S5 | --- | --- | --- | G5 |
| x | <i>Tilia americana</i> | American Basswood | N | S5 | --- | --- | --- | G5 |
| x | <i>Torilis japonica</i> | Erect Hedge-parsley | I | SNA | --- | --- | --- | GNR |
| x | <i>Toxicodendron radicans</i> | Poison Ivy | N | S5 | --- | --- | --- | G5 |
| x | <i>Tragopogon porrifolius</i> | Purple Goat's-beard | I | SNA | --- | --- | --- | GNR |
| x | <i>Tragopogon pratensis</i> | Meadow Goat's-beard | I | SNA | --- | --- | --- | GNR |
| x | <i>Trifolium pratense</i> | Red Clover | I | SNA | --- | --- | --- | GNR |
| x | <i>Trillium grandiflorum</i> | White Trillium | N | S5 | --- | --- | --- | G5 |
| x | <i>Tussilago farfara</i> | Colt's-foot | I | SNA | --- | --- | --- | GNR |
| x | <i>Typha angustifolia</i> | Narrow-leaved Cattail | I | SNA | --- | --- | --- | G5 |
| x | <i>Ulmus americana</i> | American Elm | N | S5 | --- | --- | --- | G5 |
| x | <i>Ulmus rubra</i> | Slippery Elm | N | S5 | --- | --- | --- | G5 |
| x | <i>Verbascum thapsus</i> | Common Mullein | I | SNA | --- | --- | --- | GNR |
| x | <i>Verbena urticifolia</i> | White Vervain | N | S5 | --- | --- | --- | G5 |
| x | <i>Viburnum acerifolium</i> | Maple-leaved Viburnum | N | S5 | --- | --- | --- | G5 |
| x | <i>Viburnum lantana</i> | Wayfaring-tree | I | SNA | --- | --- | --- | GNR |
| x | <i>Viburnum lentago</i> | Nannyberry | N | S5 | --- | --- | --- | G5 |
| x | <i>Viburnum opulus</i> | Cranberry Viburnum | I | SNA | --- | --- | --- | G5 |
| x | <i>Viburnum rafinesquianum</i> | Downy Arrowwood | N | S5 | --- | --- | --- | G5 |
| x | <i>Vicia cracca</i> | Tufted Vetch | I | SNA | --- | --- | --- | GNR |
| x | <i>Viola pubescens</i> | Yellow Violet | N | S5 | --- | --- | --- | G5 |
| x | <i>Vitis riparia</i> | Riverbank Grape | N | S5 | --- | --- | --- | G5 |

Appendix 5 Table 6 – Floristic Summary and Assessment

| FLORISTIC SUMMARY & ASSESSMENT | | | | |
|--|---------------------------------|--------------|-----|-----|
| Species Diversity | | | | |
| | Total Species: | 235 | | 189 |
| | Native Species: | 112 | 48% | 59% |
| | Exotic Species | 77 | 33% | 41% |
| | Species ID'd to sp. only | 46 | | |
| | Total Taxa in Region (NAI 2014) | 1496 | | |
| | % Regional Taxa Recorded | 13% | | |
| | Regionally Significant Species | | | |
| | S1-S3 Species | 2 | | |
| | S4 Species | 10 | | |
| | S5 Species | 98 | | |
| Co-efficient of Conservatism and Floral Quality Index | | | | |
| Co-efficient of Conservatism (CC) (average) | | 4.04 | | |
| CC 0 to 3 | lowest sensitivity | 38 | | |
| CC 4 to 6 | moderate sensitivity | 65 | | |
| CC 7 to 8 | high sensitivity | 8 | | |
| CC 9 to 10 | highest sensitivity | 0 | | |
| Floral Quality Index (FQI) | | 42.71 | | |

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**Hamilton
Conservation
Authority**

A Healthy Watershed for Everyone

838 MINERAL SPRINGS ROAD
P.O. BOX 81067
ANCASTER, ONTARIO L9G 4X1
P: 905-525-2181
WWW.CONSERVATIONHAMILTON.CA

Report to: Conservation Advisory Board

Approved for Circulation By: Lisa Burnside, CAO

Reviewed By: T. Scott Peck, MCIP, RPP, Deputy Chief Administrative Officer / Director, Watershed Management Services

Prepared By: Stacey Van Opstal, Monitoring Technologist
Jonathan Bastien, P. Eng., Manager - Water Resources Eng.

Meeting Date: October 9th, 2025

Subject: Water Resources Engineering Monitoring Network – Review and Enhancements

Recommendation:

THAT the Conservation Advisory Board recommends to the Board of Directors;

THAT the Water Resources Engineering Monitoring Network - Review and Enhancements staff report be adopted.

Executive Summary:

The HCA Strategic Plan, 2025-2029, under the Water Resources Management Priority area speaks to enhancing our flood forecasting and warning program and monitoring the impacts of climate change.

To implement the noted initiatives, a Year 1 strategic plan initiative was approved to undertake a system review to identify where HCA can enhance connectivity and reliability for the Water Resources Engineering Monitoring Network.

The Water Resources Engineering Monitoring Network includes rain gauges, streamflow gauges, reservoir water level gauges, and snow survey courses located strategically throughout the HCA watershed. This Monitoring Network provides information essential for Flood Forecasting and Warning (FFW), Low Water Response (LWR), and operations management at the Christie Lake and Valens Lake dams.

The completed review includes recommended priority updates to be undertaken in 2026 with additional updates proposed in 2027 and 2028. This aligns with the year 2 strategic plan initiative to implement priority system enhancements to improve connectivity and reliability of streamflow, precipitation and snowpack monitoring network, based on the recommendations from the 2025 system review.

Staff Comment / Discussion:

The attached *Water Resources Engineering Monitoring Network - Review and Enhancements* staff report details the flowing regarding this monitoring network system review:

- Background
- Existing Monitoring Network
- Considerations for Enhancing the Monitoring Network
- Evaluation of Monitoring Network Coverage by Watershed
- Suggested Potential Enhancements to the Monitoring Network
- Conclusions

Based on the system review, the following enhancements to the Water Resources Engineering Monitoring Network have been identified:

- Updates to WISKI-SODA servers and software, to improve reliability, performance and supportability
- Modernization of gauge data loggers and modems, to improve operational reliability and performance
- Expansion of the Monitoring Network to include additional rain gauges, streamflow gauges and snow survey plots, to enhance spatial coverage of information, and potentially include the additional gauges and watercourse reaches within the Flood Forecasting & Warning, Low Water Management, and other assessments.
- Upgrade or replace tipping buckets, level loggers, streamflow equipment, and other field equipment
- Expand the type of data collected, to potentially include soil moisture and temperature
- Flood and ice jam remote photo monitoring
- Enhance opportunities for the sharing of information such as a web-based solution available to the public

Priority enhancements recommended in 2026 are presented in Table ES-1. The corresponding total expected budget is approximately \$31,250 including HST.

Table ES-1: Summary of 2026 Priority Enhancements

| Suggested 2026 Priority Enhancement | Total Equipment Price (including HST) |
|--|--|
| Updates to WISKI-SODA Servers and Software | No Additional Budget Expected to be Required |
| Modernization of Data Loggers and Communications At Select Gauges (7 gauges – Kisters quote option) | \$22,000 |
| Integration of Additional Existing Gauges Into the WISKI-SODA System (3 gauges – Flowlink Option 1b quote option) | \$7,250 |
| Supplemental Monitoring Equipment (2 new level loggers - Solinst) | \$2,000 |
| Total | \$31,250 |

The following additional enhancements are recommended in 2027 and 2028. Cost estimates for these priorities will be developed and presented in the 2027 and 2028 budget.

- Installation of Additional Gauges to Expand the Monitoring Network – Precipitation Gauges
- Additional Snow Survey Courses
- Replacement of Precipitation Tipping Buckets to Improve Frozen Precipitation Monitoring
- Installation of Additional Gauges to Expand the Monitoring Network – Flow Gauges
- Soil Moisture Sensors
- Remote Photo Monitoring of Frazil Ice
- Web-Based Open Database

Regarding key findings, the recommended 2026 priorities are necessary to upgrade and modernize the Monitoring Network WISKI and SODA systems, as well as modernize and provide enhanced reliability of communication systems to the gauges. It will also provide real-time access to three existing monitoring gauges not yet part of the WISKI-SODA system.

The suggested 2027 and 2028 recommendations will increase the number of locations within the watershed where local real-time precipitation and flow data are available. The enhancements will also enhance HCA's ability to forecast potential flooding related to both rain and snowmelt, as well as improve HCA's ability to monitor local impacts from ongoing storm events, as part of Flood Forecasting and Warning. The enhancements will also increase the number of sites available for, and local accuracy

of, Low Water Response assessments. Remote photo monitoring would supplement the regular inspections of Spencer Creek for frazil ice and flooding, when frazil ice is possible, as per the HCA Ice Management Plan. Web-based open databases would advance the opportunities for HCA sharing precipitation and flow data to the public.

Strategic Plan Linkage:

The initiative refers directly to the HCA Strategic Plan 2025 – 2029:

- **Strategic Priority Area – Water Resources Management**
 - Enhance our flood forecasting and warning program to issue relevant and timely flood messaging and assist municipalities and the public in responding quickly and effectively to flood events.
 - Monitor the impacts of climate change through existing and enhanced monitoring programs and networks to inform adaptation and mitigation strategies.

Agency Comments:

Not applicable.

Legal / Financial Implications:

Recommended priority enhancements as outlined in the “*Water Resources Engineering Monitoring Network - Review and Enhancements*” report include upgrades proposed in 2026 with a corresponding total budget of \$31,250 including HST and this amount has been included in the 2026 HCA Operational Budget.

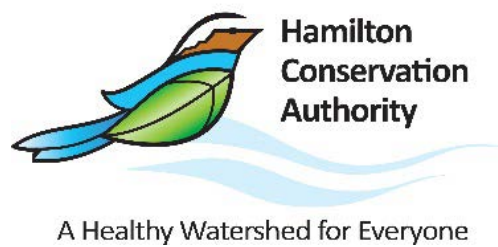
Cost estimates for the 2027 and 2028 priorities will be developed and presented in the respective budget years for suggested recommendations for those years.

Related Reports and Appendices:

Water Resources Engineering Monitoring Network - Review and Enhancements staff report

Water Resources Engineering Monitoring Network -
Review and Enhancements
Hamilton Conservation Authority

September 2025



Executive Summary

The HCA Strategic Plan, 2025-2029, under the Water Resources Management Priority area includes the following initiatives.

- Enhance our flood forecasting and warning program to issue relevant and timely flood messaging and assist municipalities and the public in responding quickly and effectively to flood events.
- Monitor the impacts of climate change through existing and enhanced monitoring programs and networks to inform adaptation and mitigation strategies.

To implement the noted initiatives, a system review was undertaken to identify where HCA can enhance connectivity and reliability for the Water Resources Engineering Monitoring Network.

The Water Resources Engineering Monitoring Network includes rain gauges, streamflow gauges, reservoir water level gauges, and snow survey courses located strategically throughout the HCA watershed. This Monitoring Network provides information essential for Flood Forecasting and Warning, Low Water Response, and operations management at the Christie Lake and Valens Lake dams.

Kisters WISKI-SODA software is used to download, manage, and store data from numerous rain, streamflow and reservoir water levels gauges within the Monitoring Network. There are presently eleven gauges already included in the WISKI-SODA system, as per Table 1 presented in the report.

The Monitoring Network includes snow surveys at four designated stations that are made at regular intervals during the winter months to determine the depth of the snow pack and its water equivalent. There are also five gauges within the existing Monitoring Network that are not presently within the WISKI-SODA system, as per Table 2 presented in the report.

The review of the existing Monitoring Network has initially identified various subwatersheds (see Table 3 in the report) for which possible expansion is expected to be viable and beneficial.

Based on this system review, the following enhancements to the existing Monitoring Network have been identified:

- Updates to WISKI-SODA servers and software, to improve reliability, performance and supportability
- Modernization of gauge data loggers and modems, to improve operational reliability and performance
- Expansion of the Monitoring Network to include additional rain gauges, streamflow gauges and snow survey plots, to enhance spatial coverage of information, and include the additional gauges and watercourse reaches within the Flood Forecasting & Warning, Low Water Management, and other assessments.

- Upgrade or replace tipping buckets, level loggers, streamflow equipment, and other field equipment
- Expand the type of data collected, to potentially include soil moisture and temperature
- Flood and ice jam remote photo monitoring
- Enhance opportunities for the sharing of information such as a web-based solution available to the public

Priority enhancements suggested for consideration in 2026 are presented in Table ES-1. The corresponding total expected budget is approximately \$31,250 including HST. These priorities are necessary to upgrade and modernize the Monitoring Network WISKI and SODA systems, as well as modernize and provide enhanced reliability of communication systems to the gauges. It will also provide real-time access to three existing monitoring gauges not yet part of the WISKI-SODA system.

Table ES-1: Summary of 2026 Priority Enhancements

| Suggested 2026 Priority Enhancement | Total Equipment Price (including HST) |
|--|--|
| Updates to WISKI-SODA Servers and Software | No Additional Budget Expected to be Required |
| Modernization of Data Loggers and Communications At Select Gauges (7 gauges – Kisters quote option) | \$22,000 |
| Integration of Additional Existing Gauges Into the WISKI-SODA System (3 gauges – Flowlink Option 1b quote option) | \$7,250 |
| Supplemental Monitoring Equipment (2 new level loggers - Solinst) | \$2,000 |
| Total | \$31,250 |

The following additional priority enhancements are suggested for consideration in 2027 and 2028. Cost estimates for these priorities will be developed and presented in 2026.

- Installation of Additional Gauges to Expand the Monitoring Network – Precipitation Gauges
- Additional Snow Survey Courses
- Replacement of Precipitation Tipping Buckets to Improve Frozen Precipitation Monitoring
- Installation of Additional Gauges to Expand the Monitoring Network – Flow Gauges
- Soil Moisture Sensors

- Remote Photo Monitoring of Frazil Ice
- Web-Based Open Database

The suggested 2027 and 2028 priority enhancements are expected to be viable and particularly beneficial for the Flood Forecasting and Warning, and Drought or Low Water Response programs. These enhancements will increase the number of locations within the watershed where local real-time precipitation and flow data are available, which will enhance HCA's ability to forecast potential floods and monitor ongoing storm events.

In addition, these enhancements will increase the number of locations within the HCA watershed where monthly total precipitation amounts and monthly average flow data would be available, which would increase the number of sites that could be included in LWR assessments.

An increased number of snow survey courses, and replacement of some gauges for improved frozen precipitation monitoring, will advance HCA's understanding of snowpack conditions across the watershed and enhance forecasts of potential snowmelt runoff, thus enhancing FFW assessments.

Replacement of precipitation tipping buckets to improve frozen precipitation monitoring would also enhance LWR assessments, as currently winter time precipitation data is only sourced from Environment Canada's Mount Hope weather station.

In-situ soil moisture probes added to the Monitoring Network would provide enhanced local real-time soil moisture measurements, beneficial for estimating the potential watershed response to rain or snowmelt runoff. Real-time measurements of the liquid or frozen state of soil moisture would also be highly beneficial, as it allows for enhanced estimations of the potential watershed response to rain or snowmelt runoff.

Remote photo monitoring would supplement the regular inspections of Spencer Creek for frazil ice and flooding, when frazil ice is possible, as per the HCA Ice Management Plan.

Web-based open databases would advance the opportunities for HCA sharing precipitation and flow data to the public.

The suggested enhancements to the Monitoring Network are also expected to increase the precipitation, flow, and snow data that is available for subwatershed studies; City of Hamilton operations, planning and assessments; emergency operations and assessments; and various planning, SWM and flooding studies by the development and consulting industries.

1. Background

Under the *Conservation Authorities Act*, Hamilton Conservation Authority (HCA) is required to provide programs and services related to the risk of natural hazards that are prescribed in regulation (O. Reg. 686/21 'Mandatory Programs and Services'). This regulation prescribes the programs and services that HCA are required to carry out in relation to various matters, including Flood Forecasting and Warning (FFW), Drought or Low Water Response (LWR), and Water Control Infrastructure in their jurisdiction.

HCA has an integral role in FFW including the following functions and responsibilities:

- Maintaining information on surface water hydrology and the areas within the authority's area of jurisdiction that are vulnerable to flooding events.
- Developing operating procedures for flood forecasting and warning, including flood contingency procedures to ensure continuity of an authority's operations in respect of flood forecasting and warning.
- Maintaining a stream flow monitoring network that, at a minimum, includes stream flow gauges available as part of the provincial-federal hydrometric network and, where the authority considers it advisable, includes additional local stream flow gauges.
- Monitoring of weather and climate information, snow surveys and observed water levels and flows utilizing local, provincial and federal data sources.
- Analysis of local surface water hydrologic conditions related to flood potential and risk, including flood forecasting, to understand and quantify the response and potential impacts within watersheds to specific events and conditions.
- Communications to inform persons and bodies that the authority considers advisable of the potential or actual impact of flood events in a timely manner.
- Provision of ongoing information and advice to persons and bodies mentioned in the above bullet to support,
 - emergency and flood operations during a flood event, and
 - documentation of flood events.

In addition, HCA also has an integral role in LWR including the following functions and responsibilities:

- Maintaining information on surface water hydrology and the areas within the authority's area of jurisdiction that are vulnerable to drought or low water events.
- Maintaining a stream flow monitoring network that, at a minimum, includes stream flow gauges available as part of the provincial-federal hydrometric network and, where the authority considers it advisable, includes additional local stream flow gauges.
- Monitoring of weather and climate information, snow surveys and water levels and flows utilizing local, provincial and federal data sources.
- Analysis of local surface water hydrologic conditions related to risk of drought and low water events.
- Gathering information to determine when low water levels exist within the authority's area of jurisdiction and initiating and maintaining the appropriate response to confirmed low water levels in accordance with the document entitled Ontario Low Water Response, dated March 2010, and available on request from the Ministry of Natural Resources and Forestry.
- Communications to inform persons or bodies that the authority considers advisable of the potential or actual impact of drought and low water events in a timely manner.
- Provision of ongoing information and advice to persons and bodies mentioned in the above bullet to support,
 - i. emergency and drought or low water activities during a drought or low water event, and
 - ii. documentation of drought and low water events. O. Reg. 686/21, s. 3 (2); O. Reg. 594/22, s. 1.

Lastly, HCA provide programs and services that support the operation, maintenance, repair and decommissioning of any water control infrastructure, the purpose of which is to mitigate risks to life and damage to property resulting from flooding or to assist in flow augmentation, which the authority owns or manages.

The Water Resources Engineering Monitoring Network (Monitoring Network) includes rain gauges, streamflow gauges, reservoir water level gauges, and snow survey courses located strategically throughout the HCA watershed. This Monitoring Network provides information essential for FFW, LWR, and operations management at the Christie Lake and Valens Lake dams. It also includes periodically collected streamflow data to support Saltfleet Wetlands post construction monitoring. This Monitoring Network data is additionally beneficial for use in: subwatershed studies; City of Hamilton operations, planning and assessments; emergency operations and assessments; compliance checks by Permit to Take Water holders; and various planning, SWM and flooding studies by the development and consulting industries.

The HCA Strategic Plan, 2025-2029, under the Water Resources Management Priority area includes the following initiatives.

- Enhance our flood forecasting and warning program to issue relevant and timely flood messaging and assist municipalities and the public in responding quickly and effectively to flood events.
- Monitor the impacts of climate change through existing and enhanced monitoring programs and networks to inform adaptation and mitigation strategies.

To implement the noted initiatives, a system review was undertaken to identify where HCA can enhance connectivity and reliability for the Water Resources Engineering Monitoring Network.

2. Existing Monitoring Network

Kisters WISKI-SODA software is used to download, manage, and store data from numerous rain, streamflow and reservoir water levels gauges within the Monitoring Network. WISKI (Water Information System by Kisters) serves as the software component, providing a comprehensive database for managing water resource data. It enables efficient data handling, including the calculation of flows from rating curves, graphical visualization, statistical analysis, and the application of formulas. SODA (Strategic Online Data Acquisition) is the hardware component, which connects to a modem or the internet to retrieve data from the gauges within the watershed. Data is collected from the gauges hourly and automatically integrated into the WISKI database.

HCA's current WISKI and SODA software were last updated in 2017. The WISKI software is hosted on a cloud-based server, which requires an update to support the newest version. The SODA software is hosted on a dedicated physical server located in the WMS server room at the Woodend Office.

There are presently eleven gauges already included in the WISKI-SODA system, as per Table 1 below. It is noted that some gauges are owned and operated by Water Survey of Canada and that HCA has permission to connect to and retrieve data from these gauges. Such gauges are noted as (WSC) below. Four of the WSC gauges (Dundas, Hwy 5, Ancaster, and Redhill) have ongoing cellular communications that was previously installed by Water Survey of Canada. The seven other existing gauges are currently relying on copper landline communication, which are being phased out by the Bell network. In addition, the existing data loggers and modems, now approximately 20 years old, are reaching the end of their lifespan.

Table 1: Monitoring Network Gauges already included in the WISKI-SODA system

| Gauge | Phone Number | Equipment | Subwatershed |
|--|----------------------------|--|---------------------|
| Valens (Rain & Reservoir Water Level) | 1-905-659-1729 Landline | US Robotics V.92 External Modem Sutron 8210 Data Recorder | Upper Spencer Creek |

| | | | |
|---|---|---|------------------------------------|
| | | TB3 Tipping Bucket Shaft Encoder | |
| Christie Lake Dam (Rain & Reservoir Water Level) | 905-627-1068 Landline | US Robotics V.92 External Modem Sutron 8210 Data Recorder TB3 Tipping Bucket Shaft Encoder | Middle Spencer Creek |
| Dundas (Rain & Streamflow (WSC)) | 905-628-8509 Landline WSC Cellular | Shaft Encoder FTS Datalogger FTS Modem TB3 Rain Gauge (HCA) | Middle Spencer Creek |
| Hwy 5 (Rain & Streamflow (WSC)) | 905-627-3064 Landline WSC Cellular | Shaft Encoder FTS Datalogger FTS Modem TB3 Rain Gauge (HCA) | Middle Spencer Creek |
| Westover (Rain & Streamflow (WSC)) | 1-905-659-1151 Landline WCS Satellite | Shaft Encoder FTS Datalogger FTS Modem TB3 Rain Gauge (HCA) | Upper Spencer Creek |
| Ancaster (Streamflow (WSC)) | WSC Cellular | Shaft Encoder FTS Datalogger FTS Modem | Ancaster Creek |
| Mohawk (Rain) | 905-383-5885 Landline | US Robotics V.92 External Modem Sutron 8210 Data Recorder TB3 Tipping Bucket | Lower Greenhill |
| Redhill (Rain & Streamflow (WSC)) | WSC Cellular | FTS Data Logger FTS Modem Gas Purge (Bubbler) System TB3 Tipping Bucket (HCA) | Redhill Creek - Valley |
| Stoney Creek Jones (Rain) | 1-905-643-6003 Landline | US Robotics V.92 External Modem Sutron 8210 Data Recorder TB3 Tipping Bucket | Stoney Creek Numbered Watercourses |
| Stoney Creek Queenston (Rain & Streamflow) | 1-905-664-1617 Landline | US Robotics V.92 External Modem Sutron 8210 Data Recorder TB3 Tipping Bucket Shaft Encoder | Stoney Creek |
| Workshop (Rain) | 905-648-7442 Landline | US Robotics V.92 External Modem Sutron 8210 Data Recorder TB3 Tipping Bucket | Sulphur Creek |

The Monitoring Network includes snow surveys at designated stations that are made at regular intervals during the winter months to determine the depth of the snow pack and its water equivalent. The data obtained are of value in estimating snowmelt runoff potential. This is a long-term partnership program with MNR. There are currently 4 snow courses within the watershed (Valens, Christie, Dundas Valley & Mt. Albion) that are monitored every 2 weeks during the from November to May. This information is not currently included in the WISKI-SODA system.

Figure 1 shows the locations of the existing rain gauges, streamflow gauges, and reservoir water level gauges from the Monitoring Network that are already included in the WISKI-SODA system. The figure also shows the location of the existing snow survey courses.

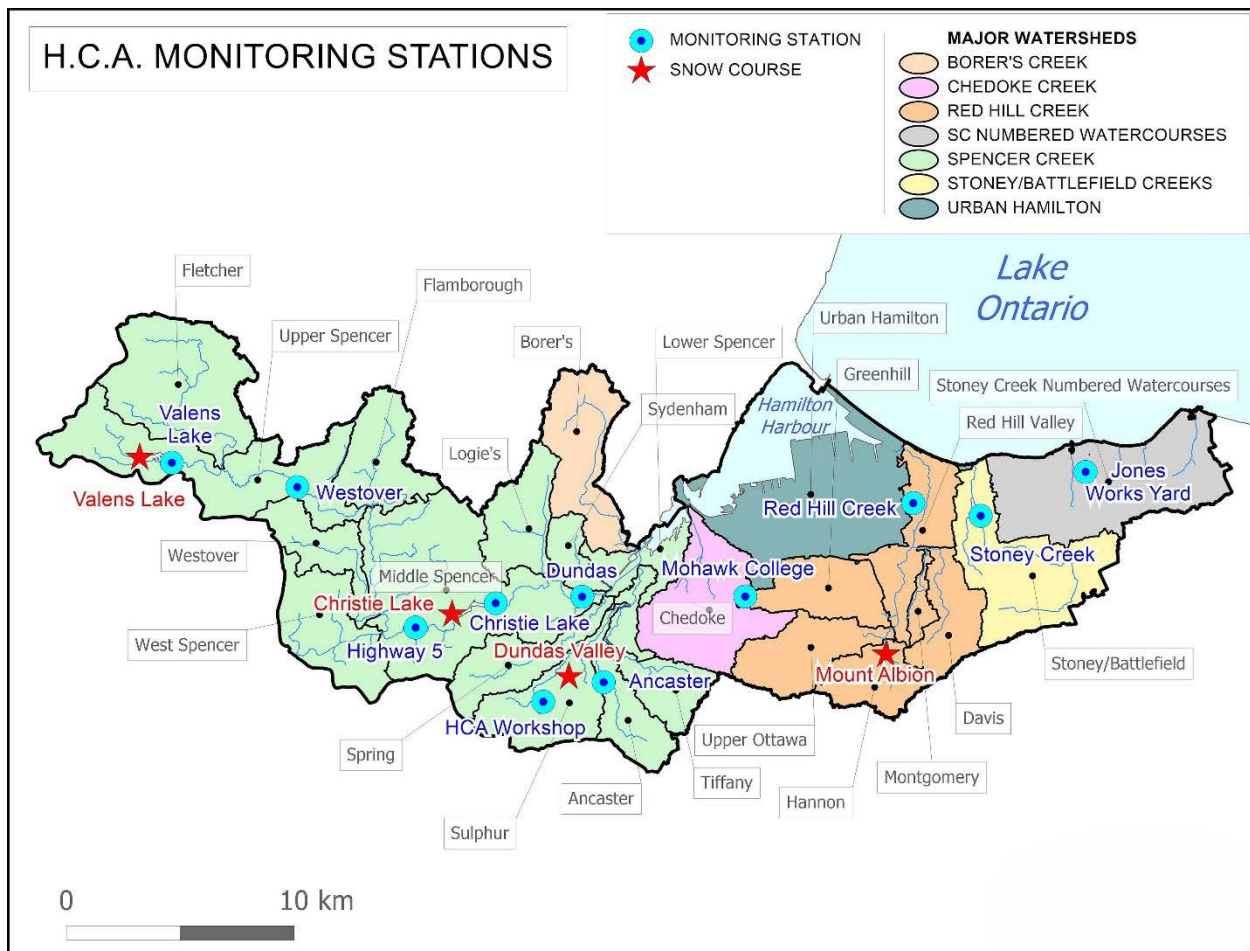


Figure 1: Existing Monitoring Network gauges included in the WISKI-SODA system, as well as the snow survey courses

There are also five gauges within the existing Monitoring Network that are not presently within the WISKI-SODA system, as per below. These gauges were either originally installed in 2011 as part of a City of Hamilton study focused on water resources in the Greenville area, or installed by HCA to support post construction monitoring for the Saltfleet Wetlands, as per Table 2.

Table 2: Existing gauges that are not presently within the WISKI-SODA system

| Gauge | Phone Number | Equipment | Subwatershed |
|--------------------------------|--|--|---------------------|
| Middletown Rd. | 289-775-8430 (1) Static IP 97.109.16.184 | ISCO Modem 2105Gi ISCO 2150 Flow Meter Blade Antenna Solar Panel Controller Battery | Upper Spencer Creek |
| Harvest Rd. | 289-776-9285 (2) Static IP 97.109.16.182 | ISCO Modem 2105Gi ISCO 2150 Flow Meter Yagi Antenna Solar Panel Controller Battery | Logie's Creek |
| Ofield Rd. | 289-921-5826 (3) Static IP 97.109.16.183 | ISCO Modem 2105Gi ISCO 2150 Flow Meter Yagi Antenna Solar Panel Controller Battery | Logie's Creek |
| Saltfleet Green Mountain Rd. | | Solinst Levellogger Edge | Stoney Creek |
| Saltfleet 3 rd Line | | Solinst Levellogger Edge | Stoney Creek |

3. Considerations for Enhancing the Monitoring Network

The Surface Water Monitoring Centre provides some considerations when designing FFW or LWR Program. The scope and complexity of the programs required for a particular jurisdiction is contingent on a variety of considerations. The physical and hydrological characteristics of watershed and watercourses, the local flooding / drought mechanisms, the level of risk within flood or drought prone areas, and staff capabilities and funding levels within associated agencies can all play a role.

Aspects to be considered in establishing an appropriate level of scope and complexity of a monitoring network are outlined below.

Monitoring networks typically include, but are not limited to systems of gauges used to monitor hydrometric and climate parameters such as water level and/or flow, precipitation, temperature, snowpack characteristics, and ground surface saturation conditions. Given their importance in flood and drought risk mitigation, and the physical conditions under which their functioning is most critical, such networks should be designed and operated with reliability and resiliency in mind.

When designing a new or reviewing an existing monitoring network, the practitioner should review and incorporate the various physical considerations specific to their circumstances, including:

- Are gauges available to assess precipitation/snowpack/climate conditions for drainage upstream of high flood risk areas or damage centers?
- Are streamflow gauges available to monitor flood conditions in damage centers?
- Are streamflow gauges available to assess flood conditions upstream of damage centres, and allow prediction of flood levels in damage centers?
- Will the network support the operation of any required flood forecast models or analytical techniques?
- Are staff gauges available in damage centers or in flood prone areas where there are not any stream gauges?
- Is the stream gauge, rainfall gauge/climate station/ snow course network density sufficient? Adequacy of density will vary depending on watershed characteristics and the risk associated with a given damage center or control structure such as a dam.
- What is the availability of stations from neighbouring watersheds that could be used?
- Are cost savings/and or network efficiencies achievable through integration of hydrometric stations with climate sensors? Opportunities should be investigated for co-locating CA/MNRF Districts' monitoring equipment, such as precipitation gauges and soil moisture sensors with the hydrometric network operated under the Canada-Ontario Agreement on Hydrometric Monitoring.
- Can or have location standards for the monitoring network (ie. Precipitation stations, snow courses) been adhered to, if possible, as per *Provincial Flood Forecasting and Warning Program – Implementation Guidelines for Conservation Authorities and the Ministry of Natural Resources and Forestry (2023)*

4. Evaluation of Monitoring Network Coverage by Watershed

The HCA watershed covers approximately 479 sq. km. The drainage system consists of 5 major watercourses: Spencer Creek, Borers Creek, Chedoke Creek, Redhill Creek and Stoney Creek.

Table 3 summarizes the subwatersheds within HCA's jurisdiction and notes those that currently have some form of monitoring as part of the existing Monitoring Network.

Table 3: Monitoring Network Gauges (Precipitation and Flow) by Subwatershed

| Subwatershed | Watershed | Existing Flow Gauge(s) | Existing Precipitation Gauge(s) | Potential for Additional Gauge(s) |
|----------------------|---------------------------|------------------------|---------------------------------|-----------------------------------|
| Westover Creek | Spencer Creek | no | no | |
| West Spencer Creek | Spencer Creek | no | no | |
| Upper Spencer Creek | Spencer Creek | yes | yes | |
| Tiffany Creek | Spencer Creek | no | no | yes |
| Sydenham Creek | Spencer Creek | no | no | yes (flow) |
| Sulphur Creek | Spencer Creek | no | yes | |
| Spring Creek | Spencer Creek | no | no | yes (flow) |
| Middle Spencer Creek | Spencer Creek | yes | yes | yes (precip) |
| Lower Spencer Creek | Spencer Creek | no | no | yes (flow) |
| Logie's Creek | Spencer Creek | yes | no | |
| Flamborough Creek | Spencer Creek | no | no | |
| Ancaster Creek | Spencer Creek | yes | no | yes (flow) |
| Fletcher Creek | Spencer Creek | no | no | yes (precip & flow) |
| Red Hill Valley | Red Hill Creek | yes | yes | yes (precip) |
| Upper Ottawa | Red Hill Creek | no | no | |
| Upper Greenhill | Red Hill Creek | no | no | |
| Upper Davis Creek | Red Hill Creek | no | no | yes (precip) |
| Montgomery Creek | Red Hill Creek | no | no | |
| Lower Greenhill | Red Hill Creek | no | yes | |
| Lower Davis Creek | Red Hill Creek | no | no | |
| Hannon Creek | Red Hill Creek | no | no | yes (precip) |
| Stoney Creek | Stoney/Battlefield Creeks | yes | yes | |
| Battlefield Creek | Stoney/Battlefield Creeks | no | no | yes (precip & flow) |
| Chedoke Creek | Chedoke Creek | no | no | yes (flow) |
| Borer's Creek | Borer's Creek | no | no | yes (precip & flow) |
| Urban Hamilton Core | Urban Hamilton | no | no | |

| | | | | |
|------------------------------------|----------------|----|-----|--------------|
| Lake Ontario | Lake Ontario | no | no | |
| Harbour Catchment - West | Urban Hamilton | no | no | |
| Harbour Catchment - East | Urban Hamilton | no | no | |
| Stoney Creek Numbered Watercourses | Stoney Creek | no | yes | yes (precip) |

Table 3 also identifies subwatersheds for which possible expansion (precipitation and flow) of the existing Monitoring Network has been initially identified as viable and beneficial to HCA’s FFW and LWR programs.

Possible expansion gauges have been identified based on various criteria. One of these criteria is precipitation gauge density. Figure 2 shows the existing Monitoring Network precipitation gauges with a preferred 2 km area of measurement around each gauge. Significant areas outside of the 2 km areas of measurement were identified as potential locations for new precipitation gauges, in order to increase spatial coverage within the HCA watershed. A dense precipitation gauge network is favourable to better quantify the large variability that occurs when weather systems move across the HCA watershed.

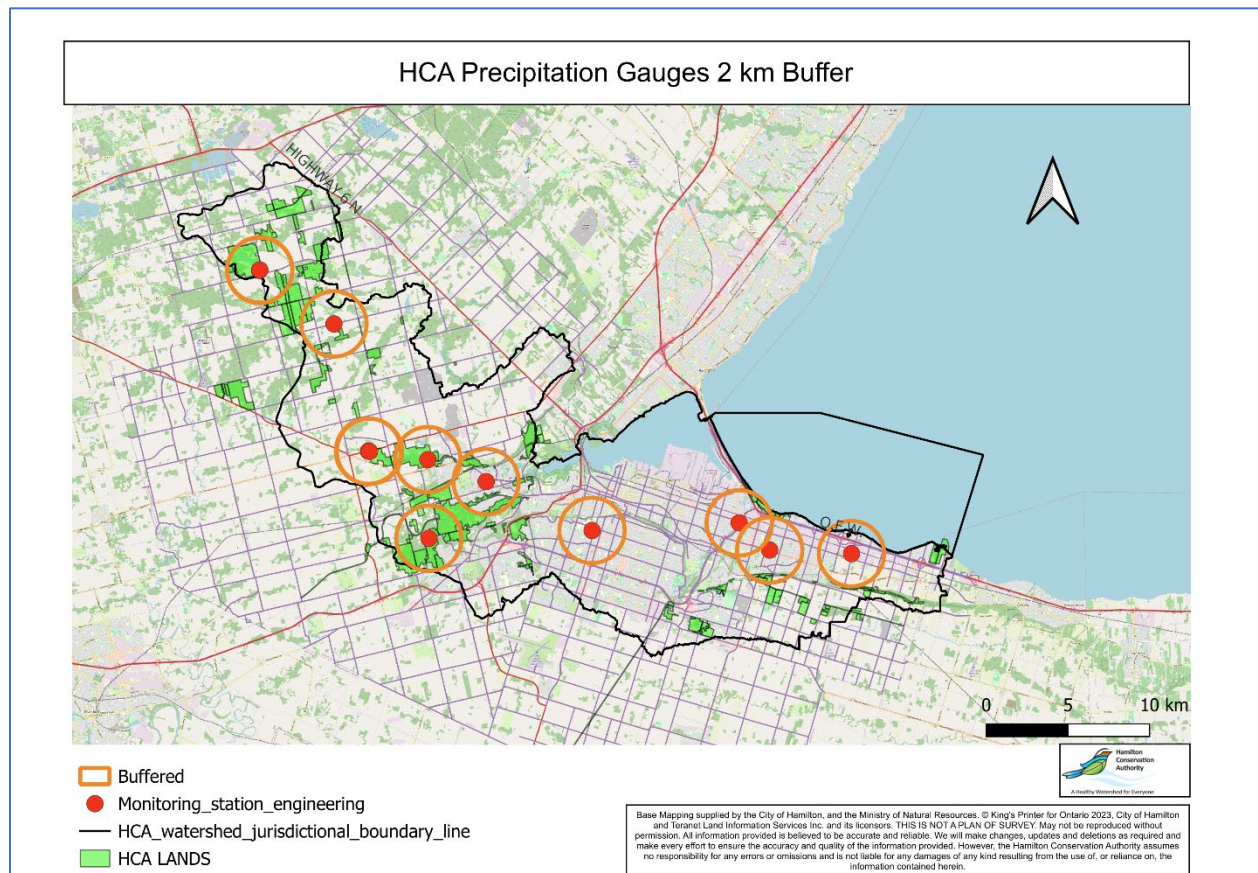


Figure 2: Existing HCA Monitoring Network precipitation gauges with a 2 km area of measurement

Another selection criterion for expansion gauges is to include creek reaches of known historical flooding or drought concern which are currently ungauged.

Additionally, possible expansion gauges have been screened to prefer sites on HCA property, City of Hamilton property, or within road right of ways.

Also considered was the availability of utilities or solar power generation at the site.

Another consideration in the selection of possible expansion gauges is the stability / consistency of the creek reach, such as the channel geometry, channel profile, and channel vegetation.

The ease of creating rating curves for flow calculations was also considered, as well as whether the creek flows permanently or is intermittent / ephemeral (only flows sometimes or only flows during runoff events).

5. Suggested Enhancements to the Monitoring Network

Based on the review of the Monitoring Network, the following enhancements have been identified:

- Updates to WISKI-SODA servers and software, to improve reliability, performance and supportability
- Modernization of gauge data loggers and modems, to improve operational reliability and performance
- Expansion of the Monitoring Network to include additional rain gauges, streamflow gauges and snow survey plots, to enhance spatial coverage of information, and include the additional gauges and watercourse reaches within the Flood Forecasting & Warning, Low Water Management, and other assessments.
- Upgrade or replace tipping buckets, level loggers, streamflow equipment, and other field equipment
- Expand the type of data collected, to potentially include soil moisture and temperature
- Flood and ice jam remote photo monitoring
- Enhance opportunities for the sharing of information such as a web-based solution available to the public

5.1 First Year Priorities (2026)

From the above list, the following priority enhancements are suggested for consideration in 2026.

5.1.1 Updates to the WISKI-SODA Servers and Software

HCA's current WISKI and SODA software were last updated in 2017 and now require upgrades to ensure continued functionality and performance. The WISKI software is hosted on a cloud-based server, which will also require an update to support the newest version. The SODA software is hosted on a dedicated physical server located in the WMS server room at the Woodend Office.

The WISKI and SODA software updates are not expected to incur additional expenses, as such upgrades are part of the annual servicing fee to Kisters for software and support.

In addition, the WISKI cloud-based server upgrade is not expected to incur additional expenses, as such upgrades are expected at this time to be part of HCA's broader Digital Transformation Plan budget. The Digital Transformation Plan is aimed at modernizing data infrastructure and enhancing efficiency.

At this time, it is expected that the existing physical SODA server will not require upgrades to support the new version of the software.

5.1.2 Modernization of Data Loggers and Communications

Seven existing monitoring network gauges are suggested for modernization. These gauges currently rely on copper landline communication, which are being phased out by the Bell network. In addition, the existing data loggers and modems, now approximately 20 years old, are reaching the end of their lifespan. Modernization will provide enhanced reliability of communication systems to the gauges. Modernization at these gauges will require the installation of new integrated dataloggers and modems with cellular communications to ensure reliable data transmission. The seven gauges are:

- 1) Valens Lake Dam
- 2) Christie Lake Dam
- 3) Westover (WSC)
- 4) Mohawk
- 5) Stoney Creek Jones
- 6) Stoney Creek Queenston
- 7) Workshop

Four cost estimate options to supply the equipment required are presented in Table 4. Staff's preferred option is Kisters integrated data logger and cellular modem (approximately \$22,000 including HST). HCA already utilizes Kisters WISKI/SODA system to download and store our

network data. Using Kisters, the second lowest quote cost, would provide enhanced support for connecting the equipment to HCA's existing system.

In addition to the above equipment costs, this modernization will also replace monthly landline servicing fees at the seven gauges with less expensive cellular servicing. Cellular servicing is expected to be approximately \$30 / month per gauge. Recent landline servicing has been approximately \$100 / month per gauge.

Table 4: Modernization of Data Loggers and Communications – Cost Estimate Options

| Hoskin Scientific | # Units | Unit Price |
|--|------------------|--------------------|
| XLink 100 with North American 4G LTE | 7 | \$3,020.00 |
| 4G LTE Omni Antenna Kit with 3 Meter Cable | 2 | \$350.00 |
| | Sub Total | \$21,840.00 |
| | HST | \$2,839.20 |
| | Total | \$24,679.20 |
| Kisters *Preferred Quote | # Units | Unit Price |
| iRIS 270 4G-CAT1-WW-Wireless 4G Data Logger | 7 | \$2,645.00 |
| 1NCE IoT Flex SIM BS5 | 7 | \$60.00 |
| 4G LTE Omni Antenna Kit | 2 | \$280.00 |
| | Sub Total | \$19,495 |
| | HST | \$2,534.35 |
| | Total | \$22,029.35 |
| Campbell Scientific | # Units | Unit Price |
| CR350-NA Measurement & Control Data Logger | 7 | \$1,995.00 |
| 4GMini 4G/LTE Ethernet/Serial/USB Cellular Modem | 7 | \$675.00 |
| Null Modem Cable, 9-Pin | 7 | \$25.00 |
| DC Power Cable for 4GMini & 4GPlus | 7 | \$35.00 |
| Whip antenna for RV50 Cellular Modem - LTE Bands | 5 | \$65.00 |
| Omnidirectional Antenna 3 dBd w/10ft Cable & Antenna Mount | 2 | \$275.00 |
| Mount Kit for the 4G Mini Modem | 7 | \$65.00 |
| | Sub Total | \$20,440.00 |
| | HST | \$2,657.20 |
| | Total | \$23,097.20 |
| DataLogger Inc. | # Units | Unit Price |
| DT82I DATALOGGER | 7 | \$2,145.00 |
| LTECube CAT4NA2 - LTE IoT Ethernet Gateway | 7 | \$465.00 |
| LTE Patch Dual Band Antenna | 2 | \$458.00 |
| | Sub Total | \$19,186.00 |
| | HST | \$2,494.18 |
| | Total | \$21,680.18 |

5.1.3 Integration of Additional Existing Gauges Into the WISKI-SODA System

For 2026, integration into the WISKI-SODA system is suggested for the three Greenville area gauges that are not presently within the system (Middletown Rd., Harvest Rd., and Ofield Rd.).

There are two main options:

- 1) Install ISCO Flowlink software on the WISKI server and then use a separate program provided by Kisters to extract and transfer data from Flowlink to WISKI.
- 2) Replace the existing equipment at the three gauges with the same type of integrated data loggers and cellular modems being proposed for the other seven stations requiring modernization.

Three cost estimate options to supply the equipment required are presented in Table 5. Staff's preferred option is Option 1b, to install ISCO Flowlink software on the WISKI server and then use a separate program provided by Kisters to extract and transfer data from Flowlink to WISKI (approximately \$7,250 including HST). It is HCA staff's understanding that additional expenses are not expected to be required to supply and install the separate Kisters program to extract and transfer data.

Table 5: Integration of Additional Existing Gauges Into the WISKI-SODA System – Cost Estimate Options

| Option 1a | # Units | Unit Price |
|--|------------------|--------------------------|
| Flowlink Cipher - Cloud-based Water Data Management Data at multiple sites, with all relevant information stored & managed through a single, centralized platform. | 3 | \$720.00 / year |
| | Sub Total | \$2,160.00 / year |
| | HST | \$280.80 / year |
| | Total | \$2,440.80 / year |
| Option 1b *Preferred Quote | # Units | Unit Price |
| Flowlink 5.1 Software, two user licenses. | 1 | \$6,425.00 |
| For retrieving measurement, parameter, and sample data from ISCO 2100 Series Modules. Stores data in a database and generates a variety of user-customizable graphs and tables. Data can also be exported. | Sub Total | \$6,425.00 |
| | HST | \$835.25 |
| | Total | \$7,260.25 |
| Option 2 | # Units | Unit Price |
| Kisters iRIS 270 4G-CAT1-WW-Wireless-4G Data Logger | 3 | \$2645.00 |
| 1NCE IoT Flex SIM BS5 | 3 | \$60.00 |
| 4G LTE OMNI Antenna Kit | 3 | \$280.00 |
| Solinst 3001 Levellogger 5 or similar | 3 | \$900.00 |
| | Sub Total | \$11,655.00 |
| | HST | \$1,515.15 |
| | Total | \$13,170.15 |

5.1.4 Supplemental Monitoring Equipment

HCA uses level loggers to measure streamflows as well as groundwater levels within wells. For 2026, 2 new level loggers are suggested, for the instances when an existing logger fails or when HCA decides to add a temporary water level monitoring station within the watershed. A cost estimate to supply the equipment (approximately \$2,000 including HST) is presented in Table 6.

Table 6: Supplemental Monitoring Equipment– Cost Estimate Options

| Solinst | # Units | Unit Price |
|--------------------|------------------|-------------------|
| 3001 Levellogger 5 | 2 | \$900.00 |
| | Sub Total | \$1,800.00 |
| | HST | \$234.00 |
| | Total | \$2,034.00 |

possible expansion (water level, flow, and precipitation) of the existing Monitoring Network

5.1.5 Summary of 2026 Priority Enhancements

The following priority enhancements are suggested for consideration in 2026, with a total expected budget of approximately \$31,250 including HST (see Table 7). These priorities are necessary to upgrade and modernize the Monitoring Network WISKI and SODA systems, as well as modernize and provide enhanced reliability of communication systems to the gauges. It will also provide real-time access to three existing monitoring gauges not yet part of the WISKI-SODA system.

Table 7: Summary of 2026 Priority Enhancements

| Suggested 2026 Priority Enhancement | Total Equipment Price (including HST) |
|--|--|
| Updates to WISKI-SODA Servers and Software | No Additional Budget Expected to be Required |
| Modernization of Data Loggers and Communications At Select Gauges (7 gauges – Kisters quote option) | \$22,000 |
| Integration of Additional Existing Gauges Into the WISKI-SODA System (3 gauges – Flowlink Option 1b quote option) | \$7,250 |
| Supplemental Monitoring Equipment (2 new level loggers - Solinst) | \$2,000 |
| Total | \$31,250 |

5.2 Second and Third Year Priorities (2027 & 2028)

The following additional priority enhancements are suggested for consideration in 2027 and 2028.

Cost estimates for these priorities will be developed and presented in 2026.

5.2.1 Installation of Additional Gauges to Expand the Monitoring Network – Precipitation Gauges

The following subwatersheds have been identified as areas where the installation of new precipitation gauge(s) is expected to be viable and would be beneficial to HCA's FFW and LWR programs.

- Fletchers Creek
- Middle Spencer Creek – HCA Millgrove Workshop
- Borers Creek
- Hannon Creek - Redhill Mount Albion
- Upper Davis Creek - Eramosa Karst Conservation Area
- Upper Battlefield Creek - Saltfleet Conservation Area
- Stoney Creek Numbered Watercourses - Fifty Point Conservation Area

These enhancements will increase the number of locations within the HCA watershed where local real-time precipitation data are available, which will enhance HCA's ability to forecast potential floods and monitor ongoing storm events, with a particular benefit for thunderstorm monitoring.

In addition, these enhancements will increase the number of locations within the HCA watershed where monthly total precipitation amounts would be available, which would increase the number of sites that could be included in LWR assessments.

New precipitation gauges will require the supply and installation of new tipping buckets, new data loggers and cellular modems (similar to but in addition to those noted in Table 4 previously), as well as availability of power utility or solar power generation and cellular servicing. Also, protective housing will be required to store the electrical equipment. The new gauges would be integrated into the WISKI-SODA system.

5.2.2 Additional Snow Survey Courses

HCA currently conducts snow survey course monitoring bi-monthly from November to May on behalf of the Surface Water Monitoring Centre. Snow courses are located in Valens Lake Conservation Area, Christie Lake Conservation Area, Dundas Valley Conservation Area, and Mount Albion Conservation Area.

An increased number of snow survey courses will advance HCA's understanding of snowpack conditions across the watershed and enhance forecasts of potential snowmelt runoff, thus

enhancing FFW assessments. The added snow survey courses may become part of the ongoing Surface Water Monitoring Centre's program or be solely part of HCA's Monitoring Network.

The preferred locations and number of such new snow survey courses are still to be evaluated. A preliminary priority location at Fifty Point Conservation Area has been identified to initially expand the Monitoring Network.

Limited expenses would be required to add new snow survey courses, as the snow measurements are taken using already available handheld snow sampler equipment. Plotting and staking the course would be the key tasks involved in snow survey course development.

5.2.3 Replacement of Precipitation Tipping Buckets to Improve Frozen Precipitation Monitoring

The existing HCA precipitation gauges use TB3 tipping buckets, which are ideal for rain however are not reliable in cold weather for snow monitoring. There are alternative precipitation gauges available on the market that measure precipitation by weight rather than volume, and are more reliable for measuring frozen precipitation.

Currently, snowpack monitoring is based on data collected from the bi-monthly snow survey courses and augmented during the subsequent 2-week windows with snowfall data from Environment Canada's Mount Hope weather station.

The availability of more localized snowfall data will provide enhanced estimates of snowpack and snowmelt runoff amounts for FFW assessments. Spring snowmelt events during rain storms often produce the largest annual flows in the area watercourses.

Replacement of precipitation tipping buckets to improve frozen precipitation monitoring would also enhance LWR assessments, as currently winter time precipitation data is only sourced from Environment Canada's Mount Hope weather station.

The preferred locations for such precipitation gauge replacements are still to be evaluated.

In addition, tipping buckets that more reliably measure frozen precipitation could be used for the above noted Installation of Additional Gauges to Expand the Monitoring Network.

5.2.4 Installation of Additional Gauges to Expand the Monitoring Network – Flow Gauges

The following subwatersheds have been identified as areas where the installation of new flow gauge(s) is expected to be viable and would be beneficial to HCA's FFW and LWR programs.

- Fletchers Creek
- Borers Creek
- Sydenham Creek

- Spring Creek
- Lower Ancaster Creek
- Lower Spencer Creek
- Battlefield Creek
- Chedoke Creek
- Stoney Creek – 2 existing gauges at Saltfleet (Green Mountain Rd.) and Saltfleet (3rd Line)

The potential locations are currently ungauged, and thus require site observations to confirm watercourse and flooding conditions. These enhancements will increase the number of locations within the HCA watershed where local real-time flow data are available, which will enhance HCA's ability to forecast potential floods and monitor ongoing storm events.

In addition, these enhancements will increase the number of locations within the HCA watershed where monthly average flow data would be available, which would increase the number of sites that could be included in LWR assessments.

New flow gauges will require the supply and installation of new flow sensors (pressure transducers, stilling wells with shaft encoders, Area-Velocity sensors, above-water radar sensors, etc.). Radar and Area-Velocity sensors would be a preferred option in locations where water levels are deep, water quality is potentially poor, and wading is not possible. Depending on the approach selected, inhouse or external construction services may be required.

New flow gauges will also require the supply and installation of new data loggers and cellular modems (similar to but in addition to those noted in Table 4 previously), as well as availability of power utility or solar power generation and cellular servicing. Also, protective housing will be required to store the electrical equipment. The new gauges would be integrated into the WISKI-SODA system.

Rating curves will need to be developed and maintained by HCA staff, to allow for calculation of flows from the collected raw data. HCA will also need to consider purchasing a remote-controlled flutter board or boat to measure creek flows and develop rating curves where wading is not an option.

5.2.5 Soil Moisture Sensors

As part of HCA's FFW program, Environment Canada satellite data is used to estimate soil moisture at the surface and in the root zone. In-situ soil moisture probes are available on the market that can be added to the Monitoring Network, to provide enhanced local real-time soil moisture measurements. Soil moisture is a key parameter for estimating the potential watershed response to rain or snowmelt runoff for FFW assessments. Real-time measurements of the liquid or frozen state of soil moisture would also be highly beneficial, as it allows for enhanced estimations of the potential watershed response to rain or snowmelt runoff.

The preferred locations for such soil moisture sensors are still to be evaluated. Preference is being given to locations with existing or planned precipitation or flow gauges.

5.2.6 Remote Photo Monitoring of Frazil Ice

Spencer Creek in Dundas has experienced two previous flooding events in the winter as a result of the formation of frazil ice. Frazil ice is formed when water flow is supercooled by turbulence and exposure to cold air during very low temperatures, typically accompanied by high winds. This ice forms throughout the water column and adheres to banks and structures within the creek, reducing the flow capacity which can result in flooding.

Frazil ice tends to accumulate in Spencer Creek near Thorpe Street, due to a general reduction in the slope of the creek and the velocity of the flowing water.

A camera could be located in this area to allow for remote observations of frazil ice development and associated flooding. Remote photo monitoring would enhance the regular inspections of Spencer Creek for frazil ice and flooding, when frazil ice is possible, as per the HCA Ice Management Plan.

Remote photo monitoring would require the supply and installation of a robust night-time suitable camera, a new data logger and cellular modem (similar to but in addition to those noted in Table 4 previously), as well as availability of power utility or solar power generation and cellular servicing. Also, protective housing will be required to store the camera and electrical equipment.

5.2.7 Web-Based Open Database

To enhance the opportunities for HCA sharing information, possible web-based open databases can be explored to share precipitation and flow data to the public. Some CA's have public access to such data available on their websites. Currently, HCA does not, but readily shares such data with interested parties upon request.

Kisters has an option of a web-based version of WISKI that could be explored. HCA previously provided this Kisters web-based WISKI on a private page of the HCA website. However, at that time, the general interest in public access to this data was small and did not warrant the service costs, so the service was cancelled. As HCA moves towards enhanced Open Data services corporately, re-instating the Kisters web-based WISKI or developing a new web-based sharing platform is considered beneficial.

6. Conclusions

The review of the existing HCA Water Resources Engineering Monitoring Network has identified various enhancements.

The priority enhancements suggested for consideration in 2026 (see Table 7 above) have a total expected budget of approximately \$31,250 including HST. These priorities are necessary to upgrade and modernize the Monitoring Network WISKI and SODA systems, as well as modernize and provide enhanced reliability of communication systems to the gauges. It will also provide real-time access to three existing monitoring gauges not yet part of the WISKI-SODA system.

The following additional priority enhancements are suggested for consideration in 2027 and 2028.

- Installation of Additional Gauges to Expand the Monitoring Network – Precipitation Gauges
- Additional Snow Survey Courses
- Replacement of Precipitation Tipping Buckets to Improve Frozen Precipitation Monitoring
- Installation of Additional Gauges to Expand the Monitoring Network – Flow Gauges
- Soil Moisture Sensors
- Remote Photo Monitoring of Frazil Ice
- Web-Based Open Database

The suggested 2027 and 2028 priority enhancements are expected to be viable and particularly beneficial for the Flood Forecasting and Warning, and Drought or Low Water Response programs. These enhancements will increase the number of locations within the watershed where local real-time precipitation and flow data are available, which will enhance HCA's ability to forecast potential floods and monitor ongoing storm events.

In addition, these enhancements will increase the number of locations within the HCA watershed where monthly total precipitation amounts and monthly average flow data would be available, which would increase the number of sites that could be included in LWR assessments.

An increased number of snow survey courses, and replacement of some gauges for improved frozen precipitation monitoring, will advance HCA's understanding of snowpack conditions across the watershed and enhance forecasts of potential snowmelt runoff, thus enhancing FFW assessments.

Replacement of precipitation tipping buckets to improve frozen precipitation monitoring would also enhance LWR assessments, as currently winter time precipitation data is only sourced from Environment Canada's Mount Hope weather station.

In-situ soil moisture probes added to the Monitoring Network would provide enhanced local real-time soil moisture measurements, beneficial for estimating the potential watershed response to rain or snowmelt runoff. Real-time measurements of the liquid or frozen state of soil moisture would also be highly beneficial, as it allows for enhanced estimations of the potential watershed response to rain or snowmelt runoff.

Remote photo monitoring would supplement the regular inspections of Spencer Creek for frazil ice and flooding, when frazil ice is possible, as per the HCA Ice Management Plan.

Web-based open databases would advance the opportunities for HCA sharing precipitation and flow data to the public.

The suggested potential enhancements to the Monitoring Network are also expected to increase the precipitation, flow, and snow data that is available for subwatershed studies; City of Hamilton operations, planning and assessments; emergency operations and assessments; and various planning, SWM and flooding studies by the development and consulting industries.



Memorandum to: Board of Directors

Approved for Circulation By: Lisa Burnside, CAO

Reviewed By: T. Scott Peck, MCIP, RPP, Deputy Chief Administrative Officer / Director, Watershed Management Services

Prepared By: Jonathan Bastien, P. Eng., Manager, Water Resources Engineering

Meeting Date: November 6th, 2025

Subject: Watershed Conditions Memorandum

Executive Summary:

During the period of September 23rd to October 27th 2025, there were no significant watercourse flooding events, no significant watercourse water safety concerns, and no Lake Ontario shoreline flooding events.

There are no observations, reports, or expectations that significant watercourse flooding, localized watercourse flooding of low-lying areas that typically flood during higher water levels, or significant water safety concerns are occurring at this time. Current flows are near baseflow conditions to slightly elevated but well below thresholds for significant water safety concerns.

However, on October 27th, two early notice Flood Outlook messages were issued related to potential watercourse flooding and Lake Ontario shoreline flooding that may result from the forecasted rain and shore-bound waves expected on Thursday, October 30th. HCA staff continue to monitor conditions and forecasts closely, and will issue updated messages as required.

The average monthly flows for October so far have ranged between significantly below long-term averages to well below long-term averages. September average recorded flows ranged between significantly below long-term averages to well below long-term averages. August average recorded flows similarly ranged between significantly below long-term averages to below long-term averages. July average recorded flows ranged between well below long-term averages to significantly above long-term averages.

There are no observations, reports, or expectations that significant Lake Ontario shoreline flooding is occurring at this time. The Lake Ontario mean daily water level averaged across the entire lake is 6 cm below average for this time of year, as of yesterday.

Christie Lake levels are currently within preferred summer operating levels. Outflows from the reservoir have been increased recently, to provide increased flows in Lower Spencer Creek during salmon spawning. Valens Lake levels are currently below preferred summer operating levels and above preferred winter operating levels. Winter drawdown of reservoir levels is underway at this time.

The most recent drought assessment indicated that Level 1 Low Water Conditions are an appropriate overall characterization of the watershed at this time. Given the time of year, reduced demand for water sourced from creeks and groundwater, and the fact that fall typically has increased amounts of precipitation, HCA staff have deferred notifying the Low Water Response Team to suggest declaration and will reassess conditions at the beginning of November.

There is currently one potentially significant rainfall event (16 to 30 mm of rain on October 30th) forecasted for the watershed over the next 2 weeks. There is currently one potentially significant Lake Ontario shoreline flooding event (up to 2.0 m shore-bound waves on October 30th) forecasted over the next 2 weeks. HCA staff continue to monitor conditions and forecasts closely, and will issue updated messages as required.

HCA staff will continue to undertake monthly drought assessments, and coordinate with the Hamilton Low Water Response Team if drought conditions warrant actions.

Staff Comment / Discussion:

CURRENT WATERSHED CONDITIONS – October 27th, 2025

Current Flows in Major Area Watercourses

There are no observations, reports, or expectations that significant watercourse flooding, localized watercourse flooding of low-lying areas that typically flood during higher water levels, or significant water safety concerns are occurring at this time.

Current flows are near baseflow conditions to slightly elevated but well below thresholds for significant water safety concerns. The five available streamflow gauges are Upper Spencer Creek at Safari Road, Middle Spencer Creek at Highway 5, Lower Spencer Creek at Market Street, Ancaster Creek at Wilson Street and Red Hill Creek at Barton Street.

The average monthly flows for October so far have ranged between significantly below long-term averages to well below long-term averages. A monthly flow average for Upper Spencer Creek at Safari Road is not available, due to a debris related issue that artificially elevated water levels at the gauge for most of October. Monthly flow in Middle Spencer Creek at Highway 5 has been 20% (considered significantly below average). Monthly flow in Lower Spencer Creek at Market Street has been 20% (considered significantly below

average). Monthly flow in Ancaster Creek at Wilson Street has been 53% (considered well below average). Monthly flow in Red Hill Creek at Barton Street has been 47% (considered well below average).

September average recorded flows ranged between significantly below long-term averages to well below long-term averages. Monthly flow in Upper Spencer Creek at Safari Road was 34% of long-term averages (considered significantly below average). Monthly flow in Middle Spencer Creek at Highway 5 was 19% (considered significantly below average). Monthly flow in Lower Spencer Creek at Market Street was 33% (considered significantly below average). Monthly flow in Ancaster Creek at Wilson Street was 53% (considered well below average). Monthly flow in Red Hill Creek at Barton Street was 46% (considered well below average).

August average recorded flows ranged between significantly below long-term averages to below long-term averages. Monthly flow in Upper Spencer Creek at Safari Road was 41% of long-term averages (considered well below average). Monthly flow in Middle Spencer Creek at Highway 5 was 18% (considered significantly below average). Monthly flow in Lower Spencer Creek at Market Street was 30% (considered significantly below average). Monthly flow in Ancaster Creek at Wilson Street was 61% (considered below average). Monthly flow in Red Hill Creek at Barton Street was 48% (considered well below average).

July average recorded flows ranged between well below long-term averages to significantly above long-term averages. Monthly flow in Upper Spencer Creek at Safari Road was 323% of long-term averages (considered significantly above average). Monthly flow in Middle Spencer Creek at Highway 5 was 140% (considered above average). Monthly flow in Lower Spencer Creek at Market Street was 194% (considered well above average). Monthly flow in Ancaster Creek at Wilson Street was 57% (considered below average). Monthly flow in Red Hill Creek at Barton Street was 44% (considered well below average). The precipitation amounts recorded at the streamflow gauges do not explain the considerable variations in average monthly recorded flows. It is therefore expected that the considerable variations in average monthly recorded flows are likely due to significant differences in local rainfall and thunderstorms received in the ungauged areas upstream of each streamflow gauge. Also, a late June rain storm in the Upper Spencer Creek area resulted in significantly increased flows at all three Spencer Creek gauges into early July.

Current Lake Ontario Water Levels

There are no observations, reports, or expectations that significant Lake Ontario shoreline flooding is occurring at this time. The Lake Ontario mean daily water level in the Hamilton area was 74.55 m IGLD85 as of yesterday. The Lake Ontario mean daily water level averaged across the entire lake (74.53 m IGLD85 as of yesterday) is 6 cm below average for this time of year.

Current Storages in HCA Reservoirs

Christie Lake levels (771.03 ft) are currently within preferred summer operating levels (771.00 to 771.50 ft). Outflows from the reservoir have been increased recently, to provide increased flows in Lower Spencer Creek during salmon spawning.

Valens Lake levels (274.89 m) are currently below preferred summer operating levels (275.25 to 275.45 m) and above preferred winter operating levels (274.15 to 274.40 m). Winter drawdown of reservoir levels is underway at this time.

Current Soil Conditions

Surface and root-zone soils are considered wet to saturated across the watershed.

RECENT STORM EVENTS

During the period of September 23rd to October 27th 2025, there were no significant watercourse flooding events, no significant watercourse water safety concerns, and no Lake Ontario shoreline flooding events.

However, on October 27th, two early notice Flood Outlook messages were issued related to potential watercourse flooding and Lake Ontario shoreline flooding that may result from the forecasted rain and shore-bound waves expected on Thursday, October 30th. HCA staff continue to monitor conditions and forecasts closely, and will issue updated messages as required.

RECENT WATERSHED LOW WATER CONDITIONS

The most recent drought assessment (including data up to September 30) indicated that Level 1 Low Water Conditions are an appropriate overall characterization of the watershed at this time. Given the time of year, reduced demand for water sourced from creeks and groundwater, and the fact that fall typically has increased amounts of precipitation, HCA staff have deferred notifying the Low Water Response Team to suggest declaration and will reassess conditions at the beginning of November.

FORECASTED WATERSHED CONDITIONS

Watercourse Flooding

There is currently one potentially significant rainfall event (16 to 30 mm of rain on October 30th) forecasted for the watershed over the next 2 weeks. HCA staff have issued an early notice Flood Outlook message related to potential significant watercourse flooding and potential significant water safety concerns. HCA staff continue to monitor conditions and forecasts closely, and will issue updated messages as required.

Lake Ontario Shoreline Flooding

There is currently one potentially significant Lake Ontario shoreline flooding event (up to 2.0 m shore-bound waves on October 30th) forecasted over the next 2 weeks. HCA staff have issued an early notice Flood Outlook message related to potential significant

shoreline flooding. HCA staff continue to monitor conditions and forecasts closely, and will issue updated messages as required.

Watershed Low Water Conditions

HCA staff will continue to undertake monthly drought assessments, and coordinate with the Hamilton Low Water Response Team if drought conditions warrant actions.

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Memorandum to: Board of Directors

Approved for Circulation By: Lisa Burnside, CAO

Reviewed By: Gord Costie, Director, Conservation Area Services

Prepared By: Liam Fletcher, Senior Manager of Conservation Area Services

Meeting Date: November 6, 2025

Subject: Conservation Area Services Update

Executive Summary:

Fall initiatives demonstrate strong community participation and visitation to experience seasonal colours and events. Additionally, the annual Haudenosaunee deer harvest in Dundas Valley is proceeding in collaboration with partner agencies.

Staff Comment / Discussion:

- **Confederation Beach Park – Road 2 Hope**
The Road to Hope Marathon will take place on November 1 and 2 at Confederation Beach Park. Road to Hope offers a variety of races for everyone including a 1km, 5km, 10km, half and full marathon with 4600 registered participants over the weekend.
- **Spencer Gorge – Reservation System**
The Spencer Gorge reservation system will finish on November the 9 for Dundas Peak, Tew and Webster falls. Spencer Gorge welcomed an estimated 1700 visitors this fall to take in the iconic vistas. Advanced reservations continue to be effective in managing visitation, reducing traffic congestion and minimizing pedestrian hazards.
- **Dundas Valley – Deer Harvest**
The annual Haudenosaunee Habitat Wildlife Committee Deer Harvest began on Monday, November 3, 2025, and will run until Thursday, December 4, 2025, in the west end of the Dundas Valley Conservation Area. This archery-only deer hunt is designated for Indigenous harvesters only and is conducted with the

support of the Ministry of Natural Resources and Forestry, Hamilton Police Service, and Municipal Bylaw Enforcement. The deer harvest, is a long-standing tradition providing sustenance for the Haudenosaunee community.

- **Westfield Heritage Village – Halloween**

The Witches Halloween event at Westfield Heritage had great attendance despite a little bit of wet weather. The event received a great promotion with a feature on Breakfast Television on October 23. This event welcomed 2700 visitors over the weekend. Thank you to all the volunteers and staff who made the Witches Halloween event a success.