

CAVE SPRINGS

MANAGEMENT PLAN 2017–2047

Background Report
DECEMBER | 2016





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Cave Springs...

A PLACE THAT IS NEVER TWICE THE SAME.

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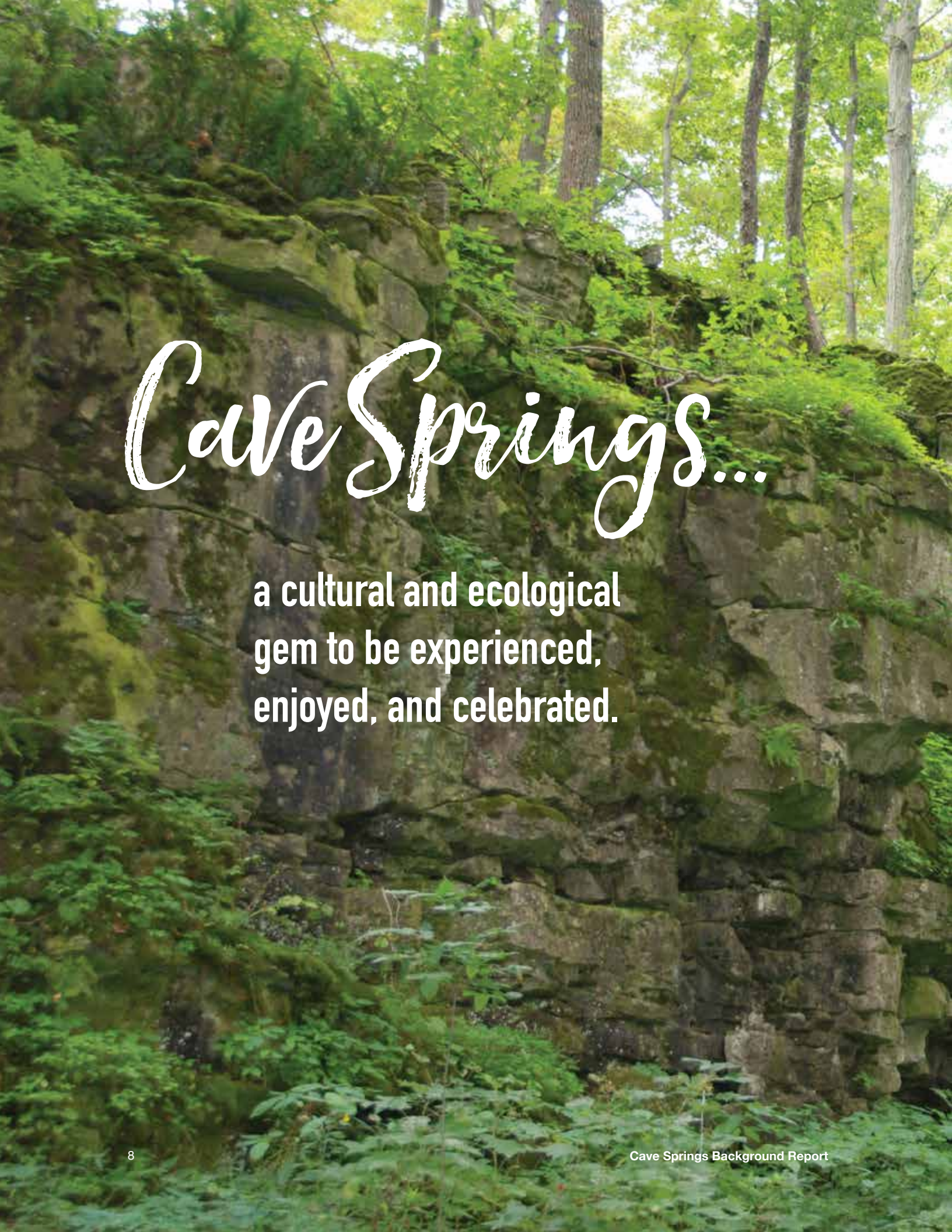
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A photograph of a mossy rock wall in a forest. The wall is made of large, irregular stones covered in green moss and ferns. Tall trees with green leaves are visible in the background.

Cave Springs...

a cultural and ecological
gem to be experienced,
enjoyed, and celebrated.



As you step onto the property, the stresses and worries of day-to-day life dissipate.

The senses come alive with wonder, excitement, and anticipation. The property calls to us and draws us in. Close your eyes and you can imagine the Neutral Indians, who set-up camp hereabouts, climbing to the top of the escarpment, taking in the spectacular Lake Ontario, and the forest that was once Niagara. Close your eyes a second time, and you can picture the early European settlers discovering the rich soils below the escarpment, perfect for farming and growing food. Close your eyes yet again, and this time listen. Listen to the chirping birds and rustling trees. Listen to the water trickling through the streams, or to the children laughing at the nearby camp. Listen to the distant but distinct beating of tribal drums. Close your eyes one last time, and you may even hear Margaret Reed passing along stories and legends about the land and the people, embellished to be certain, but always aimed at bringing the property alive and allowing others to feel its heart beat. This is Cave Springs, a cultural and ecological gem to be experienced, enjoyed, and celebrated. It is a place that is never twice the same. Day after day, season after season, Cave Springs reveals itself uniquely and especially for you. We invite you on to this hallowed ground for your own unique encounter with nature, tranquility, and great beauty. May your experience be magical and inspiring and completely respectful of the encounters yet to be enjoyed by others.



Welcome to Cave Springs.





1.0 *introduction*



1.0 INTRODUCTION

Cave Springs Conservation Area is a uniquely rich site that boasts beautiful vistas overlooking Lake Ontario. There exists a tremendous diversity in its natural and cultural heritage features, and a cultural folklore that resonates in the imagination of visitors. Stories of German spies, buried treasure, and magical salt springs have intrigued numerous visitors over the years.

Cave Springs Conservation Area is owned by the Niagara Peninsula Conservation Authority (NPCA) and consists of a patchwork of parcels obtained since 1981 in an effort to preserve both natural and cultural history.

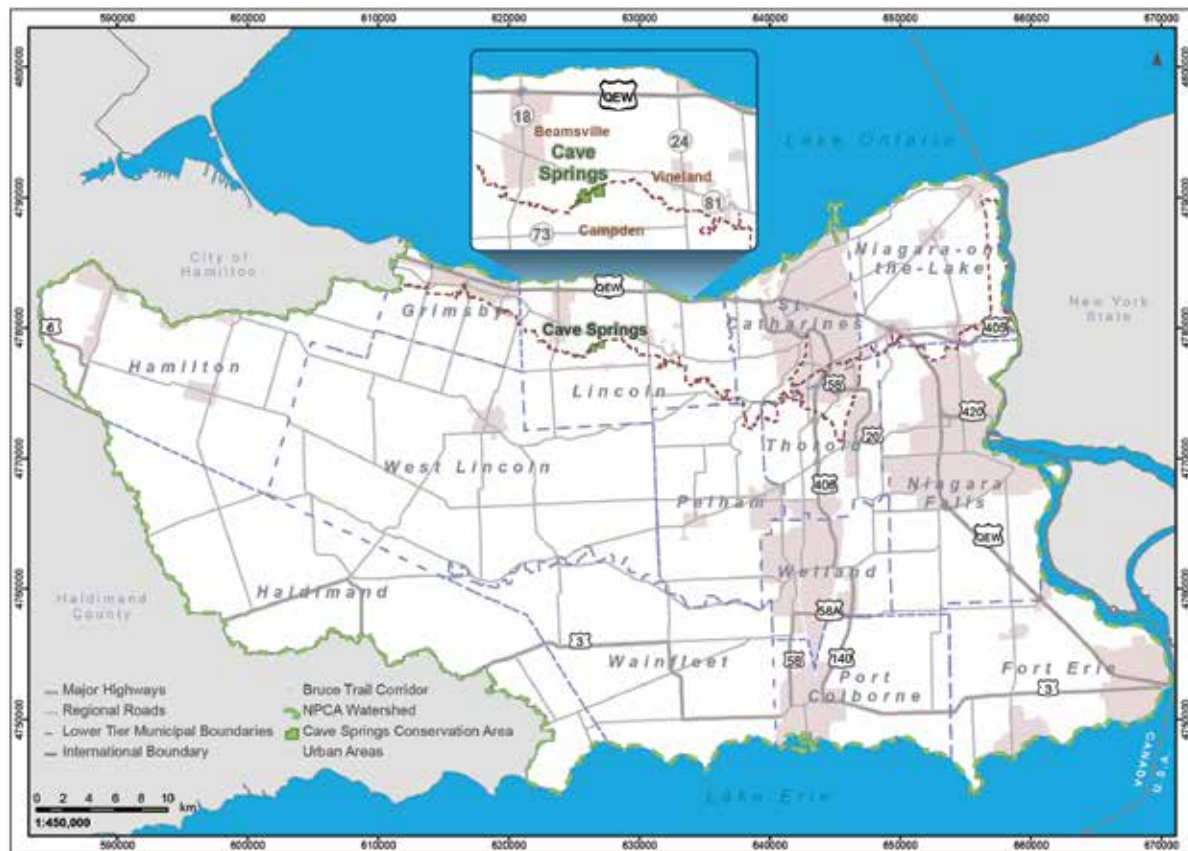


Figure 1: Cave Springs Location



The Site is nestled along the Niagara Escarpment, near the town of Beamsville, in the municipality of Lincoln, Ontario (Figure 1). The Site is a beautiful representation of the Niagara Escarpment's talus slopes and cliffs. The escarpment rim's beauty, with its sheer face and stunning views, is matched only by the majesty of the bedrock plain forests which are dominated by old growth Sugar Maple and a wide array of native wildflowers.

The Niagara Escarpment provides a unique landscape that plays host to a rich diversity of inhabitants and their corresponding ecosystems, some of which are increasingly rare in our highly urbanized environment. Currently, this park is designated as a Nature Reserve under the Niagara Escarpment Parks and Open Space System (NEPOSS), and is part of the United Nations Educational, Scientific and Cultural Organization (UNESCO) Biosphere Reserve. These designations have been granted in an effort to help maintain and protect the area's natural diversity.

NEPOSS

NIAGARA ESCARPMENT PARKS AND OPEN SPACE SYSTEM

Over the last 11,000 years, humans have been a sporadic, keystone species responsible for character-defining elements at Cave Springs. Elements remain from many of these eras, leaving overlapping layers of natural and cultural heritage. Cave Springs is best interpreted as a sensitive natural environment overlaid with a cultural landscape. The Niagara Escarpment Plan (NEP) defines cultural landscape as: *"The product of human activity over time in modifying the landscape for their own purpose, and is an aggregation of human made features such as a village, farmland, waterways, transportation corridors, and other artifacts"* (NEPOSS Planning Manual, March 2012), (NEP 2005).

In the spirit of the Niagara Escarpment Plan (Figure 2), and those committed to preserving it, the NPCA and its partners have been working diligently to develop a Niagara Escarpment Parks and Open Space System Management Plan for the property that will do justice to both the natural and



cultural treasures on this extraordinary property. The Cave Springs Management Plan will ensure that the natural and cultural heritage features of the property are fully and accurately documented, establishing a baseline by which the property can be maintained, monitored, and protected. The Plan will also help determine appropriate levels of human activity on the property in ways that minimize impacts on the natural environment.

The preparation of a Management Plan for lands within the Niagara Escarpment Parks and Open Space System (NEPOSS) are required under Part 3.1.6 of the Niagara Escarpment Plan (NEP). The Niagara Peninsula Conservation Authority has prepared this Background Information document as part of the final NEPOSS Management Plan proposal for the Cave Springs Conservation Area. The final Management Plan is intended to be the principal guiding document for the planning, development, and management of the Cave Springs Conservation Area. The Management Plan will be developed in three stages:



STAGE 1

Project Charter



STAGE 2

Background Information Document including an Inventory and Analysis and Concept Alternatives and Considerations



STAGE 3

Final Management Plan

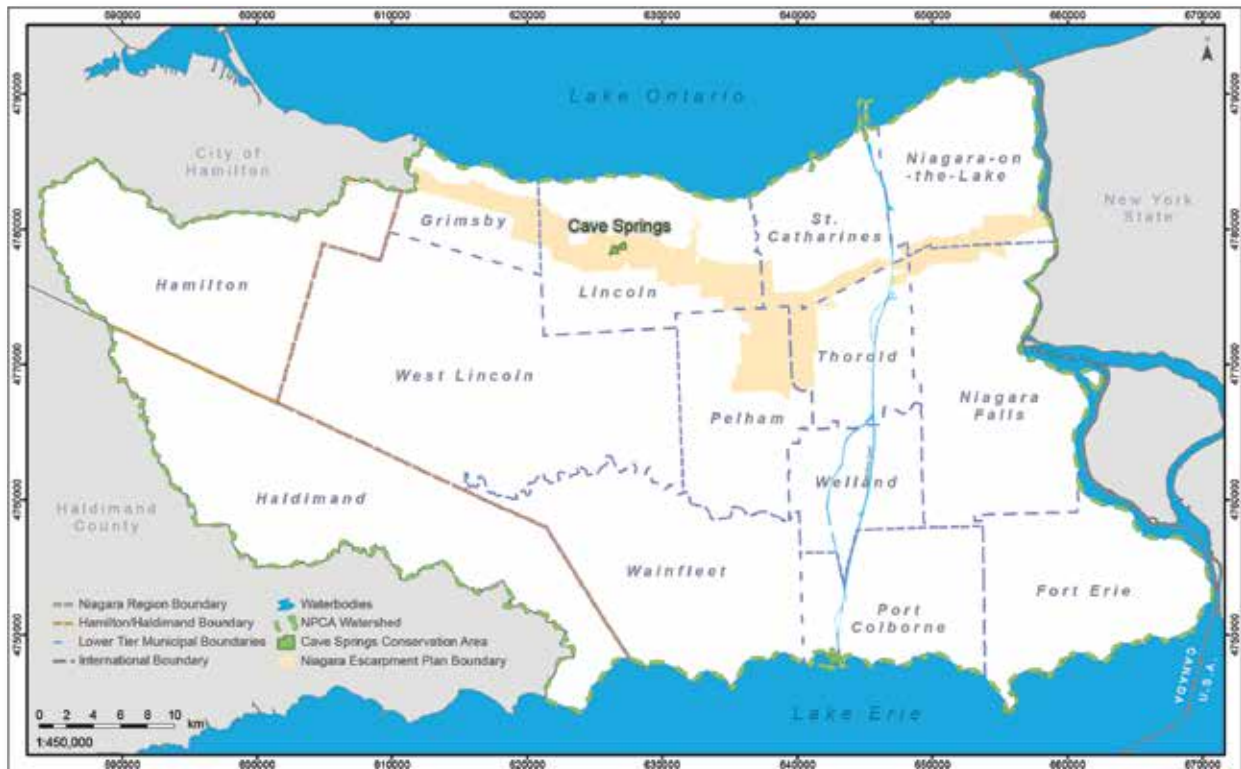


Figure 2: Niagara Escarpment Planning Area

1.1 VISION STATEMENT

The Cave Springs Conservation Area Management Plan strives to create a balance between conservation stewardship, sustainable access, and public outreach.

The Niagara Peninsula Conservation Authority, through the Cave Springs Conservation Area, will practice conservation leadership by promoting the principals of the Niagara Escarpment's United Nations Educational, Scientific and Cultural Organization (UNESCO) Biosphere Reserve designation. The key objective is to protect the Niagara Escarpment's sensitive habitats, and to respect the Site's unique cultural landscapes, including the protection of the features of the Beamsville and Cave Springs Farms Area(s) of Natural and Scientific Interest (ANSI).

Trails and educational facilities will meet the standards set forth by the Accessibility for Ontarians with Disabilities Act (AODA) guidelines. Facilitating

public access to Cave Springs Conservation Area will enable visitors to experience the remarkable wonder of the Niagara Escarpment firsthand. The Niagara Peninsula Conservation Authority, as stewards of natural and cultural history at Cave Springs, strives to be a regional leader in providing outdoor passive, recreational experiences, educational programming, creative engagement, and opportunities for scientific research, including developing a plan for the maintenance, monitoring and protection of sensitive ecological habitats and cultural features. The NPCA also strives to enhance access to, and awareness of, the Bruce Trail Corridor. In keeping with these objectives, the NPCA seeks to rebuild existing buildings for use as historically interpretive locations, education, and special events facilities.

Cave Springs, as part of the Niagara Escarpment Parks and Open Space System, is a contributing component within a larger conservation context. The Cave Springs Conservation Area, through a partnership with the Bruce Trail, and in collaboration with the local community, can create greater public understanding of ecology, a richer appreciation of the Niagara Escarpment's cultural landscape, and improved public access to Niagara's diverse landscape.

AODA

**ACCESSIBILITY FOR ONTARIANS
WITH DISABILITIES ACT**



20

collecting background information



2.0 COLLECTING BACKGROUND INFORMATION

2.1 PROJECT BACKGROUND

The Niagara Peninsula Conservation Authority's mandate is to further the conservation, restoration, development and management of natural resources other than gas, oil, coal and minerals, within its administrative area. As part of this responsibility it owns and manages over 40 Conservation Areas throughout the Niagara Peninsula helping to conserve wildlife habitat, genetics and biodiversity, along with balancing environmental and community needs. To maintain this balance at Cave Springs Conservation Area a NEPOSS Management Plan is being undertaken.

2.2 COLLECTING BACKGROUND INFORMATION AT CAVE SPRINGS

As part of this Plan, several studies are being conducted in 2014 and 2015 to provide baseline information on existing resources and areas of concern to assist in Site resource management decisions. The background information collected through this process includes a Natural Heritage Study (Appendix A), a Cultural Heritage Study (Appendix B) conducted by ASI Archaeological & Cultural Heritage Service, a Water Resource Assessment Study (Appendix C), an Asset Condition Report, literature review and public consultation conducted by NPCA staff.

This Background Report includes identification, assessment, and analysis of natural and cultural heritage and water resource features, pressures, and constraints. The findings from each report form the scope, nature, and location of proposed Site-specific objectives, zoning, park classification, and management actions.

NATURAL HERITAGE STUDY

The purpose of the Natural Heritage Study (Appendix A) was to obtain an updated comprehensive resource baseline of the Site's significance for plants, animals, and ecosystems (i.e. which species inhabit the Site for which part of their lifecycle), and specifically to:

- Identify Natural Heritage features.
- Identify significant wildlife habitat areas (breeding, nursery/rearing, forage, hibernation, migration).
- Identify Species at Risk (SAR) and SAR habitats including defining protection areas.
- Identify significant plant communities for protection and maintenance.

- Inform management decisions (i.e. develop land uses and practices) in ways that support the sustainment of the resource base.

In addition to the Natural Heritage Study (Appendix A), a literature review was conducted for existing documentation on the Site and surrounding area.

SAR

SPECIES AT RISK

Existing documentation was reviewed for species and habitat information previously documented at the Site and surrounding area. This assisted in identifying areas where historically, species are no longer detected, have not been evaluated or are under-evaluated, as well as areas where species and habitat are known to exist. The data reviewed included existing studies, inventories, conservation statements, files and documentation on flora, fauna, ecosystems, soil and Species at Risk (habitat and protection needs). This information was used to help focus inventory needs and refine methodologies for the Site's Natural Heritage Study (Appendix A) in order to ensure the greatest probability of detecting species at the Site.



Each component of the Natural Heritage Study (Appendix A) also:

- Focused on observing suitable species habitats and determining the best times of season and day to make the observations.
- Used appropriate, updated protocols for each category or species.
- Was to be completed in 2015, with the exception of the salamander study. The timeframe for the salamander study will continue for a minimum of three years (through spring 2017), should no SAR be detected in the first or second year. This is to ensure that a reasonable effort has been made to detect any cryptic small rare populations in suitable habitat, such as the Jefferson salamander.



CULTURAL HERITAGE STUDY

The primary objectives of the Cultural Heritage Study (Appendix B) were to prepare and report upon background research that identified the known and potential cultural heritage resources of the property, including archaeological sites, built heritage features, and cultural landscapes, as well as the identification of sound planning practices for the management and protection of these resources.

WATER RESOURCE ASSESSMENT STUDY

The primary task of the Water Resource Assessment Study (Appendix C) was to gather a better understanding of the nature of groundwater and surface water flow at the Site. This information is needed to inform the development of policy guidelines to protect, improve, and enhance the water resources both on and off the Site.

Key Study tasks were to:

- i. Investigate the Site's physical features
- ii. Identify water monitoring locations both on and off Site
- iii. Monitor water flow and quality over time
- iv. Analyze water level, flow and chemistry data
- v. Develop a conceptual water flow model
- vi. Identify design constraints
- vii. Provide future monitoring and design recommendations

PUBLIC CONSULTATION AND INPUT

Public consultation began with the onset of the Management Plan process and has continued throughout the development of the Management Plan. The NPCA gathered information and input from members of the general public and relevant stakeholder groups on the natural heritage features, cultural features, and issues of interest. This input will help to shape the future of the Site. Public consultation has been used to explain the process of the Management Plan development, confirm natural heritage and cultural features of the Site, and to determine where there may be concerns with proposed management direction.

One of the first steps of public consultation was the development of a list of project stakeholders. This list grew as the public consultation process continued throughout the project, and included neighbours, parties who use the Conservation Area, local school boards, Brock University, Niagara College, the Niagara Bruce Trail Club, local politicians, municipalities, and decision makers, First Nations and Métis, acquaintances of Margaret Reed, local tourism associations and businesses, the Niagara Escarpment Biosphere Fund, local nature clubs, the Ministry of Natural Resources and Forestry, the Niagara Escarpment Commission and many others. The Niagara Escarpment Commission (NEC) and Ministry of Natural Resources and



Forestry (MNRF) were included via conference call throughout the planning process and attended some of the Technical Advisory Committee meetings.

Public consultation and communication took place using a variety of public consultation techniques including mail/email notices, newspaper ads, website postings, social media, open houses, workshops, requests for comment/input online, one-on-one discussions, and Site visits. By using a variety of methods, the NPCA ensured that the public consultation process was transparent, accessible, and accountable. The NPCA also invited the public to sign-up for the Cave Springs Management Plan Newsletter to receive notifications of meetings, project updates and other important information with regards to the Management Plan. The NPCA consulted with the public and stakeholder groups at key points throughout the Management Plan process. The NPCA gathered public input and explored different viewpoints in order to make balanced planning decisions that support the long-term planning direction for the Cave Springs Conservation Area.

In addition to meetings, public open houses, and workshops, the NPCA also had members of the public on the Cave Springs Management Plan Steering Committee. The composition of the Steering Committee allowed for two members of the NPCA's Community Liaison Advisory Committee (CLAC), a multi-stakeholder public engagement committee, to sit on the Cave Springs Committee and report back to the CLAC throughout the project. Steering Committee meetings were held monthly throughout the Management Plan process. At various times throughout the development of the Management Plan, Project Lead Mark Brickell presented the project status and next steps to the CLAC group and asked for feedback/comments.

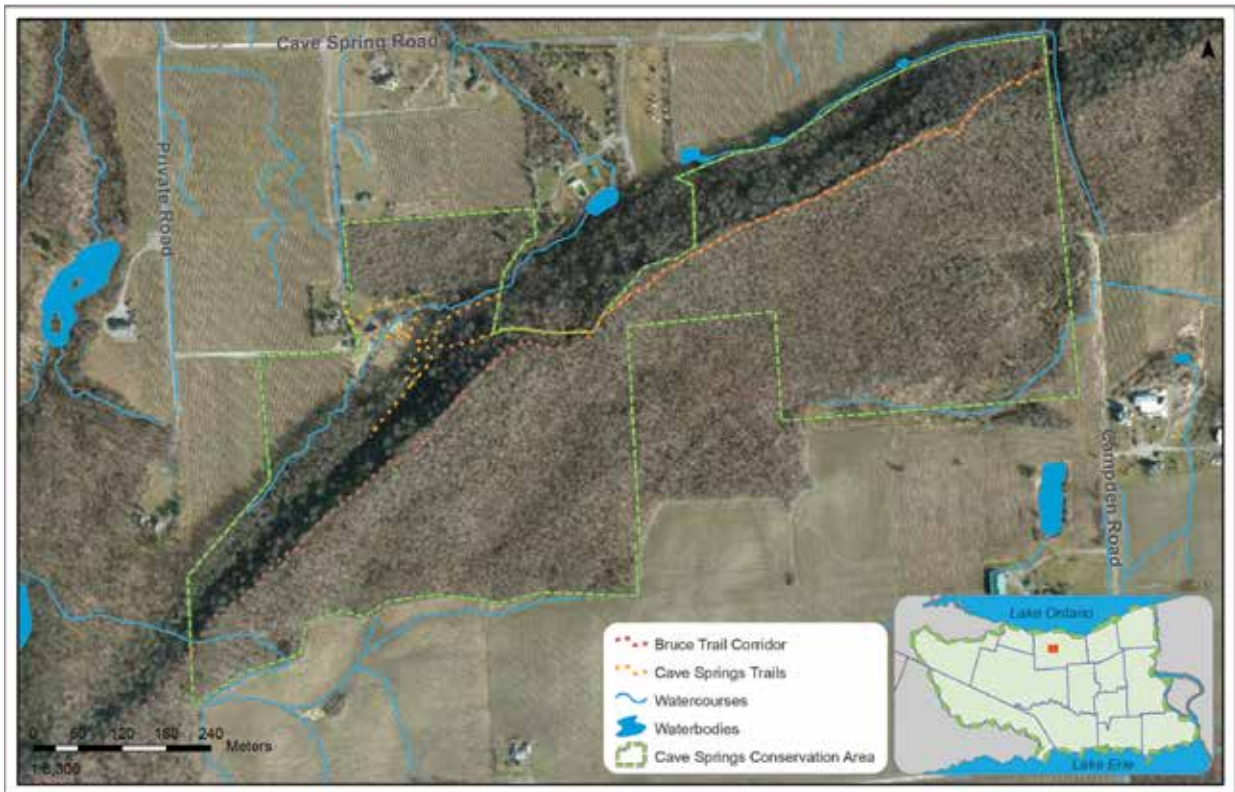


Figure 3: Cave Springs Conservation Area

2.2.1 EXISTING CONSERVATION AREA

The Cave Springs Management Plan will include the area indicated in Figure 3, comprised of Part Lots 9, 10 and 11 in Concession 5, Town of Lincoln. This property can be accessed at 3949 Cave Springs Road, or via the Bruce Trail Corridor. Cave Springs Conservation Area is over 44 hectares in size. A further 1.9 hectares of land had been farmed by the previous owner of the property, but has naturally regenerated since the NPCA's acquisition.

All of the land within the Cave Springs Conservation Area is land that is owned by the Niagara Peninsula Conservation Authority. Adjacent land use includes residential, agricultural, businesses (including a camp used by school groups and lodgers), the Bruce Trail Corridor, and a road network.

2.2.2 CURRENT INFRASTRUCTURE

A NUMBER OF STRUCTURES AND DEVELOPMENT CURRENTLY EXIST ON THE SITE INCLUDING:

An entranceway, which is a single 2.34 metre wide farm gate with a padlock.

An access driveway to the property, which is off of Cave Springs Road. It is approximately 167.64 metres long and 2.43 metres wide and consists of 0.63 centimeters of clear granular stone, and is approximately 2.54 centimeters in depth.

A 30.48 centimeters concrete culvert, which traverses the driveway and is situated approximately 24.99 meters from the Cave Springs Road entrance way.

Networks of trails on the property above, below and transcending the escarpment including the NPCA maintained Cave Springs Trails, unofficial ATV trails and the Bruce Trail Corridor. Most of the maintained trails are in good shape, although not in conformance with the Accessibility for Ontarians with Disabilities Act.

A septic system, which currently is not active or useable. It is a conventional gravity-fed system with an estimated 3,028-litre concrete tank and six rows of septic tile. Each row appears to be approximately 24.38 meters long and made of clay tiles. Clay tiles indicate that the septic system was laid in place prior to 1980.

A septic tile bed, which sits approximately 3.04 meters from the tank and runs east and west in front of the house in the lawn.

A barn dug well that is located on the northwest side of the barn. The well is hand dug, and 4.57 meters deep. It is currently not used, nor is it recommended for use, and is sealed from public access.

An inoperable weigh scale that is recessed into the ground in front of the barn.

A barn that is a two-storey structure approximately 10.66 meters by 7.31 meters and is currently being leased and used for storage.

A main house that is divided into 3 sections: the original Bob Lamont barn, the shed-roofed addition to the south, and the converted trailer to the southwest. The master bedroom is loft-style and located on the top floor. The main house is 4.41 meters by 9.1 meters. The back section, the main entrance, is 2.43 meters by 5.63 meters. Attached to the back entrance is an old shed that was converted into living space that is 4.87 meters by 2.28 meters.

Three small outbuildings including a small wood shed, a peacock/poultry house and a small storage shed have been taken down under an NEC demolition permit and with the permission of the Town of Lincoln Building Department.

Absent on the Site is parking. Vehicles visiting the Site must park in the cul-de-sac outside of the entry gate.

Utilities, including electrical do exist on the Site.

A holding tank for water.

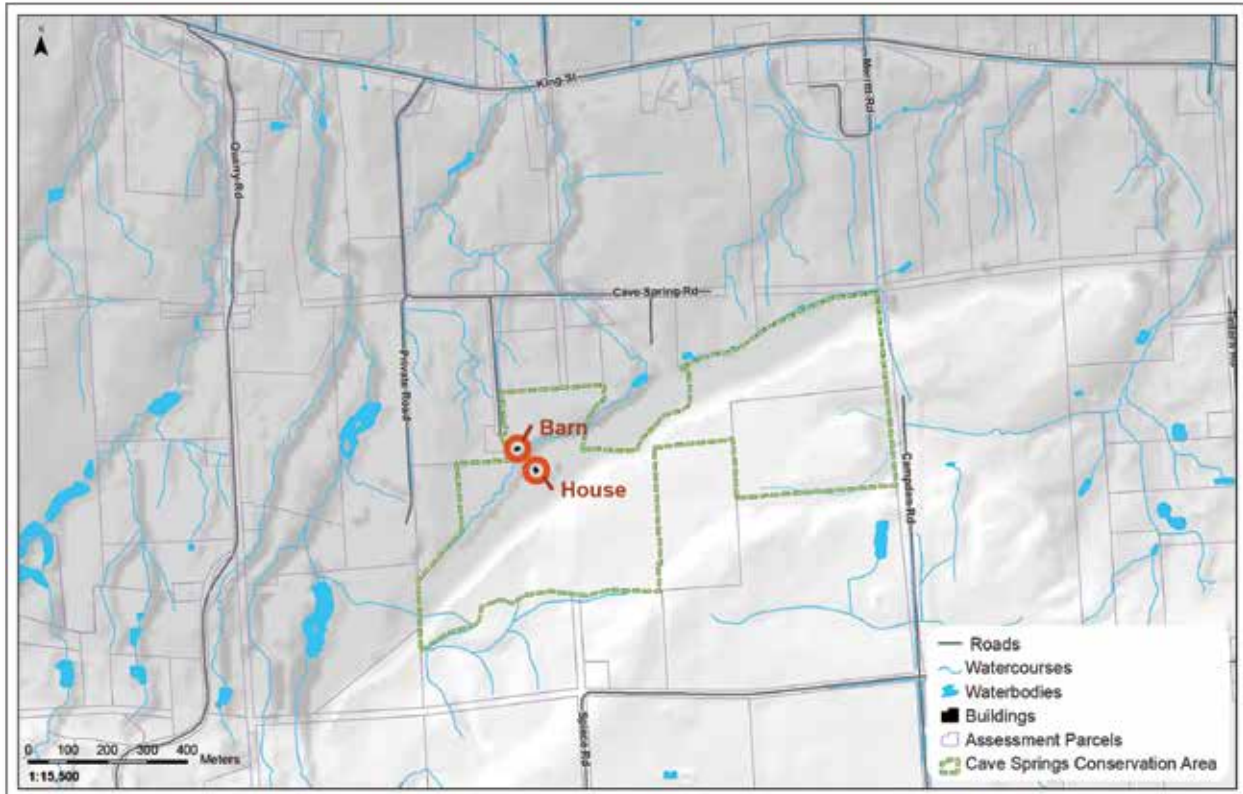


Figure 4: Cave Springs Buildings

2.2.3 CURRENT RECREATIONAL USES

Currently, Cave Springs Conservation Area recreational use includes passive recreational activities within 2.3 kilometres of the existing Cave Springs Trail system. This includes 1.5 kilometres of Bruce Trail Corridor, and unsanctioned rock climbing with 52 climbing routes and bouldering. Unofficial ATV and dirt bike trails exist south of the escarpment in the forested area off of Campden Road. When the Cave Springs Camp is open, educators conduct educational nature walks on a regular basis.



2.2.4 CURRENT VISITATION

Visitation of the Site varies by season with April through October being the busiest. The current visitation is difficult to determine, as there are no NPCA staff on-Site most of the time and therefore no way to record visitors. The NPCA estimates, based on discussions with current users, that there are currently more than 6,000 visitors to the Cave Springs Conservation Area per year. (Table 1: Estimated Annual Visitor Use at Cave Springs Conservation Area)

The adjacent Cave Springs Camp uses the trail system throughout the spring, summer and fall seasons to conduct educational nature walks on a daily basis. Cave Springs Camp estimated that over 2300 students and teachers use the Site between May and June, and that weekend rentals can account for an additional 15-200 visitors. In July and August, Cave Springs Camp hosts approximately 550 people. In the months of September and October school groups visit the Site and account for approximately 200 students. There are also camp visitors who rent, which contribute to the overall number of visits during this period.

The Ontario Access Coalition has identified 52 climbing routes on the property with estimated numbers of up to 20 people per week accessing the site in the spring and fall, and approximately 10 people per week accessing the site in the summer. Given this estimate, the NPCA anticipates that there are over 375 climbers using the site per year.

The Niagara Bruce Trail Club estimates that approximately 1000 visitors each year use the Bruce Trail Corridor. This number includes members of the Niagara Bruce Trail Club, local visitors and visitors from out of town (varying in age) hiking through the Cave Springs Conservation Area.

GROUP	SPRING	SUMMER	FALL	WINTER	TOTALS
Ontario Access Coalition	120	84	120	48	372
Cave Springs Camp	3100	550	1000	0	4650
Niagara Bruce Trail Club	400	300	200	100	1000
					6022

Table 1: Estimated Annual Visitor Use at Cave Springs Conservation Area



2.2.5 SITE CHARACTERISTICS

Cave Springs Conservation Area has diverse, unique and sensitive vegetative communities, which support a variety of habitats and species. These communities are composed of treed slopes below the escarpment cliff face, which is littered with boulders of stone. Fissures can be found on top of the escarpment and on the escarpment face. There is an interior forest within a mature tableland woodlot, which hosts many habitat trees. There are meadows, streams and wetlands throughout the property. These components support combinations of forage, roosts, dens and nests. The overall natural heritage landscape is a well-integrated and balanced ecosystem.

The Site has a former ice cave that retained ice throughout the summer and was once used by local inhabitants to store food.

The Site has a history of archaeological finds including a potential Aboriginal settlement. Local folklore includes rumours of providing refuge for German spies, the legacy of Margaret Reed as the “Witch of Cave Springs”, and a hidden cave that boasts a wealth of Aboriginal artifacts.

Geological formations include escarpment springs, and some of the best examples of block talus slopes, rock fissures and karst topography on the Niagara Escarpment in the Niagara Region. There



"One of the Indian head carvings, photographed by Kenneth Kidd in November, 1948. – Royal Ontario Museum, Toronto, photograph." (Rannie 1981: 12) and "Indian head carving in the collection of Robert Calvert, London" [photo by Bill Fox, London] (Rannie 1981: 14)

are spectacular vistas overlooking Lake Ontario, and The Adam Steps, found immediately adjacent to the Cave Springs property. The Adam Steps are a historical staircase traversing the Escarpment, which many suspect were used by the Neutral Indians.

2.2.6 NATURAL HERITAGE FEATURES

The Site's natural heritage features include the Niagara Escarpment, the Beamsville Escarpment Provincial Life Science Area of Natural and Scientific Interest (ANSI) and the Cave Springs Farm Earth Science ANSI (Figure 5). This area is within the Niagara Escarpment Plan Natural Area and the Niagara Escarpment Plan Protection Area. Additional Natural Heritage System Components for the site are identified as: Migration Corridor, Significant Woodland and fish habitat. There is an intermittent stream, locally known as Margaret's Creek, which is mapped by the Ministry of Natural Resources and Forestry (MNR) as Type 3: Marginal Fish habitat, traversing the Site. The Site contains habitat for a variety of Species. Wildlife habitat can be found throughout the above noted features including in the interior forest and Escarpment habitat.

The Natural Heritage Study (Appendix A) highlights the Cave Springs Conservation Area as having diverse and unique vegetative communities, which support a variety of habitats and species. Its striking compilation ranges from treed, large, block talus slopes to rock fissures and grikes. Part of the uniqueness is the Site's escarpment

feature consisting of escarpment talus face and tableland forest, which is part of the World Biosphere United Nations Educational, Scientific and Cultural Organization (UNESCO) area. This designation recognizes the Niagara Escarpment feature internationally, as an important ecological area that balances humans and the biosphere (i.e. sustainable local economies, community, and conservation of terrestrial ecosystems).

The life science and geologic features have a provincial and regional designation by the Ontario Ministry of Natural Resources and Forestry, adding to the Site's significance. These include the Provincially Significant Life Science ANSI "Beamsville Escarpment", which identifies diverse vegetative communities and Niagara Escarpment features of plain rim and cliff, and talus of high provincial representation. Of particular note are the escarpment overhang rubble having produced "some of the most extensive and best large block talus slopes on the Niagara Peninsula" (Jalava et.al., 1992), as well as "some of Niagara's largest exposed grikes/clints" (dolostone exposed and raised blocks (grikes) separated by solution-weathered cracks(clints) (Jalava et.al., 1992)), and a moderate representation of Niagara Escarpment terrace and terrace valley features.

The Regionally Significant Earth Science ANSI "Cave Springs Farm", identifies Lockport caprock crevassing along rock joints, and provides a good example of post-glacial and "perhaps periglacial crevasse development" on the Niagara Escarpment.

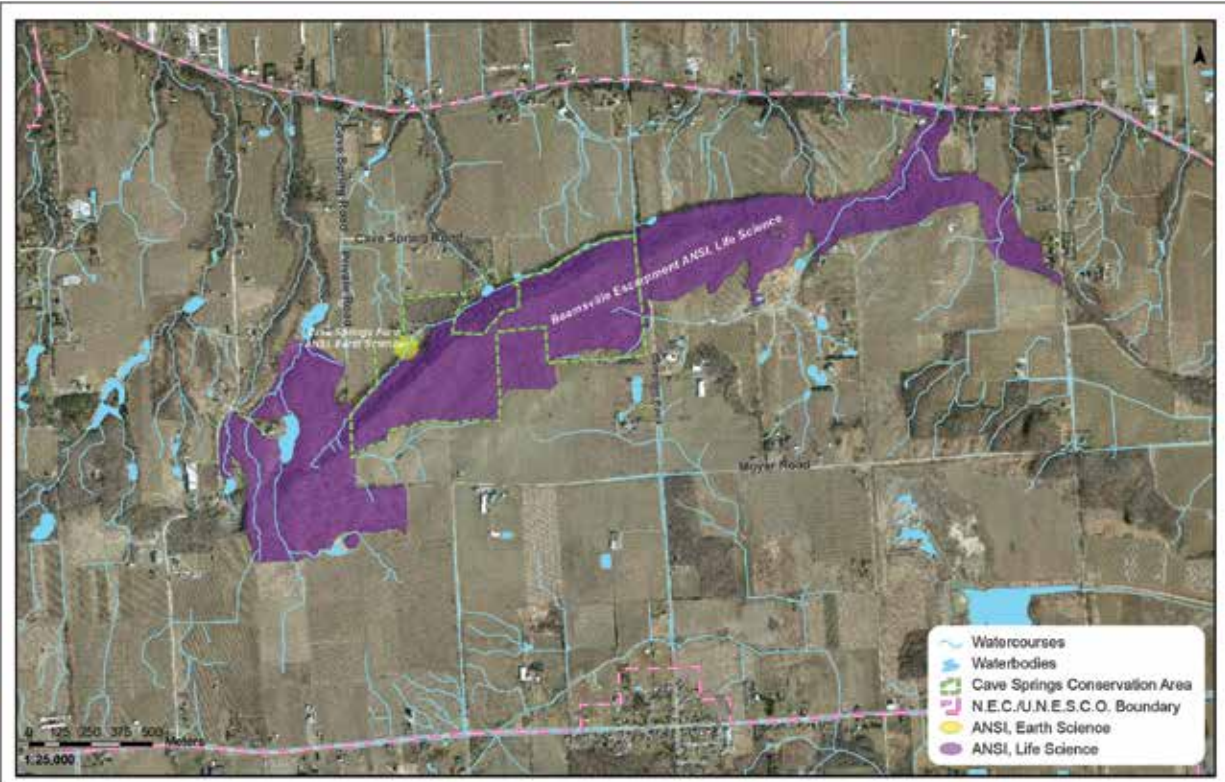


Figure 5: ANSI and UNESCO Boundaries

(Ministry of Natural Resources, Central Region, Parks and Recreation Section, 1983. Regional and Local Earth science Areas of Natural and Scientific Interest In Niagara District).

The Cave Springs Conservation Area is mapped as a Natural Heritage System: Migration Corridor. Corridors support the movement of wildlife and dispersal of plant material, playing a vital role in maintaining ecosystem health and integrity in the Niagara Region (Niagara Region Official Plan, 2015). This corridor also connects other Core Natural Areas. The area is mapped as both a Significant Woodland and a migration corridor, which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size, or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history (Niagara Region Official Plan, 2015).

An intermittent watercourse (locally known as Margaret's Creek) traverses the Site at Campden Road and is mapped by the Ministry of Natural Resources and Forestry (MNRF) as Type 3: Marginal Fish habitat. The fish habitat includes

spawning and rearing grounds, a nursery, food supply, and migration areas on which fish depend, directly or indirectly, in order to carry out their life processes. The watercourse also provides a foraging area for bats. The Site contains habitat for a variety of Significant and unique species. Wildlife habitat can be found throughout the above noted features.

2.2.7 CULTURAL HERITAGE FEATURES

The Niagara Peninsula Conservation Authority has adopted the working principle that "it is an objective... to avoid wherever possible the disruption or disturbance of known cultural heritage sites, features, landscapes or areas of archaeological potential within the Cave Springs Conservation Area," within an overall management process appropriate to a "Nature Reserve," or a "Natural Environment" classification for the area as defined by the Niagara Escarpment Parks and Open Space System Planning Manual. (ASI Archaeological & Cultural Heritage Service, 2015)

Archaeological Services Inc. (ASI) was retained by the Niagara Peninsula Conservation Authority to conduct a Cultural Heritage Inventory and Planning Study in support of the Cave Springs Conservation

Area Management Plan prepared according to the requirements of the Niagara Escarpment Parks and Open Space System Planning Manual. (ASI Archaeological & Cultural Heritage Service, 2015)

One archaeological site has been registered within the Conservation Area and there are reports of several other potential sites, the veracity or location of which cannot be confirmed on the basis of the present evidence, but which should not be discounted. Moreover, the entire conservation area is generally considered to have potential for the presence of hitherto undocumented archaeological resources. (ASI Archaeological & Cultural Heritage Service, 2015)

The Adam Steps site was registered by Ian Kenyon and William Fox, who at the time were Regional Archaeologists with the Ontario Ministry of Culture, as a small number of chert flakes were found eroding from a hiking trail along the base of the escarpment near the extreme southwest corner of the Conservation Area property. This locale had



The Adam Steps

attracted the attention of archaeologists several decades earlier. In 1948, Kenneth Kidd, then of the Royal Ontario Museum, documented carvings of two human heads cut into the face of the escarpment at The Adam Steps that were rendered in the round and in frontal view. Another head, reportedly from the Site, was found in a private collection that now apparently resides at the Ontario Museum of Archaeology at the University of Western Ontario. It is unclear how many such carvings were originally present, however no traces were found at the site by Kenyon and Fox, due to the activities of looters. The carvings, which reportedly measured 16-20 centimetres high, have no known counterparts in the archaeological record of southern Ontario. This has led to some uncertainty as to their age and cultural affiliation, however, it may be noted that the limited documentation available suggests that the heads bear many stylistic similarities with human faces found on many Late Woodland ceramic and ground stone “effigy” smoking pipes. (ASI Archaeological & Cultural Heritage Service, 2015)

A minimum of eight cultural heritage landscapes, comprised of combinations of built heritage features and other forms of landmarks or human alterations to the natural landscape which serve to shape the conservation area as it exists and is understood today, have been identified. (ASI Archaeological & Cultural Heritage Service, 2015)

The eight cultural heritage features that were identified based on background research and field review include:

I. REMNANT FARMSTEAD

There are two gambrel barns on the Site, one that is often referred to as the “winery building” was built in the 1930s and was home to Margaret Reed until her death in 2005. The other barn, also built in the 1930s, may rest on the stone foundations of the original homesteading cabin.

Several other outbuildings existed on the Site from the Margaret Reed era for the purpose of housing animals. These buildings were deemed as being safety hazards and were subsequently demolished in the fall of 2015.

On the adjacent property sits a two-storey brick farmhouse that was originally constructed in the 1880s along with another gambrel outbuilding.

The surrounding agricultural landscape is predominantly used for grape production,

however there are several mature apple trees still present on the Site.

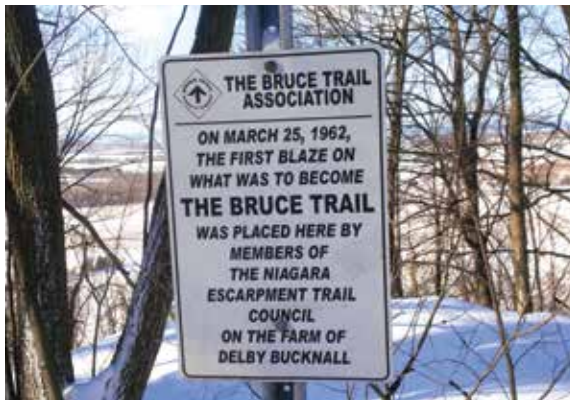
II. REMNANT HISTORIC ROADSCAPES

The Site features at least two segments of historical track/roadway that were built or improved by past property owners. One road travels to the ice cave, while the other leads up the escarpment face and was constructed by Bob Lamont in the 1920s. In the late 1940s an additional road was constructed to access the Cave Springs Camp. Today all three roadways are used as hiking trails.

III. BRUCE TRAIL

Currently, the only official access to the Cave Springs Site is through the Bruce Trail. The Bruce Trail runs along the escarpment and boasts many scenic views of Lake Ontario. The Bruce Trail is Canada's oldest and largest marked footpath. It provides the only continuous access to the Niagara Escarpment and spans more than 890 kilometres of main trail and over 400 kilometres of associated trails (bruce trail.org).

In 1962, the first trail marker of what was to become the Bruce Trail was placed on the Cave Springs Site.



IV. SPYHOLE CAVE

The spyhole cave is located in the escarpment face. It was rumored that during the First World War it provided a sanctuary for German spies. The cave is a good example of the folklore that is integral to the Site.

V. THE ADAM STEPS AND THE PETROGLYPH SITE

The Adam Steps are the only registered archaeological site at the Cave Springs Conservation Area. They consist of a series of irregular stone steps and are currently used as a contemporary trail. Indian head carvings existed on the cliff face in this location until their removal by looters. On the rock face west of the steps are a series of expertly carved initials. Some of these carvings may be attributed to local late 19th century stonemasons. Other evidence of early quarrying exists in this area.

VI. PETROGLYPH ABORIGINAL SITE

A 1960s carving of an Aboriginal man wearing a Great Plains-style ceremonial headdress acts as a landmark for the trail that leads up the escarpment to connect with the Bruce Trail. There is a step stone with remnants of quarrying marks in close proximity to the carving.

VII. ICE CAVE

Once a natural phenomenon and tourist attraction during the late Victorian Era, the Ice Cave is known for its properties of preserving ice though the summer months. Bob Lamont attempted to expand the Cave by using dynamite, which resulted in a blocked entrance due to a rock fall.

VIII. WELLS AND INFRASTRUCTURE ASSOCIATED WITH WATER COLLECTION

A number of wells and water collecting infrastructure have been identified on the Site. These wells are physically, functionally, and historically linked to the escarpment with many historical references to various property owners collecting water from them. (ASI Archaeological & Cultural Heritage Service, 2015)

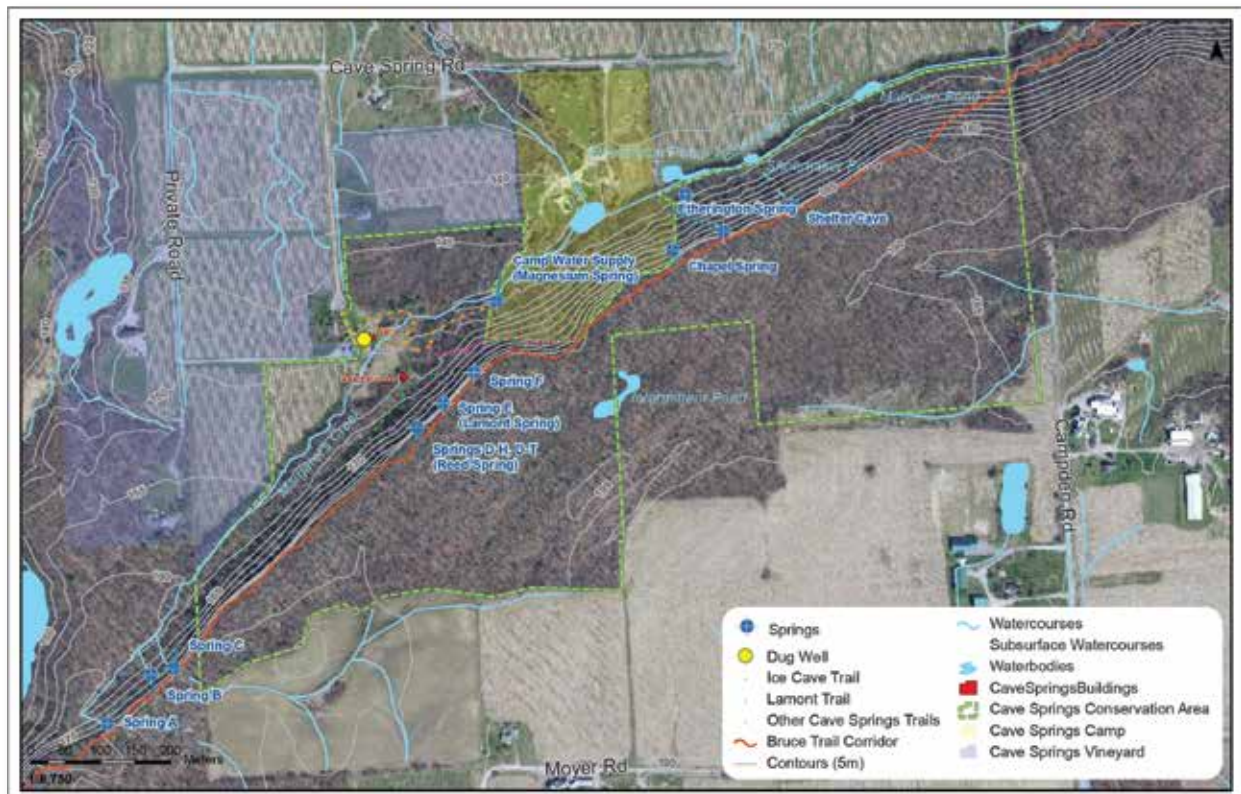


Figure 6: Water Resource Site Layout



2.2.8 GEOLOGICAL AND WATER RESOURCE FEATURES

“The Cave Springs property is both typical, and at the same time, a unique example of the Niagara Escarpment in Southern Ontario. It is typical in its abrupt break in the landscape and height above sea level. The uppermost Gasport and Decew formations form a vertical face which terminates in a scree slope that covers the remaining members of this feature.”

(B. Murphy, 2015) Figure 6: Water Resource Site Layout.

“Water!... Cave Springs inherited its name from a spring, which is no longer visible. Before the United Church acquired a twelve acre portion of Cave Springs, there was a hole or cave in the ground from which water spouted up like a fountain...This is why the area was called Cave Springs.” (Reed, 1998)

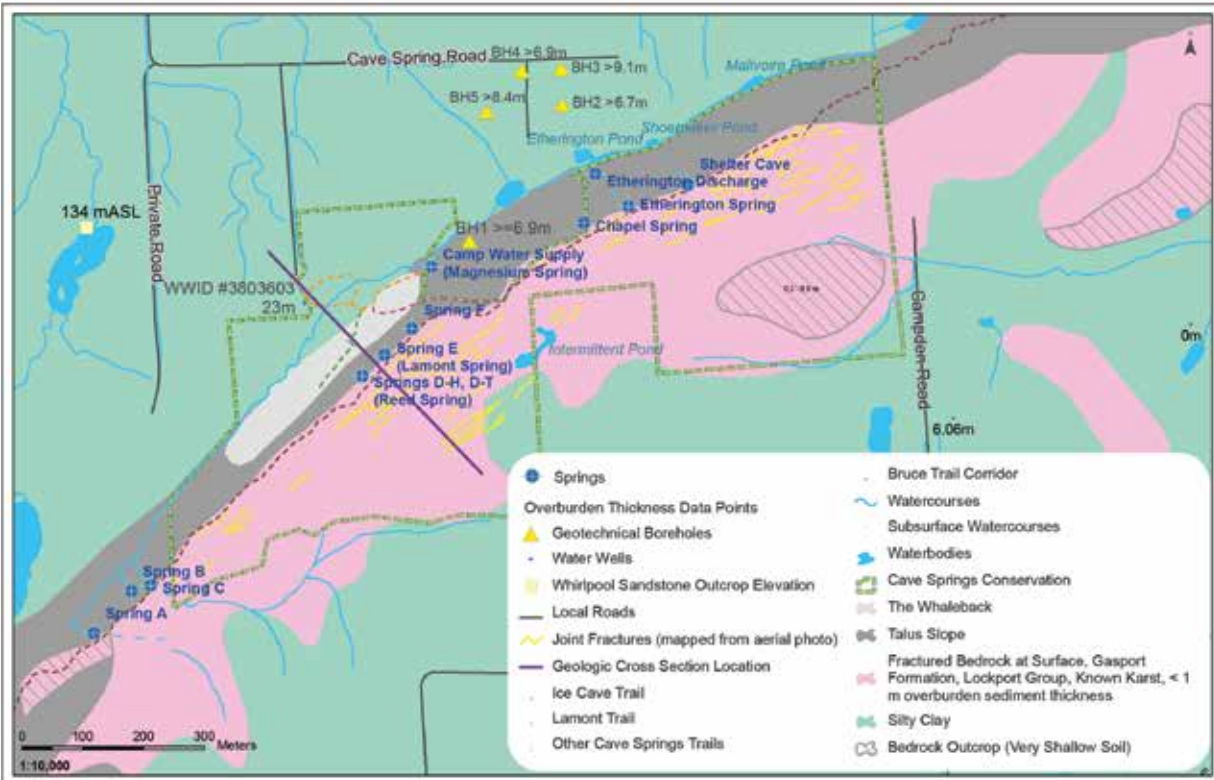


Figure 7: Geological Overview

The Cave Springs Conservation Area is 44 hectares in size, with about 2/3 of the Site above the Niagara Escarpment (Figure 7: Geological Overview). A magnificent vertical bedrock scarp is the dominant feature of the conservation lands and is crossed by the Bruce Trail. Vineyards and the Cave Springs Camp are north of the Site, agricultural fields for grain production to the south, and some forested areas are adjacent.

The physical setting of Cave Springs has a diverse number of water movement pathways. The pathways studied include: (i) streams on silts and clays, (ii) fracture joints in bedrock, (iii) escarpment face springs, (iv) talus slope seeps, (v) agricultural field tile drains, (vi) water supply wells and (vii) ponds.

Historical knowledge, or in some cases stories, introduce many of the technical sections. The quoted references present a “firsthand” understanding of the Site before delving into more detailed water resource information. The quoted references are meant to bridge between the interests expressed to the NPCA by various project stakeholders and the technical findings on the Site.





2.2.8.1 PHYSIOGRAPHY

Physiography is the general description of landforms. Reed (1998) provides a good starting point in describing the Site and the surrounding area:

“ Below the ‘Mountain’ (escarpment) on the flat sand plains formed by the waters of Lake Iroquois, a glacial ancestor of Lake Ontario, lies spread a vista of orchard and vineyard, climatically protected by a hill of rock southwards above the Escarpment stretch the fertile farmlands of the gently rolling till plain.’

The terrain of Lincoln consists of strongly contrasted geological systems and land forms, a characteristic of the Niagara Peninsula. Running throughout the breadth of the town from east to west are alternate bands of soft shale and hard dolomite. Queenston shales to the north and Marcellus

shales to the south were long ago scooped out into the basins of lakes Ontario and Erie and between these belts of less resistant rocks there rises the massive Escarpment of harder dolomite.

North of the Escarpment the terrain ranges from the level of Lake Ontario, rising by a small bluff to the flat sand plain. The Lake Iroquois bench is outlined on topographical maps by the 350-foot (106.75 metre) contour and is followed closely by Niagara Regional Road 81 (King Street).

The area lying between Regional Road 81 and the Escarpment is called by topographers ‘The Bench’, a broad, giant step narrowest at the western end of the town and widening to approximately two miles (3.22 km) at the eastern boundary, Fifteen Mile Creek. The topography of the



Figure 8: Surface Geology, Soil Types & Physiography (modified after Steele and Haynes, 2000)

Bench (on which Cave Springs lies) varies from gently rolling to undulating, with slopes frequently exceeding 10 percent and soil erosion an important hazard... a forested Escarpment, crevasse valleys, cliff face... Cave Springs lies... between the Mohawk Trail and the foot of the Escarpment." (Reed, 1998)

The most significant landform at the Site is the Niagara Escarpment. It forms the boundary between the lands above the escarpment that transition to the southern Haldimand Clay Plain, and the lands north, below the escarpment that transition to the Lake Iroquois Sand/Shale Plain (Chapman and Putnam, 1994). Figure 8: Surface Geology, Soil Types & Physiography.

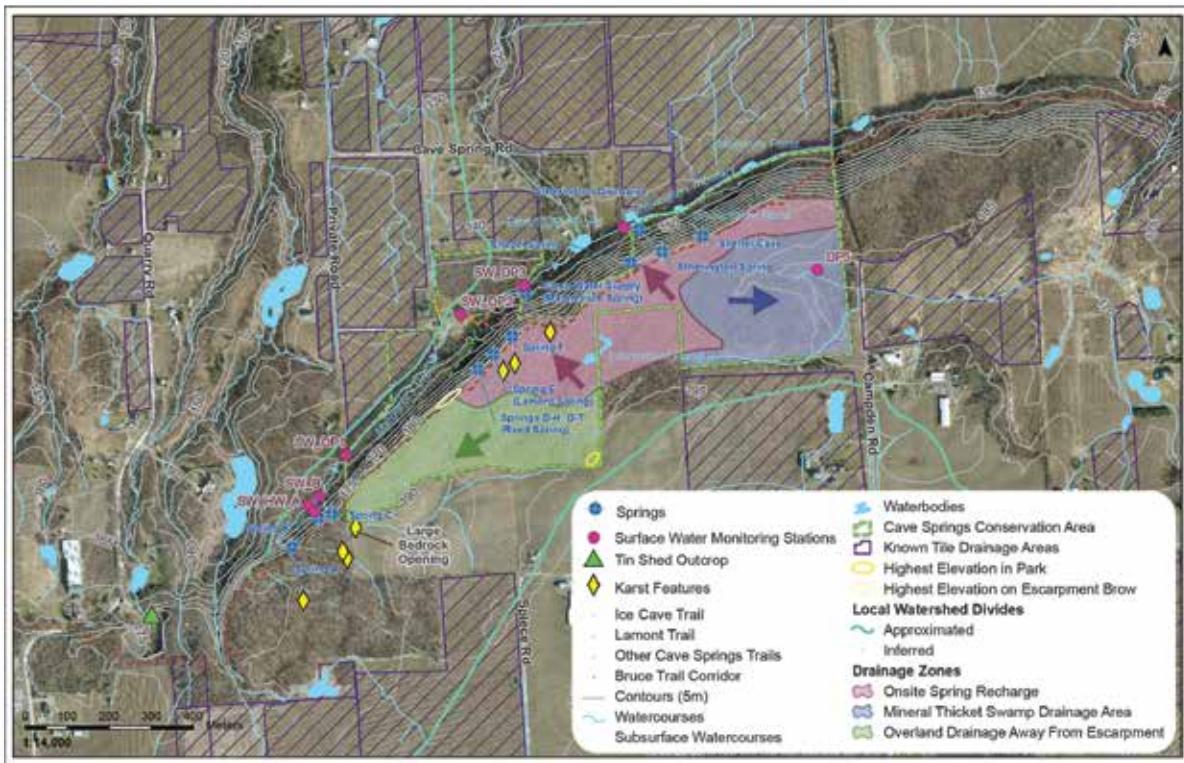


Figure 9: Topography and Surface Water Drainage

2.2.8.2 TOPOGRAPHY AND DRAINAGE

“The Escarpment appears on a topographical map with its base an elevation of approximately 145 metres, the top at 190 metres...The ‘Mountain’ as it is known locally, is an erosional cliff about 50 metres in height, its steep face comprising a sequence of sandstones, shales and Dolomites...At Cave Springs, the Escarpment is the steepest continuous cliff of any portion between the Twenty and Thirty Mile creeks, and also the least dissected by stream gorges.”
Reed (1998).

See Figure 9: Topography and Surface Water Drainage

“The vegetation cover on the talus slope indicates that it has been stable for an extended period of time. Some trees are obviously over a hundred years in age. There is no indication of downslope creep affecting the shape of their trunks, nor is there indication of recent local soil slips.”
(Murphy, 2015)

I. CAVE SPRINGS ESCARPMENT WATERSHEDS

Above the escarpment there are three small watersheds. The first, Onsite Spring Recharge (Figure 9: Topography and Surface Water Drainage) provides local recharge to a number of the springs. The second is the Mineral Thicket Swamp Drainage Area. The third is the Overland Drainage Away From Escarpment. With thin overlying soils (Figure 7: Geological Overview), and a series of joint bedrock fractures at the surface, the amount of runoff is likely limited. A runoff off-site to the south is expected to flow to a large vertical bedrock opening (Figure 9: Topography and Surface Water Drainage) and directly recharge Spring C. Similarly, agricultural runoff from the south appears to flow to some underground drainage karst features and directly recharge Spring A.



II. DRAINAGE BELOW THE ESCARPMENT

“The stream running through the paddock adjacent to the barn used to flow quite well except for a brief period in July and August. It cannot be relied upon now. There is scarcely room to dip a bucket in anymore except during heavy run-off in the spring and fall. It is rare now to see deep snow in the winter with the stream running through it.”

(Reed, 1998)

An intermittent stream, Margaret’s Creek, flows the length of the western portion of the Site. It originates south of the Site and receives discharge from a series of Escarpment springs, A, B and C (Figure 9: Topography and Surface Water Drainage). This creek drains to the northeast into the pond on the Cave Springs Camp, which eventually flows to Lake Ontario five kilometres away.

Immediately north of the eastern portion of the Site is a stream, the Etherington Tributary. This stream flows to the southwest and also discharges to the pond at the Cave Springs

Camp. This tributary is connected to a series of constructed ponds (Etherington, Shoemaker and Malivoire, Figure 9: Topography and Surface Water Drainage) located at the base of the talus slope.

III. WHALEBACK

“There is a ridge of material trending east west just to the north of the boulders which at first glance might appear to be a roadway to the ice cave. However numerous large blocks protruding from its sides would indicate that it is a post glacial (erosional) feature.”

(Murphy, 2015)

There is another important topographic feature at the Site that is easily overlooked and trends parallel to the escarpment. It is labeled “Ice Cave Trail” (Figure 9: Topography and Surface Water Drainage) and “Whaleback” (Figure 7: Geological Overview).

This “Whaleback” ridge (Figure 7: Geological Overview) creates a small valley that directs local runoff, snowmelt and discharge from escarpment springs to the Cave Springs Camp water supply to the northwest. The “Whaleback” appears to be over 400 metres in length and reaches a height of about 9 metres near the former ice cave and is about 4.5 metres high at the Lamont Trail trailhead.

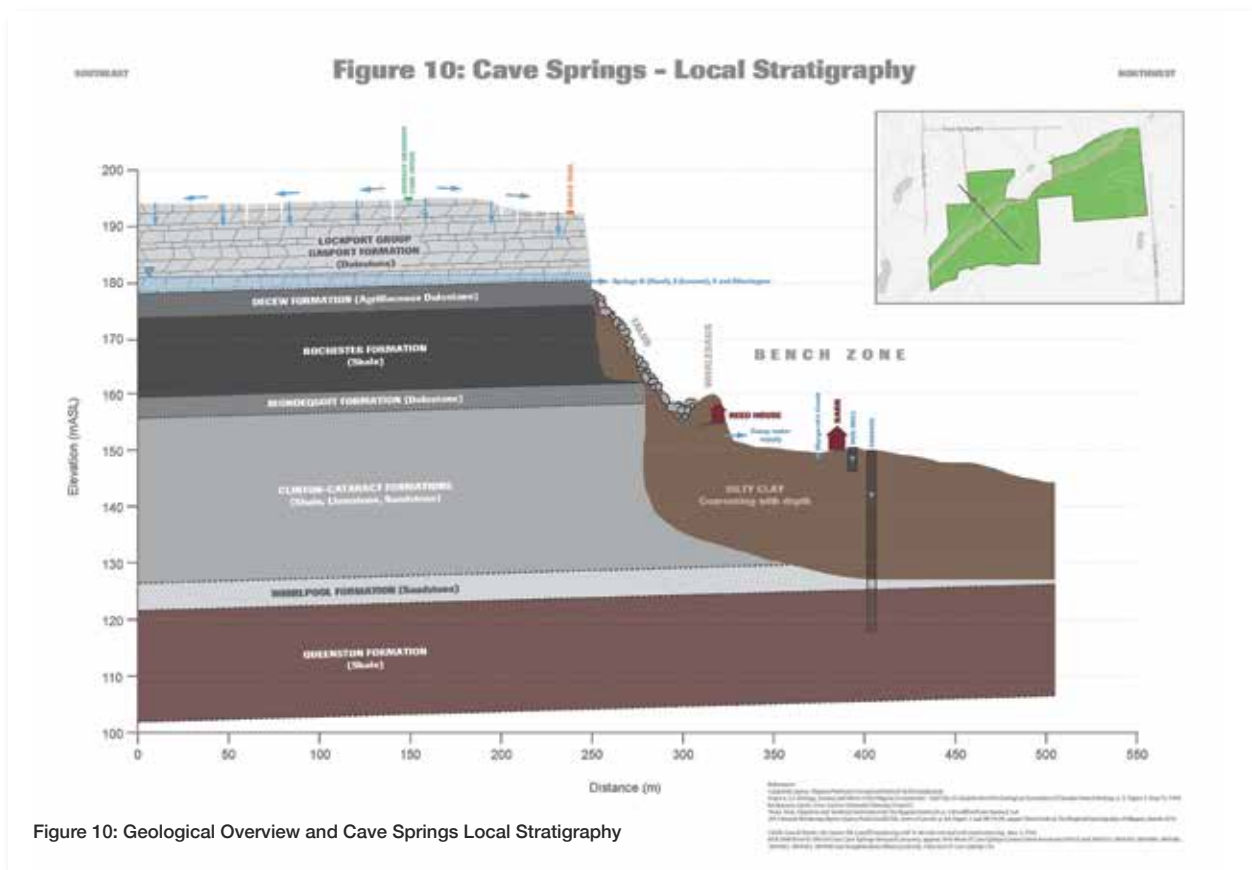
IV. TILE DRAINAGE

A small portion of the Site is tile drained where the land is rented from the NPCA for viticulture. This vineyard drainage is generally to the north (Figure 9: Topography and Surface Water Drainage), however a thin grassed area immediately adjacent to Margaret’s Creek does drain to the creek via two tile drain outlets. A number of other areas adjacent the Site are also tile drained. Tile drained lands below the escarpment drain to the north away from the Site, and tile drains to the southeast of the Site (above the escarpment), drain to the east. The tile drained area southwest of the Site (above the escarpment), may partially drain run-off towards springs A, B and C.

2.2.8.3 SOILS

Soil information is important to understanding the potential for water infiltration into karst features and fractures on the Niagara Escarpment.

Immediately above the escarpment are well-drained soils only 50 to 100 centimetres thick over bedrock



with good permeability. These areas are inferred to have high potential for infiltration of snow melt and rain. Set-back from the escarpment and the well-drained soils are poorly drained soils only 50 to 100 centimetres thick over bedrock, where permeability is moderate to slow, and surface runoff is moderate.

Soils below the escarpment, within the Site boundary on the Bench, are mostly imperfectly drained, moderately to slowly permeable soils, with moderate to rapid surface runoff. With low infiltration rates, water conditions in these soils tend to be perched with slow recharge to the underlying aquifers.

2.2.8.4 GEOLOGY

I. OVERBURDEN SEDIMENTS

“...[T]he escarpment was completely buried beneath glacial ice. As the ice retreated it deposited debris upon the landscape in a number of post glacial features. Along the escarpment debris was deposited as a talus slope against

the face and as a glacial till between the escarpment and Post-Glacial Lake Iroquois (Figure 10: Cave Springs Local Stratigraph). At Cave Springs the flat area of till at the base of the exposed escarpment is called the Lake Iroquois Bench.

Localized mounds of debris marked the places where the ice had become stationary for a period of time. One of the largest of these is the Vinemount Moraine, which runs east west a few kilometres south of the brink of the escarpment (Figure 8: Regional surface geology, generalized soil types and physiography).

The surface cover of post glacial till deepens southward away from the crest of the escarpment (Geological Overview and Cave Springs Local Stratigraphy). There is some evidence of ice wedging of dolostone blocks along the crest.”
(Murphy, 2015)

Clay and silts more readily promote run-off, and/or groundwater discharge while underlying saturated materials protect the underlying bedrock aquifer from surface impacts. An absence of these materials overlying the bedrock aquifer can allow for faster infiltration of runoff and snowmelt (Figure 10: Geological Overview and Cave Springs Local Stratigraphy).

Above the escarpment most of the Site is mapped as bedrock at surface, having less than 1 metre of sediment cover (Figure 10: Geological Overview and Cave Springs Local Stratigraphy). This allows for direct recharge to the bedrock aquifer.

The talus slope in front (north) of the Niagara Escarpment is believed to consist of fine grained clayey texture soils.

Below the escarpment the sediments are silty to clayey till of fairly low permeability and have a thickness of over 20 metres (Figure 10: Geological Overview and Cave Springs Local Stratigraphy).

II. BEDROCK

“On the top of the Escarpment the exposed surface of the dolomite cap that is some nine metres in thickness is weathered and eroded. Fractures and bedding planes in the rock have been widened by dissolution of the dolomite by infiltrating rainwater and circulating ground water...”
(Reed, 1998)

“The Niagara Escarpment “...owes its steep, north facing face in the Niagara Peninsula to a resistant caprock consisting of the Decew and Lockport Dolostones which overly softer Rochester Shales...The uppermost Lockport (Group) and Decew formation form a vertical face which terminates in a scree slope that covers the remaining members of this feature. The beds of the Lockport Dolostone are massive while the “Decew” Formation shows thinner beds.”
(Murphy, 2015)

Work by Haynes (1994) has only identified the Gasport Formation (part of the Lockport Group) at Cave Springs. The Gasport appears

to thicken from five to 14 metres from Spring F to the Reed Spring (D).

In the western section of the property, immense dolostone blocks form the base of the talus slope. Some are over ten metres in length and weigh tens of tonnes. Many of these blocks must have been buried beneath glacial ice, having eroded from the escarpment face. The tumbled nature of the blocks form numerous shallow caves, such as the former Ice Cave. (B. Murphy, 2015)

III. KARST AND GRIKES

“I also learned from Mr. Haynes about the deep fissure caves on the flat land at the top, at the base of which, springs issue along the contact of the Decew Dolostone...This is why there is water emanating from the Escarpment. It is also the reason for a possible rock slide. These fissure caves which occur about twenty feet back from the brow of the Escarpment are visible and available. They are a couple of feet wide and could be as much as thirty feet deep...It can be imagined how the rain and snow enters these crevices and alternately freezes and thaws creating expansion and contraction of the rock. This is what causes rocks to be pushed out and down the side of the Escarpment. In the last few years I have seen new piles of rock that have fallen right on the path.”
(Reed, 1998)

“An intersecting vertical system of cracks called joints in the Lockport Dolostone facilitates the breaking off of ... large blocks. Chemical (and physical) weathering along the edges of the joints has resulted in wide cracks up to a metre in width developing on the upper surface of the dolostone. This is known as Karst Topography. Surface water infiltrates these cracks and emerges as springs near the (contact) of the Decew Formation.”
(Murphy, 2015)

Fractures between joints are important as the primary pathway for water movement both into, and through the Lockport Dolostone of the Niagara Escarpment at the Site. This has also been noted locally “Cave Springs Farm – Extensive crevassing

KARST

IS A SPECIAL TYPE OF
LANDSCAPE THAT IS FORMED
BY THE DISSOLUTION OF
SOLUBLE ROCKS, INCLUDING
LIMESTONE AND DOLOMITE.

of the Lockport caprock along joints in the rock is a good example of post-glacial and possibly periglacial crevasse development upon the Niagara Escarpment. (Cowell, D.W., and Woerns, N., 1976 Earth Science Candidate Nature Reserves in the Niagara Escarpment Planning Area; Ontario Ministry of Natural Resources, Division of Parks, System Planning Section, Park Planning Branch, Environmental Planning Series VII, 2), (Ministry of Natural Resources, Central Region, Parks and Recreation Section, 1983. Regional and Local Earth science Areas of Natural and Scientific Interest In Niagara District). The joints that are chemically weathered are as such because of the calcium magnesium carbonate of the bedrock, which dissolves in infiltrating water.

Karst is the term applied to topography formed over limestone, dolostone or gypsum and characterized by sinkholes, caverns and lack of surface streams (Fetter, 1994). The Niagara Escarpment Commission has long understood the presence of Karst Topography along the Niagara Escarpment. *“Karst Topography, the abundance of dolostone and limestone in Niagara Escarpment rocks, makes chemical weathering an important process in shaping the area landscape. The calcium and magnesium carbonates composing these rocks readily dissolve in the weak acid conditions common to most natural water to create sinkholes, caves, springs and other features of karst topography...”* (1977 plaque at another Niagara Escarpment site, Brunton and Dodge, 2008). *This karst terrain is present at the Site: “Solution weathering has created a Karst topography on the upper surface along the escarpment crest. Widening up to half a metre of some of the joints extends several metres horizontally and downward into the Lockport...”* (Murphy, 2015)

“More groundwater flows through the large fractures which have a higher hydraulic conductivity...than that of the unfractured rock”
(Fetter, 1994)

Water entering the karst topography directly recharges the springs through the dolostone aquifer. A series of these joint fractures, parallel to the brow of the escarpment, are mapped in Figure 10: Geological Overview and Cave Springs Local Stratigraphy (through aerial interpretation). Some of these features are individually mapped on Figure 9: Topography and Surface Water Drainage.

IV. SAFETY CONSIDERATIONS AND SLOPE STABILITY

“...[P]rofessor S.J. Haynes from Brock University came to Cave Springs in May 1994...and...warned...that there will be a considerable rockfall at Cave Springs in the undetermined future. He recommended that no one should walk along this trail under the brow of the Escarpment.”
(Reed, 1998)

“The erosion of the Decew Formation results in smaller pieces of debris and an undercutting beneath the Lockport Dolostone. Erosion is still active. Over time the talus slope has developed a stable angle of repose of about 45 degrees... There is evidence of continued weathering and erosion (e.g. ice wedging) of the face in the form of exfoliation and recent minor rock falls. In some spots it is obvious that continued rock falls are imminent... The vegetation cover on the talus slope indicates that it has been stable for an extended period of time. Some trees are obviously over a hundred years in age. There is no indication of downslope creep affecting the shape of their trunks. Nor is there indication of recent local soil slips... There is some evidence of ice wedging of dolostone blocks along the crest.”
(Murphy, 2015)

A large amount of climbing equipment is installed into the face of the escarpment at the Site. It is not currently known how the climbers evaluate risk of their sport with the stability of the escarpment. An assessment of the safety of the escarpment is recommended. This should include details of an escarpment safety monitoring program to protect users of the Bruce Trail and climbers.

2.2.8.5 HYDROGEOLOGY

Hydrogeology is the study of the relationships between geologic materials and water processes such as groundwater flow and groundwater chemistry (Fetter, 1994).

I. AQUIFERS AND CONFINING LAYERS

A first step in understanding the relationship between geologic materials and water processes at Cave Springs is to classify the main geologic materials into aquifers, and low permeability material as confining layers (Figure 11: Idealized groundwater flow systems for Niagara Escarpment).

An aquifer is a geologic unit that can store & transmit water at rates fast enough for supply. A confining layer is a geologic unit having little or no ability to transmit water. (Fetter, 1994)

Above the escarpment at the Site, the sediments are relatively thin and the groundwater table is inferred to be predominantly within the Lockport Group - Gasport Formation dolostone bedrock. Where the overburden sediments are thin, the groundwater system in the dolostone is unconfined and more easily directly recharged.

At the escarpment, springs are observed at the contact between the Gasport Formation and the underlying, lower permeability Decew Formation.

Below the escarpment, the talus slope transmits water from the Niagara Escarpment springs through small channels, though the flow is often obscured by dolostone blocks and vegetation (e.g. Etherington Discharge, Figure 9: Topography and Surface Water Drainage). Infiltrating waters and snowmelt are also conveyed to discharge points farther downslope, as observed at the Camp Water Supply (Figure 9: Topography and Surface Water Drainage).

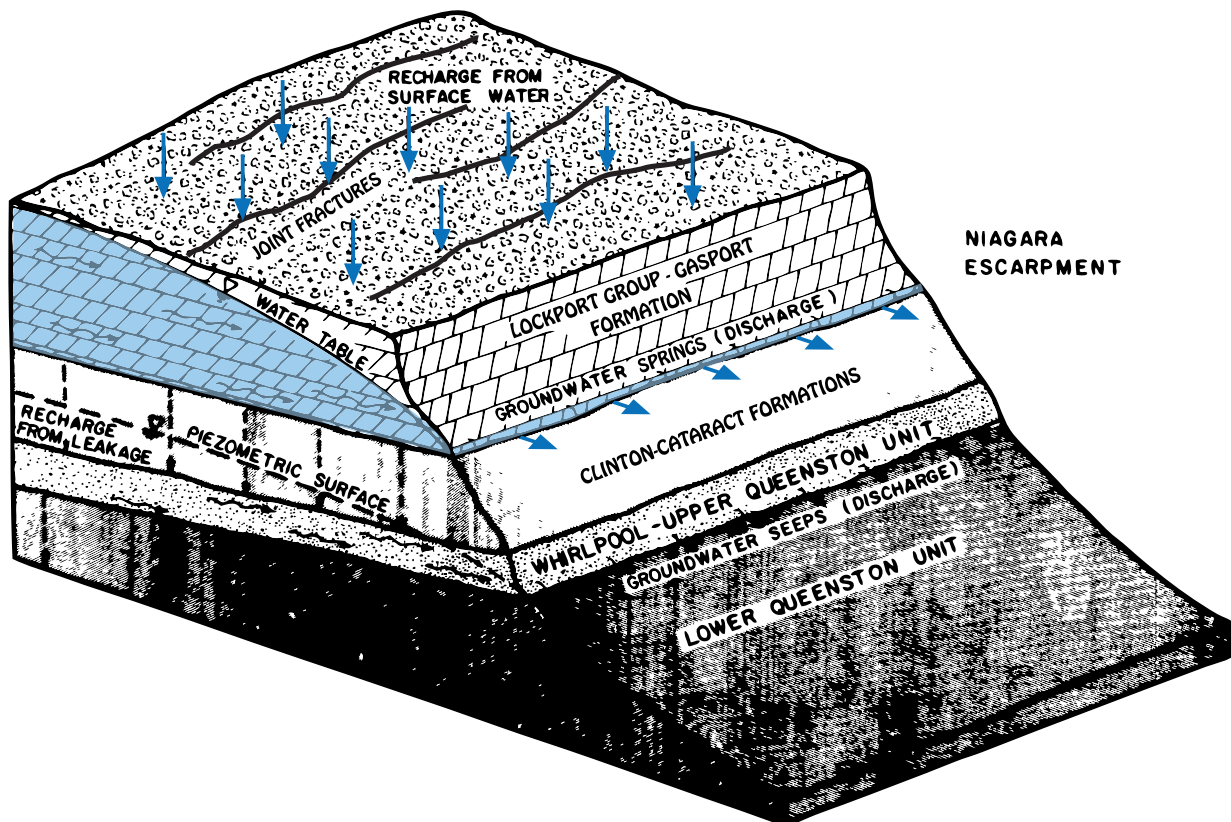


Figure 11: Idealized Groundwater Flow Systems for Niagara Escarpment (modified after Gale, J.E., Nadon, R.L., Mackay, D.A. and Swezey, R.A., 1983)

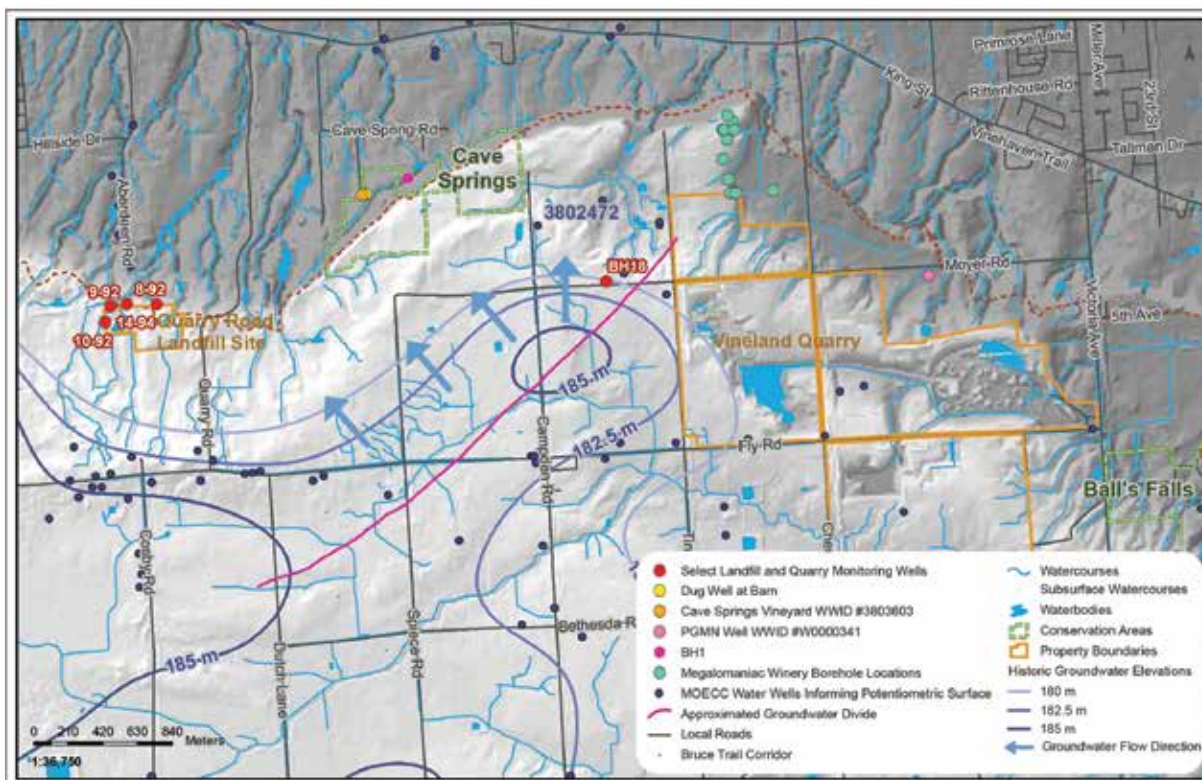


Figure 12: Lockport Formation Regional Groundwater Flow

RECHARGE AREAS AND DISCHARGE AREAS

“An aquifer transmits water from recharge areas to discharge zones. Recharge areas are usually in topographically high places. Under natural conditions, a volume of water recharges the aquifer and an equal volume is discharged.

Where permeable rock units overlie rocks of much lower permeability, a contact spring may result. A lithologic contact is often marked by a line of springs. It is not necessary for the underlying layer to be impermeable, merely that the difference in hydraulic conductivity be great enough to preclude transmission of the water that is moving through the upper horizon. (Fetter, 1994)

The above definition of contact spring appears to fit this Site. These contact springs occur at the face of the escarpment where the Gasport Formation

overlies the Decew Formation (Figure 10: Geological Overview and Cave Springs Local Stratigraphy). “Each spring is associated with a joint on the overlying dolostone. At these points there is localized erosion of the Decew Formation to produce shallow hollows and caves. The natural process is for the talus slope to re-absorb the springs and discharge the water again at a lower point.” (B. Murphy, 2015)

Contact springs at the Site include Springs D-H/D-T (Reed), E (Lamont), F, and Etherington (Figure 9: Topography and Surface Water Drainage). It is believed that there are also springs above the Shoemaker and Malivoire ponds but they have not been located. Similar contact springs adjacent to the Site include A, B, C, and Chapel (Figure 9: Topography and Surface Water Drainage).

Recharge of the Cave Springs bedrock aquifer is primarily from direct infiltration along the escarpment, e.g. “Onsite Spring Recharge” (Figure 9: Topography and Surface Water Drainage). Limited aquifer recharge is also expected to occur through overlying silt and clay south of the Site and flow to the Site.



GROUNDWATER FLOW

Groundwater flow is northeast in the dolostone aquifer from a groundwater divide 1.3 kilometre to the southwest of the Site (Figure 12: Lockport Formation Regional Groundwater Flow). A review of nearby groundwater monitoring wells showed an annual average groundwater level recharge of 1 to 2 metres.

The clayey silt to silty clay soils of the talus slope are low permeability and function as an aquitard. The tops of these soils have considerable rock and vegetative cover that at times hide escarpment spring discharge as it flows downslope (e.g. Etherington Spring).

The uppermost silty clay immediately north of the talus slope is a low permeability confining unit. In 2015, water levels were 0.8 to 1 metre below ground surface. This shallow groundwater elevation matches the conceptual model of this being a groundwater discharge area.

2.2.8.6 WATER SUPPLIES

I. BARN DUG WELL

“ On the north west side of the barn is a hand dug well fifteen feet deep. The barn (originally a stone cottage) was located near the banks of the stream giving residents immediate access to water perhaps before the well was dug. Possible high water or flooding caused the soil to erode. The stone wall sagged and cracked open from floor to ceiling. The stream in those days certainly would have run more freely than it does now.”

(Reed, 1998)

In the past, this well was equipped with a hand pump and could go dry in the summer. The well is currently not being used, and is sealed from public access.



II. LAMONT RESERVOIR (SPRING E)

“Mr. Lamont... engaged a dowser who pointed to a spot on the hillside where an excellent source of water would be found...They moved along a hundred feet more and the same thing happened (Springs D - Reed)... A small reservoir was excavated and the water led by a pipe to the Estate House. He built a new road up the Mountain and used it to bring down timber and firewood.”

(Reed, 1998)

It is believed that the Lamont Spring is Spring E, and that the pond at the spring is the hand-dug reservoir built by Robert Lamont in the 1930s for winemaking.

III. REED SPRING (D SPRING)

There are pipes at the Reed Spring (D) which formally directed escarpment spring discharge to the Reed home. There were two sets of pipes as one was for winter flow and the other for summer. As the flow in the winter pipe would lessen, the supply would be changed to the summer flow spring. The water has not recently been used, as it is not now considered potable. The pipes are currently disconnected from the escarpment face, but a cemented-in tap remains.

IV. CAVE SPRINGS CAMP WATER SUPPLY (MAGNESIUM SPRING)

“Everybody knew about the Magnesium Spring at Cave Springs. It seems that Dr. W Harry Upshall gave the spring this name during the first few days of Cave Springs Camp. There is a similar spring on the Etherington Farm to the east. Everybody, the Indians and all who followed them, recognized the health-giving properties of the water...the Magnesium Spring continues to flow freely until about July of each year. There is not as much water during the heat of the summer and early fall, but the Spring has never been known to dry up completely.

Why is it called the Magnesium Spring?... The water flowing from the Magnesium spring and the Etherington springs which are adjacent to each other was known to aborigines and white settlers

alike as possessing special qualities. It was said to be particularly efficacious for certain stomach disorders.

“...the Camp installed their own water line into the Camp and in so doing... (changed) the visual appearance of the ‘magic’ spring which used to push upwards from a hole ...in the ground. The water was several hundred feet from where they needed to use it and...It was decided that they would cap the flow and divert it through a pipe into a concrete holding tank. From there, a pipe was laid along the north side of the Camp property line and into the Camp property...”
(Reed, 1998)

The Camp Water Supply provides water for both potable use and other needs such as the pool. The collection system, which feeds the holding tank, goes some distance up the talus slope. Staff members of Cave Springs Camp indicated that the flow increases following rain events. It is believed that escarpment spring discharge (e.g. Springs D, E and F) flows through the rocky talus slope and is directed through the base of the valley towards the Camp Water Supply.

V. ETHERINGTON AND SHOEMAKER PONDS

The Etherington and Shoemaker spring ponds are located immediately to the north of the Site and east of the Cave Springs Camp. These ponds contain pipes which direct flow for residential use to the north.





2.2.8.7 HISTORICAL FEATURES

I. THE LOST (TREASURE) CAVE

“ There are no...true caves at Cave Springs... the tale of the ‘Lost (Treasure) Cave’ that is said to have yielded valuable evidence of a civilization long since vanished. A story that for years has been widely credited as the product of a fertile imagination. Almost pinpointed on the slope of the Escarpment, its location and secrets had defied the fine-combing of a generation of eager Campers and a half century of scrambling over the Escarpment by boys and girls and adult hikers from the Beamsville area...The Lost Cave may never be found.”
(Reed, 1998)

II. THE UNDERGROUND LAKE

“ The existence of an ‘underground lake’ is firmly entrenched in local folklore, especially in the area of the Escarpment above and to the west of Cave Springs Farm. There used to be a passageway to the water through a hole in the ground, as many will testify. The entrance was loose rock in a field above the former Clinton Township quarry on Quarry Road. Existence of the hole leading to the lake was well known a couple of generations ago and numerous exploration expeditions were undertaken there by youths keen for adventure.

The level of the ‘lake’ is, in fact the water table at that point...The weathered state of the rock cap of the Escarpment provides innumerable cracks and fissures for water to seep into the ground. It is reasonable to deduce that the dissolving action of penetrating surface water has eroded, on a



small scale, local enlargements or cavities, either above or below the water table. It is unlikely however, geologists feel, that such cavities will be very extensive or continuous. More probably, they are shallow, isolated local openings along fractures or bedding planes. If such a cavity were present at the level of the water table this might give the appearance or illusion of a 'lake' especially since the extent of the water surface cannot be calculated by observation. Rather than use the word 'lake', though, 'underground reservoir' is more precise.

Underground cavities, caves and caverns are frequently found in limestones and dolomites around the world, and perhaps also at Cave Springs though on a scale much smaller than in some other locations. Scientific deduction and conjecture here

seem to corroborate, not contradict, local experience. There is no scientific conflict with the evidence of those who encountered water down the slope of the passageway beginning in the field off Quarry Road. It is said that the location of the entrance to the 'underground lake' is now covered by a farmer's barn...

Generations of boys and girls and their parents have believed in the lake. As yet, except for the many inconsequential disagreements over what term should be used to describe this treasure house of ...water, no one has yet, or is ever likely, to prove that there is not, indeed, an 'Underground Lake' at Cave Springs." (Reed, 1998)



III. THE ICE CAVE

“ The most fascinating feature at Cave Springs is the Ice Cave. For an untold number of years the Ice Cave has drawn visitors to Cave Springs to see the phenomenon of ice forming in the spring and lasting all summer. During the winter, there is no ice in the cave. The cave is reached by walking along a path at the foot of the Escarpment through the trees. This path is about three feet wide and it drops off on the south side into a gully and on the north side it slopes down to the flat land below. The path is therefore on the top of a long mound of earth. I have been told that it is the result of the melting glaciers ...pushing the earth up into what looks like a sandbar on the shoreline.

(The Ice Cave)...is a natural refrigerator set in the base of the Escarpment about three hundred feet to the west of the path up the hill. Its cool depths that hold ice through

the warmest days of summer provided a natural storehouse for owners of the farm from pioneer times...Mr. Lamont recognized the value of the Ice Cave as a storehouse for fruits and vegetables and he used it extensively...The end of the Ice Cave in its original state came during the years that Robert Lamont owned Cave Springs Farm from 1924 – 1948...he sought to enlarge the cave by using dynamite but in setting off a substantial charge he succeeded only in ruining that which he had sought to improve. Large pieces of rock descended from the ceiling and walls. It blocked the mouth and wrote ‘finis’ to the access to the rear portion of the cave. What looks like a wall about two feet inside the cave was once the ceiling. To the east of the Ice Cave a jumble of large rocks that were displaced by the explosion are lying in the ravine. Above the now demolished Ice Cave on a ledge there is a cedar post with nails still attached, a relic of Mr. Lamont’s fence.



...The Ice Cave was never the same again, though it is still possible to enter for about two feet. In the depths there is ice to this day.....I have discovered that whatever the temperature is outside, inside it is the opposite. Therefore, during the winter months no matter how cold it was, there was no visible ice in the cave. But during the heat of the summer there was always ice....This phenomenon still occurs, but the ice does not last as long as it used to... Standing a few feet away from the mouth of the cave on a hot day, the steam rising from the cave because of the clash of heat and cold, is quite a sight. People who can see Cave Springs from a distance have reported a cloud of steam that emanates from the cave during various temperature changes... At this time, the only time to see some ice in the cave is during the middle of April and the first two weeks in May...Hopefully, if we can see some heavier snowfall and a warm spring as we used to experience, the Ice Cave will live up to its reputation again.

What is needed is a thick layer of snow lying on the rocks all winter. In order to have ice forming in the summer there has to be enough water in the rocks that freezes in the winter. Thus, when the sun shines on the rocks in the spring, the ice is melted and water drips down onto the floor of the cave where it freezes. The hotter the sun got the thicker the ice developed (in the old days)" (Reed, 1998)

A photograph of a forest scene. In the foreground, there is a path covered with fallen yellow and orange leaves. To the left, a large tree trunk stands vertically. In the background, a rocky outcrop or cliff face is visible, partially covered by green foliage. The overall scene is a dense forest with autumn foliage.

3.0

*identifying
features and
planning
considerations*



3.0 IDENTIFYING FEATURES AND PLANNING CONSIDERATIONS

The Cave Springs Conservation Area Management Plan will be consistent with the requirements of the Niagara Escarpment Plan (NEP) and the Niagara Peninsula Conservation Authority's (NPCA) Strategic Plan. The NEP states that Management Agencies will prepare plans for each park or open space in the Niagara Escarpment Parks and Open Space System. Each Plan is to establish guidelines for long-term protection, development and management of the park or open space area (NEP 2005, section 3.1.6). The NPCA Strategic Plan reinforces these mandates in its pursuit of balancing lifecycle responsibilities against capital budget processes.

The Planning process will be structured to satisfy the legislative requirements of the Niagara Escarpment Plan (2005) and the Conservation Authorities Act, and will include extensive consultation with the public, stakeholders and related agencies.

The Ontario Ministry of Natural Resources and Forestry (MNRF), in accordance with the Niagara Escarpment Plan (2005), will review this Plan. Upon approval of this document by the Steering Committee and the NPCA board, submission will be made to the Niagara Escarpment Commission for review and endorsement. The Management Plan will then be submitted to the Ministry of Natural Resources and Forestry, who makes circulation and final approval. The Cave Springs Conservation Area Management Plan will be the prevailing policy document for the next five to ten years for implementation purposes with monitoring and recommended uses continuing for the next 30 years from the date of MNRF approval.

3.1 PLANNING CONSIDERATIONS

3.1.1 TOWN OF LINCOLN OFFICIAL PLAN (2010)

The Cave Springs Conservation Area property is identified by the Town of Lincoln as a part of Niagara Escarpment Parks and Open Space System within the Town's Official Plan. Section 2.11.3(g) of the Official Plan states that it is the Town's policy to support the development of the Niagara Escarpment Park System in this area.

3.1.2 NIAGARA REGION OFFICIAL PLAN

The Policy Framework of the Niagara Region's Official Plan is committed to maintaining a Healthy Landscape throughout Niagara, while giving particular attention to natural features of special significance within the broader landscape. In addition, the Niagara Region recognizes that public and private stewardship is a key component of the protection of natural heritage features that will help achieve long-term ecosystem health and a Healthy Landscape.

OVERALL OBJECTIVES FOR A HEALTHY LANDSCAPE ARE:

To maintain a healthy natural environment for present and future generations.

To conserve Niagara's distinctive natural character.

To apply an ecosystem-based approach to planning and decision-making.

To foster and promote cooperation among public agencies, private landowners, and community groups.

To support and encourage environmental stewardship and restoration.

The Cave Springs property falls within the Core Natural Heritage System identified within the Regional Official Plan. The Core Natural Heritage System contains the most significant natural areas in Niagara, and the linkages among them. The core natural areas within the system are significant in the context of the surrounding landscape because of their size, location, outstanding quality, or ecological functions. They contribute to the health of the broader landscape, protecting water resources, providing wildlife habitat, reducing air pollution, and combating climate change. Some contain features of provincial or even national significance, such as threatened or endangered species.

THE OVERALL OBJECTIVES FOR THE CORE NATURAL HERITAGE SYSTEM ARE AS FOLLOWS:

To maintain, restore and, where possible, enhance the long-term ecological health, integrity and biodiversity of the Core Natural Heritage System and its contributions to a Healthy Landscape.

To recognize the linkages among natural heritage features and ground and surface water resources.

Cave Springs is designated in part as an Environmental Protected Area (EPA) due to the Provincially Significant Life Science Area of Natural and Scientific Interest (ANSI) identified on the property. The ANSI is associated with this section of the Niagara Escarpment.

3.1.3 PROVINCIAL LEGISLATION AND CONSERVATION AUTHORITIES ACT

The *Conservation Authorities Act* (CAA) was established in 1946 by the provincial legislature to govern the activities undertaken by a conservation authority within its regulated area. The *Conservation Authorities Act* provides the means to implement programs to manage natural resources, and to own and manage lands for parks and recreation purposes.

3.1.4 NIAGARA PENINSULA CONSERVATION AUTHORITY: REGULATION OF DEVELOPMENT, INTERFERENCE WITH WETLANDS & ALTERATION TO SHORELINES & WATERCOURSES – ONTARIO REGULATION 155/06

The Regulation is a generic regulation made under Section 28 of the *Conservation Authorities Act*, which prevents or restricts development in areas where the control of flooding, erosion, dynamic beaches, pollution, or the conservation of land may be affected by development. Any proposed development within the Cave Springs property must comply with this Regulation.

3.1.5 PROVINCIAL POLICY STATEMENT (2014)

The Provincial Policy Statement (PPS) is issued under Section 3 of the Planning Act. It provides policy direction on matters of provincial interest related to land use planning and development. It also emphasizes the importance of parks, trails, recreation and open spaces for strong, healthy communities, and recognizes that negative impacts on protected areas should be minimized.

Section 1.5 of the PPS speaks to public spaces, recreation, parks, trails and open spaces. Of particular relevance to NEPOSS are subsections 1.5.1(b) and (d), which indicate the following:

Healthy, active communities should be promoted by:

- b) Planning and providing for a full range and equitable distribution of publicly-accessible built and natural settings for recreation, including facilities, parklands, public spaces, open space areas, trails and linkages, and, where practical, water-based resources
- d) Recognizing provincial parks, conservation reserves, and other protected areas, and minimizing negative impacts on these areas.

All other legislations and plans shall be consistent with the PPS. The NEP takes precedence over the PPS in the event of a conflict.



3.1.6 GREENBELT PLAN (2005)

The Cave Springs property falls within the Niagara Escarpment Plan (NEP) area of the Greenbelt.

The Greenbelt Plan (2005) provides policies that direct land use activities outside of environmentally sensitive areas as well as good agricultural lands in order to provide protection to the Province's agricultural land base, as well as the ecological features and functions within the Greenbelt Plan area. The Greenbelt Plan covers a large area of land that includes the Niagara Escarpment, and the Oak Ridges Moraine. The policies of the Niagara Escarpment Plan (NEP) are the policies of the Greenbelt Plan for the Niagara Escarpment Plan Area with one exception: the Greenbelt's policies for Parkland, Open Space and Trails also apply to these lands.

Within the NEP area of the Greenbelt, the policies of the NEP supersede the policies of the Greenbelt with the exception of the Greenbelt's policies for Parkland, Open Space and Trails.

Section 3.3.2 of the Greenbelt's Parkland, Open Space and Trail Policies state:

The Province should, in partnership with municipalities, conservation authorities, non-government organizations, and other interested parties:

1. Encourage the development of a system of publicly accessible parkland, open space and trails where people can pursue the types of recreational activities envisaged by this plan, and to support the connectivity of the Natural Heritage System.
2. Encourage the development of a trail plan and a coordinated approach to trail planning and development in the Greenbelt to enhance key existing trail networks and to strategically direct more intensive activities away from sensitive landscapes.
3. Promote good stewardship practices for public and private lands within the Greenbelt, including clear demarcation of where public access is permitted.

3.1.7 NIAGARA ESCARPMENT PLAN

The *Niagara Escarpment Planning and Development Act* established a planning process to ensure that areas within its jurisdiction would be protected. From this emerged the Niagara Escarpment Plan (NEP), which serves as a framework of objectives and policies in order to strike a balance between development, preservation, and enjoyment of this important resource. The NEP is the principal provincial planning document to which the Cave Springs Conservation Area Management Plan must conform.

The Cave Springs property is designated as an Escarpment Natural Area and an Escarpment Protection Area within the NEP. For each of its land use designations, the Niagara Escarpment Plan outlines the objectives, permitted uses, and policies.

ESCARPMENT NATURAL AREAS

Included within this designation are Escarpment features, which are in a relatively natural and undisturbed state.

The three main objectives of these areas are:

1. To maintain the most natural Escarpment features, stream valleys, wetlands and related significant natural areas and associated cultural heritage features.
2. To encourage compatible recreation, conservation and educational activities.
3. To maintain and enhance the landscape quality of Escarpment features.

(NEP Policy 1.3)

Within this designation, non-intrusive recreation uses are permitted, such as nature viewing and trail activities (except motorized vehicle trails or the use of motorized trail vehicles), archaeological activities, un-serviced camping sites and other trail-related construction (i.e. bridges, boardwalks) necessary for the use of the Bruce Trail. Further, other uses permitted in Park or Open Space Master/Management Plans that are not in conflict with the NEP are also permitted.

ESCARPMENT PROTECTION AREAS

Included within this designation are Escarpment features that have been significantly modified by land use activities such as agriculture or residential development, lands needed to buffer Escarpment Natural Areas, and natural areas of Regional Significance.

The main objectives of these areas are:

1. To maintain and enhance the open landscape character of Escarpment features.
2. To provide a buffer to prominent Escarpment features.
3. To maintain natural areas of regional significance and cultural heritage features.
4. To encourage agriculture, forestry and recreation.

(NEP Policy 1.4)

Within this designation, recreational uses oriented towards lands which require minimal modification of the existing natural, topographic and landscape features and which do not require the building of major structures (i.e. picnic sites, day use sites, unserviced camp sites, trails) as well as archaeological activities are permitted. Also permitted, are any Bruce Trail related constructions that are necessary for the use of the Bruce Trail. Other uses are permitted in Park or Open Space Management provided they are not in conflict with the NEP.

HERITAGE

In addition to the importance of the natural and agricultural features of this Site there are many significant heritage features such as the petroglyphs, archaeological potential, and the folklore surrounding the Site. Section 2.12 of the NEP sets out policies for heritage with the “objective to inventory, interpret, evaluate, maintain and conserve the cultural heritage features of the Niagara Escarpment Plan Area”. Policies relevant to the Site include the following:

1. Care should be taken to discover unknown, and to preserve known, archaeological sites (especially native burial sites) and areas where such sites might reasonably be expected to exist.
2. Existing heritage features, areas and properties should be retained and re-used. To determine whether such actions are

feasible, consideration shall be given to both economic and social benefits, and costs.

3. New development, including reconstruction, alterations, and consideration of a second dwelling under Part 2.2.7.b) should be in harmony with the area’s character and the existing heritage features and building(s) in general mass, height and setback, and in the treatment of architectural details, especially on building facades.
4. Where new development involves a heritage feature it should express the feature in some way. This may include one or more of the following:
 - Preservation and display of fragments of the former building features and landscaping
 - Marking the traces of former locations, shapes and circulation lines
 - Displaying graphic verbal descriptions of the former use
 - Reflection of the former architecture and use in the new development
5. Where development will destroy or significantly alter cultural landscapes or heritage features, actions should be taken to salvage information on the features being lost. Such actions could include archaeological salvage and excavation, and the recording of buildings or structures through measured drawings or photogrammetry, or their physical removal to a different location.

An inventory, as well as analysis and assessment of the inventory of cultural heritage features of the property, is an integral part of the Management Plan. The NEPOSS Planning Manual lists the following as examples of cultural heritage features:

- Archaeological resources which may include: Indigenous settlers and Indigenous people’s farming societies
- Places with ceremonial or cultural significance
- Indigenous people’s burial hunting and gathering areas
- Cultural landscapes
- Built Heritage Resources
- Industrial and domestic heritage structures

The NEP also provides the framework for the establishment and coordination of a system of publicly owned lands along the Escarpment known as the Niagara Escarpment Parks and Open Space System (NEPOSS).

The policies and objectives of the Niagara Escarpment and the following objectives and policies of NEPOSS apply to these areas.

NEPOSS Objectives are:

- To protect unique ecological and historical areas
- To provide adequate opportunities for outdoor education and recreation
- To provide for adequate public access to the Niagara Escarpment
- To complete a public system of major parks and open space through additional land acquisition and park and open space planning
- To secure a route for the Bruce Trail
- To maintain and enhance the natural environment of the Niagara Escarpment
- To support tourism by providing opportunities on public land for discovery and enjoyment by Ontario's residents and visitors
- To provide a common understanding and appreciation of the Niagara Escarpment.

The Niagara Escarpment Parks and Open Space System Planning Manual (MNR, 2012) recommends the development of *"policy guidelines for long term protection, development and management of the park or open space area"* (Section 3.1.6, Niagara Escarpment Plan, Province of Ontario, 2005). These guidelines should:

- *"...[S]eek to protect the quality and quantity of the resource...Also... ensuring that hydrologic functions, not only features, are protected"* (NEC, 2013)
- *"...[M]aintain and enhance the quality and character of natural streams and water supplies "* (NEC, 2013)
- *"...[M]aintain the most natural Escarpment features, stream valleys, wetlands, and related significant natural areas."* (NEC, 2013); and
- *"...[P]rotect, improve or restore the quality and quantity of water"* (Ministry of Municipal Affairs and Housing, 2014)

NATURE RESERVE

The Cave Springs Site is currently classified as a Nature Reserve under the NEPOSS guidelines. Nature Reserves are considered to be areas which represent the most significant, distinctive natural areas and landforms found along the Niagara Escarpment. These areas serve to protect selected Areas of Natural and Scientific Interest ANSI. Management practices and uses in a nature reserve will ensure that the features and values for which the reserve was established remain protected.

Access to these areas will not be widely promoted and activities will be limited to those which can further scientific understanding and education (e.g. scientific research, natural history interpretation, and nature trails or the Bruce Trail). The minimum of facilities necessary to support these activities will be provided.

NATURAL ENVIRONMENT

These lands are characterized by the variety and combination of outstanding natural features, historical resources and outstanding landscape. Natural Environment areas provide opportunities for the protection of important natural and cultural features. Activities may range from backcountry hiking in the interior of these areas to car-camping and day use activities in the more developed or accessible areas.

3.1.8 ENVIRONMENTAL ASSESSMENT ACT

Pursuant to the Environmental Assessment Act, applicable projects are subject to assessment so as to determine related impacts on above ground cultural heritage resources (MTO 2006). When considering cultural heritage resources in the context of improvements to specified areas, a 40-year-old threshold is used as a guiding principle when identifying cultural heritage resources.

While identification of a resource that is 40 years or older does not confer outright heritage significance, this threshold provides a means to collect information about resources that may retain heritage value. Similarly, if a resource is slightly younger than 40 years old this does not preclude the resource from retaining heritage value.

3.1.9 ENDANGERED SPECIES ACT

The *Endangered Species Act* identifies species that are at risk in Ontario, provides for tools and mechanisms to protect those species and their habitats, and promotes stewardship activities to assist in their recovery. Species at risk and their habitats have been identified within the Cave Springs property.

3.1.10 SPECIES AT RISK ACT

The purposes of the *Species At Risk Act* (SARA) is to prevent wildlife species in Canada from disappearing, to provide for the recovery of wildlife species that are extirpated (i.e. no longer exist in the wild in Canada), endangered, or threatened as a result of human activity, and to manage species of special concern to prevent them from becoming endangered or threatened. A series of measures applicable across Canada provides the means to accomplish these goals.



Little Brown Bat - Photo: EC Government of Canada / Gouvernement du Canada

3.1.11 NIAGARA ESCARPMENT DEVELOPMENT PERMITS

If an agency is proposing a development within the Niagara Escarpment Development Control Area, a Development Permit will be required unless specifically exempted under Ontario Regulation 828/90. With few exceptions, the Niagara Escarpment Development Control area is the area covered by the Niagara Escarpment Plan. Furthermore, proposals for development within approved/endorsed Management Plans may be exempted from development control.

3.2 FEATURE IDENTIFICATION AND PLANNING CONSIDERATIONS

3.2.1 SITE-SPECIFIC NATURAL HERITAGE PLANNING CONSIDERATIONS

Natural Heritage features include habitat of endangered, threatened, special concern and rare species, hydrological systems, including streams and wetlands, wildlife habitat, fish habitat, Significant Woodlands, Areas of Natural and Scientific Interest, and Niagara Escarpment features.

3.2.1.1 NIAGARA ESCARPMENT PLAN

The Cave Springs property is split into two designations under the Niagara Escarpment Plan (NEP). *The Escarpment Protection Area* along the base, or floor, of the escarpment slope, which includes the existing development on the property, and the *Escarpment Natural Area*, which encompasses the escarpment slope and all lands along the top of the Escarpment. As the Cave Springs property falls within the jurisdiction of the Niagara Escarpment Commission (NEC), all proposed development and site alterations will be subject to the policies of the NEP and may require Development Permits from that agency.

Any development or site alterations proposed on the Cave Springs property should be vetted through the NEC first to determine whether a Development Permit is required. It should be noted that while proposed development or site alterations in an approved Management Plan does not automatically mean that a Development Permit will be issued, the NEC may choose to streamline or eliminate the permit process if the approved Management Plan contains a detailed development strategy or concept plan for the proposed development. Each proposal for development will be assessed individually to ensure consistency with the

NEP, NEPOSS and the Management Plan. If a Development Permit is required by the NEC, it must be obtained before any other agency approvals. The NPCA acts as a commenting agency to the NEC throughout this process.

From a Planning and Development context, the NPCA's main review interest and responsibility in this instance pertain to the natural hazard and natural heritage features found on Site as they relate to the future development and use of the Cave Springs property. NPCA's comments below reflect the Conservation Authority's Land Use Policy Document (implementing Ontario Regulation 155/06) and their Memorandum of Understanding (MOU) with the Region of Niagara for Natural Heritage review under Section 7 **Environmental Policies** of the Regional Official Plan.

3.2.1.2 NPCA ONTARIO REGULATION 155/06

An intermittent stream, which eventually outlets into Lake Ontario traverses the Site. This watercourse is referred to as Lake Ontario Tributary 20, known locally as Margaret's Creek. Due to the small upstream drainage area of this watercourse, the NPCA does not have a flooding concern for this feature.

The Ministry of Natural Resources and Forestry (MNRF) have identified this intermittent stream, Margaret's Creek, as a Type 3 Marginal Fish Habitat. Typically, a 15 metre naturally vegetated buffer, measured from the banks of the watercourse, is required for all new development and site alterations adjacent to a Type 3 Fish Habitat. A reduction in this buffer may be considered by the NPCA and may require the completion of an Environmental Impact Study (EIS) prepared by a qualified consultant which confirms (to the satisfaction of the NPCA) that a reduction in the 15 metre buffer, together with appropriate mitigation measures, will not have a negative impact on the watercourse or fish habitat.

Should any work be proposed in the watercourse, or within the 15 metre buffer, a work permit may be required from the Conservation Authority in accordance with the "Regulation of Development, Interference with Wetlands and Alterations to Shoreline and Watercourses" (O. Reg. 155/06).

The Site is also impacted by very steep slopes associated with the Niagara Escarpment. The NPCA's Land Use Policy Document considers the Niagara Escarpment to be included within the jurisdiction of the NPCA, and is therefore afforded the protection of the NPCA's Valleyland Policies.

The NPCA's objectives when reviewing applications and proposals on lots adjacent to steep slopes or valleys would pertain to minimizing soil erosion and sedimentation, protecting life and property from the potential for slope stability problems, and ensuring that the natural integrity of the valley slope is maintained over the long term.

Typically, the NPCA requires that all new development and site alterations be setback at least 7.5 metres from the stable top of a bank. A reduction in this setback may be considered if there is insufficient room to develop outside of this setback and a Geotechnical Investigation is completed by a qualified Geotechnical Engineer that confirms that a reduced setback would not have any negative impact on the stability of the slope/escarpment over the long term (to the satisfaction of the NPCA). Under no circumstances will the NPCA permit a reduction of this setback so that site alterations or developments occur beyond the top of a stable slope, onto the slope face.



The existing development on the Cave Springs property is located along the base of the escarpment. Any proposal to do any works or site alterations along the base or toe of the escarpment that could have the potential to create an erosion concern (i.e. cutting or regrading along toe of slope) will be subject to a Geotechnical Investigation (to the

satisfaction of the NPCA) to ensure the proposed works will not have any negative impact on the overall stability of the area over the long term.

Any proposal for works adjacent to the top or toe of the escarpment, or on the escarpment face will be subject to further Geotechnical Investigations and may also require work permits from the NPCA.

3.2.1.3 REGION OF NIAGARA'S ENVIRONMENTAL POLICIES

In addition to the watercourse being identified as a Marginal (Type 3) Fish Habitat, the Region of Niagara's Core Natural Heritage Mapping has identified the escarpment and all lands above the escarpment at the Cave Springs property as being impacted by the Beamsville Escarpment Provincial Life Science Area of Natural and Scientific Interest (ANSI), which is an Environmental Protection Area (EPA) under Regional Policies. This area is also identified as a Significant Woodland, which is an Environmental Conservation Area (ECA). The area has been mapped as a Significant Woodland due to the potential presence of Species at Risk; the size of the woodland area; the presence of interior habitat; and the presence of a watercourse and ANSI within the feature. Lastly, the entire property is also noted as an ECA-Public Land as it is owned by the NPCA.

ANSI

**AREA OF NATURAL AND
SCIENTIFIC INTEREST**

It should be noted that while not mapped as a Significant Woodland on the Region's Core Natural Heritage Mapping, NPCA staff would recommend that the north east portion of the Cave Springs property also be classified as an ECA Significant Woodland. NPCA staff members have observed a Species at Risk on the Site in this area and would suggest that this section of the property is connected to the larger Significant Woodland on the remaining lands.

Under Regional Policy 7. B.1.11, new development and site alterations are permitted within an ECA, but only within the adjacent lands of an EPA if it has been demonstrated that, over the long term, there will be no significant negative impact on the Core Natural Heritage feature, or its functions. This is typically accomplished through the completion of an Environmental Impact Study (EIS) by a qualified consultant to the satisfaction of the Region of Niagara or its delegate.

Further, in accordance with Policy 7.B.1.10, development and site alterations are not permitted within an EPA except for the following:

- Forest, fish and wildlife management
- Conservation and flood or erosion control projects where it has been demonstrated that they are necessary in the public interest and other alternatives are not available
- Small scale, passive recreational uses and accessory uses such as trails, boardwalks, footbridges, fences, docks, and picnic facilities that will have no significant negative impact on the natural features or ecological functions of the Core Natural Heritage System

Where such uses are proposed, an EIS will be required to meet the satisfaction of the Region, or its delegate.

Through the extensive fieldwork carried out on the Site by NPCA staff, several areas were identified as significant habitats of threatened and endangered species. Where such habitats or species were identified, under Regional Policy 7.B.1.3, development and site alterations will be subject to the policies for EPAs.



Also mapped by the Region of Niagara's Core Natural Heritage mapping is the Cave Springs Farm Earth Science ANSI (Regional Candidate). Currently, the NPCA's practice is only to identify the ANSI on the Site, and suggest that the Ministry of Natural Resources and Forestry is contacted.

Lastly, the Site has been mapped as a Highly Vulnerable Aquifer (HVA). Regional Policy 7.A.2.9 states that development shall not have significant negative impacts on ground water quality or quantity. Should any new development (specifically a private sewage system) be proposed on the property further studies (i.e. Hydrogeological

Studies) may be required to determine if the proposed development will have any negative impact on the HVA in the area. If impacts are anticipated, appropriate mitigation measures and monitoring would need to be incorporated into the design of the septic system to provide protection to the sensitive groundwater features.

3.2.2 SITE-SPECIFIC CULTURAL HERITAGE PLANNING CONSIDERATIONS

Cultural Heritage features include cultural landscape, heritage property and local heritage values or interests.

3.2.2.1 NIAGARA ESCARPMENT PLAN (NEP) AND NIAGARA ESCARPMENT PARKS AND OPEN SPACE SYSTEM (NEPOSS)

Section 2.12 of the NEP sets out policies for heritage with the objective to "inventory, interpret, evaluate, maintain and conserve the cultural heritage features of the Niagara Escarpment Plan Area." Policies relevant to the present assessment include the following:

- Care should be taken to discover unknown, and to preserve known, archaeological sites (especially native burial sites) and areas where such sites might reasonably be expected to exist.
- Existing heritage features; areas and properties should be retained and reused. To determine whether such actions are feasible, consideration shall be given to both economic and social benefits and costs.
- Where new development involves a heritage feature it should express the feature in some way. This may include one or more of the following:
 - Preserving and displaying fragments of the former building's features
 - Landscaping
 - Marking the traces of former locations, shapes and circulation lines
 - Displaying graphic verbal descriptions of the former use
 - Reflecting the former architecture and use in the new development

- Where development will destroy or significantly alter cultural landscapes or heritage features, actions should be taken to salvage information on the features being lost. Such actions could include: archaeological salvage and excavation, the recording of buildings or structures through measured drawings or photogrammetry, their physical removal to a different location.

Part 3 of the NEP sets out policies for a Niagara Escarpment Parks and Open Space System as a framework for the establishment and coordination of a system of publicly owned lands on the escarpment, as well as the Bruce Trail. Public lands are acquired in order to protect distinctive features and significant areas along the Escarpment (e.g., waterfalls, distinctive landforms, special plant communities, and animal habitats). Historical and archaeological sites, often found associated with these feature areas, are also incorporated. There are 158 existing and proposed parks and open space areas within the System, the majority of which are, or will be, linked by the Bruce Trail, creating a system that is linear in nature (NEP 2015: 94).

Development and administration of the NEPOSS is coordinated by the Ministry of Natural Resources and Forestry (MNRF), but it is owned and managed through the continued cooperation of seven conservation authorities: the MNRF, the Ontario Heritage Trust, the federal Department of the Environment – Parks Canada, the St. Lawrence Seaway Management Corporation, the Niagara Parks Commission, the Royal Botanical Gardens, municipalities and other bodies capable of managing areas in the public interest (e.g., the Bruce Trail Association, local service clubs, approved conservation organizations).

Parks and open space in NEPOSS are classified based on the predominant characteristics of the property: Nature Reserve, Natural Environment, Recreation, Historical, Escarpment Access, Resource Management Area. These classifications are to serve as a guide to management and use of the park or open space area. The NEP classifies Cave Springs Conservation Area as a Nature Reserve and provides the following description (NEC 2015: 134):

- This 38.4 hectare area includes a forested escarpment plain, crevasse valley, cliff face, several lookouts and archaeological sites. The property includes the Beamsville Escarpment Provincially Significant Life Science ANSI. The lands are managed by the Niagara Peninsula Conservation Authority and crossed by the Bruce Trail.

A Nature Reserve is described as (NEC 2015: 98):

- ...areas which represent the most significant and the distinctive areas and landforms found along the Niagara Escarpment. These areas serve to protect selected Areas of Natural and Scientific Interest. Management practices and uses in a Nature Reserve will ensure that features and values for which the reserve was established remain protected in perpetuity.
- Access to, and activities within, Nature Reserves are limited and only minimum facilities necessary to support activities which can further scientific understanding and education (e.g. scientific research, natural history interpretation, nature trails or the Bruce Trail) will be provided.



3.2.2.2 NEPOSS MASTER/MANAGEMENT PLANNING POLICY

Section 3.1.6 (1) of the NEP states that “[m]anagement agencies will prepare plans for each park or open space in the Niagara Escarpment Parks and Open Space System. Each Plan will establish policy guidelines for long term protection, development and management of the park or open space area.” The Ministry of Natural Resources and Forestry developed the *Niagara Escarpment Parks and Open Space System Planning Manual* (OMNR 2012) to assist management agencies in the preparation of such management plans, providing guidance on the design, development, implementation and maintenance of those management plans.

The goal of the Management Plan is to establish direction for long-term protection, development and management of the park or open space that meets the requirements of the *Environmental Assessment Act* and is consistent with the NEP.

An inventory, as well as analysis and assessment of the inventory of cultural heritage features of the property are integral parts of the Management Plan. The NEPOSS Planning Manual lists the following as examples of cultural heritage features:

- Archaeological resources which may include: Indigenous settlers, Indigenous people's farming societies, places with ceremonial or cultural significance, and Indigenous peoples' burial, hunting and gathering areas
- Cultural heritage landscapes
- Built heritage resources
- Industrial and domestic heritage structures

Types of information to be collected include:

- Description of site features,
- Map(s) of cultural heritage features
- Site surveys and analysis of the features that make up the cultural heritage landscapes, as well as delineation of landscape boundaries

3.2.3 ARCHAEOLOGICAL RESOURCE DEFINITIONS AND MANAGEMENT CONSIDERATIONS

Portions of the following section are taken from the *Cultural Heritage Inventory and Planning Study, Cave Springs Conservation Area Management Plan* (Cultural Heritage Study: Appendix B).

Neither the Niagara Escarpment Plan nor the NEPOSS Planning Manual provide explicit definitions of archaeological sites or resources. There are, however, other planning and legislative documents that provide relevant definitions.

The 2014 Planning Act Policy Statement defines archaeological resources (Section 6.0, Definitions) as including "artifacts, archaeological sites and marine archaeological sites." Individual archaeological sites (that collectively form the archaeological resource-base) are distributed in a variety of locational settings across the landscape, being locations or places that are associated with past human activities, endeavours, or events. These sites may occur on or below the modern land surface, or may be submerged under water.

The physical forms that these archaeological sites may take include: surface scatters of artifacts;

subsurface strata which are of human origin or incorporate cultural deposits; the remains of structural features; or a combination of these attributes. As such, archaeological sites are both highly fragile and non-renewable.

The Ontario Heritage Act (Ontario Regulation 170/04) defines "archaeological site" as "any property that contains an artifact or any other physical evidence of past human use or activity that is of cultural heritage value or interest". It defines "artifact" as "any object, material or substance that is made,



modified, used, deposited or affected by human action and is of cultural heritage value or interest”. And it defines “marine archaeological site” as “an archaeological site that is fully or partially submerged or that lies below or partially below the highwater mark of any body of water.” Archaeological fieldwork is defined as “any activity carried out on, above or under land or water for the purpose of obtaining and documenting data, recovering artifacts and remains or altering an archaeological site and includes monitoring, assessing, exploring, surveying, recovering, and excavating.”

The NEPOSS Planning Manual includes consideration of “Aboriginal Site Values” which are relevant to archaeological sites, but not necessarily exclusively so. Examples of Aboriginal Site Values include:

- Information regarding a community’s history and its association with lands and waters:
 - Locations and significance of burial, hunting, gathering and fishing sites, travel routes and traditional use areas, water levels and flows
 - Aboriginal place names or values with spiritual, ceremonial or cultural significance that will require protection.

- Traditional ecological knowledge:
 - Observations on biophysical or geographic features.
 - Landscape observations, such as the abundance of species (e.g., species at risk), habitat use, population movement, harvest levels, the collection of medicinal plants.
- Information on cultural geographic features such as place names and storied places.
- Information on cultural processes such as the oral history of people and places.
- Information about the community’s views on the potential for resource-based economic development.

3.2.4 CULTURAL HERITAGE FEATURE DEFINITIONS AND MANAGEMENT CONSIDERATIONS

Portions of the following section are taken from the *Cultural Heritage Inventory and Planning Study, Cave Springs Conservation Area Management Plan* (Cultural Heritage Study: Appendix B).



**THE NEP (2015) AND NEPOSS
PLANNING MANUAL (OMNR 2012)
PROVIDE THE FOLLOWING CULTURAL
HERITAGE FEATURE DEFINITIONS:**

Cultural Heritage Features:

Human-made features of the landscape

Cultural Landscape:

A cultural landscape is the product of human activity over time in modifying the landscape for their own purpose, and is an aggregation of human-made features such as a village, farmland, waterways, transportation corridors, and other artifacts.

Heritage Property:

Features in or on the land or underwater and considered to be a consultable record of past human activities, endeavours or events (e.g., buildings, street furniture, engineering works, planting and archaeological sites)

Local Heritage Value or Interest:

Status accorded to heritage properties by a municipality where the council of the municipality, on the advice of a Local Architectural Conservation Advisory Committee (LACAC) or the Ontario Heritage Trust, is prepared to designate or has designated, and will enter or has entered into an easement agreement under the Ontario Heritage Act.

Provincial Heritage Value or Interest:

Status accorded properties for which provincial heritage plaques have been erected, or otherwise which have been declared to be provincially significant by the Ontario Heritage Trust, an agency of the Ministry of Tourism, Culture and Sport.

National Heritage Value or Interest:

Status accorded to properties recognized as national historic sites on a list compiled by the Historic Sites and Monuments Board of Canada, an agency of the federal Department of the Environment – Parks Canada.

In addition, the NEPOSS Planning Manual provides management considerations for these features (OMNR 2012: 73):

- Conducting appropriate studies and research (including analysis of physical, documentary, and oral evidence by qualified persons, aimed at understanding the property's cultural heritage value, including its level of significance (e.g., local, provincial, etc.).
- Documenting the feature identification process with a written account of the research and the evaluation.
- Developing an on-going care/maintenance schedule to prevent deterioration and sustain the heritage value of the feature for long term benefit.
- The impact of proposed activities on the cultural heritage feature and heritage attributes, and measures to mitigate these impacts.
- Establishing and maintaining a cultural heritage conservation policy and procedure(s) for identifying and protecting the heritage properties and features, including objectives and targets and a commitment to continual improvement.

This cultural heritage assessment considers cultural heritage resources in the context of long-term protection, development and management that meet the requirements of the Environmental Assessment Act (1990).

Pursuant to the Environmental Assessment Act, applicable projects are subject to assessment so as to determine related impacts on above ground cultural heritage resources (MTO 2006). When considering cultural heritage resources in the context of improvements to specified areas, a 40 year old threshold is used as a guiding principle. While identification of a resource that is 40 years old or older does not confer outright heritage significance, this threshold provides a means to collect information about resources that may retain heritage value. Similarly, if a resource is slightly younger than 40 years old, this does not preclude the resource from retaining heritage value.



The analysis used throughout the cultural heritage resource assessment process addresses cultural heritage resources under various pieces of legislation and their supporting guidelines:

- Environmental Assessment Act (R.S.O. 1990, Chapter E.18)
 - Guideline for Preparing the Cultural Heritage Resource Component of Environmental Assessments (MCC – MOE 1992)
 - Guidelines on the Man-Made Heritage Component of Environmental Assessments (MCR – MOE 1981)
- Ontario Heritage Act (R.S.O. 1990, Chapter O.18) and a number of guidelines and reference documents prepared by the Ministry of Tourism and Culture (MTC):
 - Standards and Guidelines for the Conservation of Provincial Heritage Properties (MTC 2010)
 - Ontario Heritage Tool Kit (MCL 2006)
- Planning Act (R.S.O. 1990, Chapter P.13) and the 2014 Provincial Policy Statement

(ASI: Archaeological & Cultural Heritage Services, 2015)

3.2.5 WATER RESOURCES LAND USE PLANNING CONSIDERATIONS

A Water Resources Assessment Study was prepared to provide a baseline description of the water resources at the Site to inform the development of water-related policy guidelines. Reiterating Section 1.0, these guidelines should provide “*long term protection, development and management of the park or open space area*” (Section 3.1.6, Niagara Escarpment Plan, Province of Ontario, 2005), and should:

- “[S]eek to protect the quality and quantity of the resource...Also... ensuring that hydrologic functions, not only features, are protected” (NEC, 2013)
- “[M]aintain and enhance the quality and character of natural streams and water supplies ” (NEC, 2013)
- “[M]aintain the most natural Escarpment features, stream valleys, wetlands, and related significant natural areas.” (NEC, 2013); and
- “[P]rotect, improve or restore the quality and quantity of water” (Ministry of Municipal Affairs and Housing, 2014)

Redevelopment of the Site will also need to consider appropriate set-backs from servicing infrastructure at adjacent properties. This includes cisterns and sewage systems at the Cave Spring property.





4.0

*analyzing risks
of future proposed
development*



4.0 ANALYZING RISKS OF FUTURE PROPOSED DEVELOPMENT

4.1 NATURAL HERITAGE: ANALYZING RISKS

The existing features at the Cave Springs Conservation Area include natural areas and resources such as the escarpment face, talus and tableland; clints and grikes, as well as the provincially significant Area of Natural and Scientific Interest Life Science, 'Beamsville Escarpment', international UNESCO World Biosphere, and a regional Area of Natural and Scientific Interest Earth Science 'Cave Springs Farm'.

These most significant features within the park are at the greatest risk. The degree of fragility or susceptibility of the feature, the geographic extent or scope of the pressure, and the severity or intensity of pressures all affect the level of risk. To this extent, updated information on the ecological features, including the escarpment face plants, is not known. For determined uses, the talus, escarpment face, and tablelands are determined to be at highest risk of impact due to a greater potential of significant features for protection in active management and monitoring. For example, any Species At Risk found, or rare geologic habitat, would require more frequent and elaborate monitoring.

Uses and activities that occur at the Site include:

- Unsanctioned rock climbing on the escarpment face
- Bouldering
- Hiking/nature interpretation on the Cave Springs Trail to the Ice Cave, along the Bruce Trail Corridor and the trail traversing the escarpment that connects the lower and upper trails



- ATV and dirt bike use in the tableland areas
- Birding along the Bruce Trail Corridor and Cave Springs Trail to the Ice Cave
- Folklore tours with camp groups at the Cave Springs Trail and up the escarpment linking trail to 'Spy Hole'

Park features potentially affected by activities include:

- The disturbance of the Escarpment face by rock climbers.
- The disturbance of breeding birds, Species of Concern, including Species At Risk, and plants by hikers, rock climbers, and ATV and dirt bike users. Native plants may be displaced by invasive species

Prohibited site activities such as ATVs, dirt bikes and bouldering will be communicated as prohibited through signage and education.

The Management Plan will include mitigation measures, which will be determined from Site inventories. Positive impacts will be optimized through the Management Plan with educational use including appropriately designed structures and locations of development based on inventory and study findings. Any development that may have a negative impact on the viability of a natural heritage feature that cannot be mitigated and deemed acceptable will be adequately assessed. Development, final design and activities for the Site will be established in such a way that there is no negative impact to the feature. Monitoring will be required for the natural heritage features and any proposed activities within, or adjacent to, the features.

4.2 CULTURAL HERITAGE: ANALYZING RISKS

Portions of the following section are taken from the *Cultural Heritage Inventory and Planning Study, Cave Springs Conservation Area Management Plan* (Cultural Heritage Study: Appendix B).

Cultural heritage resources are generally scarce, fragile, and non-renewable. Two major elements of the environment pose threats to these resources:

- Natural forces, which may result in numerous deleterious effects to heritage resources, such as flooding and erosion of archaeological sites by watercourses, or disturbances and displacements caused by tree growth or burrowing rodent activities.
- Human activity, which may also result in adverse effects. Looting, for instance, while not only illegal, disrupts important archaeological sites. Imprudent planning is capable of destroying archaeological sites, as well as built heritage resources and cultural heritage landscapes when appropriate mitigating measures are not taken. The latter is generally the greater threat.

Initiatives or activities within the Conservation Area that should include consideration of archaeological, built heritage and cultural heritage landscape concerns during the preliminary planning phases include road and trail construction, service installations, amenities developments, changing water levels, forestry activity, borrow pitting, drainage improvements, continued occupation (e.g., the use and maintenance of modern facilities where these and archaeological sites coincide), and any other activity that involves disturbances of soil and bedrock. In addition to the above concerns, initiatives or activities that may specifically impact built heritage and cultural heritage landscape features include degradation or loss of existing resources through neglect, the accidental removal of buildings, and vandalism.

(ASI Archaeological & Cultural Heritage Service, 2015)

4.3 WATER RESOURCE ASSESSMENT: ANALYZING RISK

Hydrologic functions are 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 (NEC, 2013).

Hydrologic features are permanent and intermittent streams, wetlands, lakes (and their littoral zones), seepage areas and springs, and aquifers and groundwater recharge areas (NEC, 2013).

In regards to hydrologic features, in relation to relative significance of the natural heritage features or cultural heritage features hydrologic features were identified (e.g. creek, aquifer, aquitards) on the Site

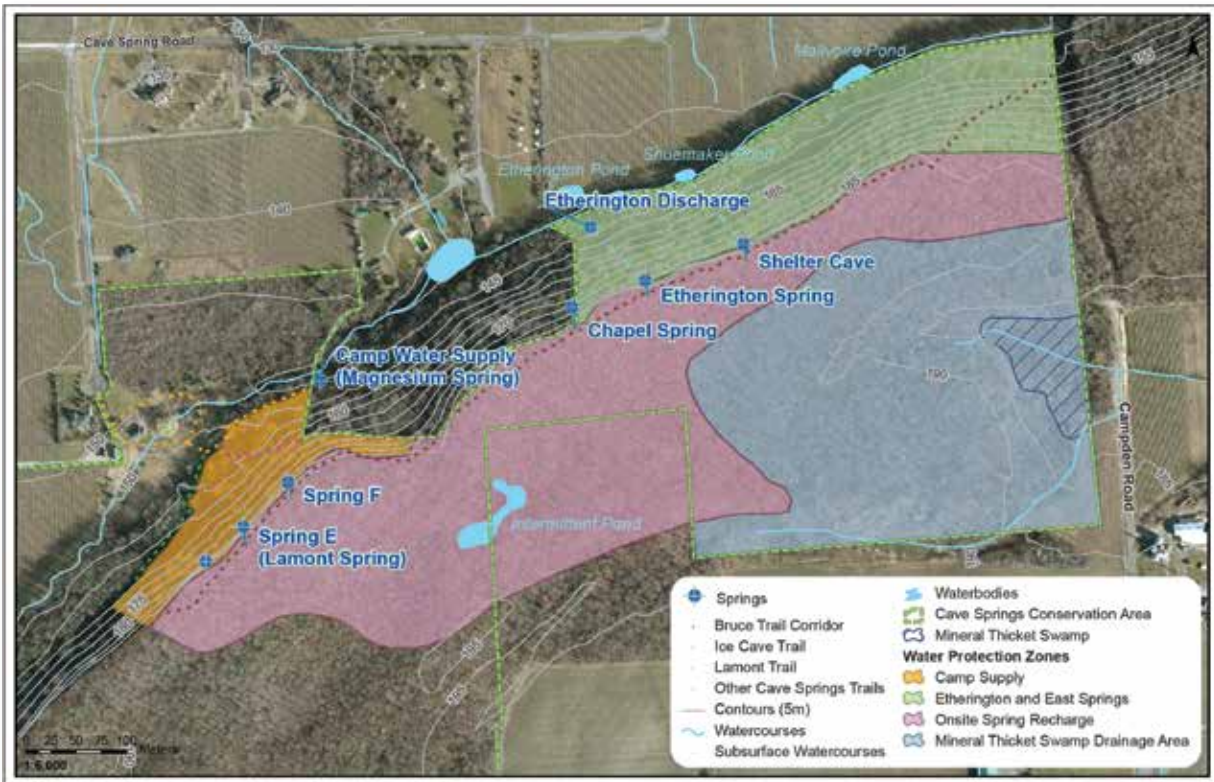


Figure 13: Water Protection Zones

and on adjacent land. Many of these features are protected within an earth science ANSI. Identification of on-site springs being current, and potentially future, water supplies, and of off-site springs sustaining the on-Site creek. Current pressures affecting features include geotechnical instability of escarpment face combined with climbers and Bruce Trail use, and active erosion along one on-Site creek. The best options and approaches for conserving, managing, maintaining or enhancing hydrogeological features and aspects of service include planning and following the Water Resource Assessment Study (Appendix C) conclusions and recommendations.

Due to the sensitivity of a number of areas on the Site, four water protection zones are proposed (Figure 13: Water Protection Zones). Land use changes in these zones could affect water quality, or change the amount of recharge and hence the quantity. An assessment of potential impacts should be completed before any proposed land use changes are contemplated.

Four Water Protection Zones include:

1. Camp Supply Water Protection Zone
2. Etherington and East Springs Protection Zone
3. On-Site Spring Recharge
4. Mineral Thicket Swamp Drainage Area

In addition to assessment of any impact, conclusions and recommendations of the Water Resource Assessment Study (Appendix C) including works in these areas should seek to meet applicable Niagara Escarpment Commission (NEC), Ontario Building Code, Health Unit and other applicable requirements and standards. Recommendations include no negative impact to key hydrologic features through future design review, future sewage design review and water monitoring recommendations, treatment of springs if used as supply, inventory of karst features, and decommissioning of an unused dug well.



5.0

*preparing the
background
information document*



5.0 PREPARING THE BACKGROUND INFORMATION DOCUMENT

5.1 REGIONAL CONTEXT

5.1.1 THE NIAGARA PENINSULA

The Niagara Peninsula is the portion of Southern Ontario, Canada, laying between the south shore of Lake Ontario and the north shore of Lake Erie in the Great Lakes Basin. It is a distinct geographical region easily recognizable on any world map. With an area of just over 2,000 square kilometres, the Peninsula sits within the Carolinian lifezone making it one of the most biodiverse regions in Canada. The Niagara River, a channel connecting Lake Erie to Lake Ontario, forms the eastern boundary of the area, while the Niagara Escarpment, a heavily forested topographical feature, dissects the Peninsula east to west and continues beyond.

5.1.2 THE GREAT LAKES: ONTARIO AND ERIE

The Great Lakes, as we know them today, formed about 14,000 years ago at the end of the last glacial period. Retreating ice sheets carved basins that filled with meltwater creating a series of interconnected freshwater lakes. Visible from space, the total surface area of 244,106 square kilometres, and the total volume (measured at the low water datum) of 22,671 cubic kilometres equates to 21% of the world's surface freshwater. Of the five Great Lakes, the smallest two are Lake Ontario and Lake Erie.

Lake Erie, named for an Iroquoian tribe living along its southern edge at the time of European contact, is the shallowest and smallest by volume of all of the Great Lakes. With a maximum depth



By SeaWiFS Project, NASA/Goddard Space Flight Center, and ORBIMAGE; cropped and labeled by Beyond My Ken (talk) 05:49, 11 September 2012 (UTC) - http://visibleearth.nasa.gov/view_rec.php?id=793, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=21248289>

of just 64 metres, Lake Erie is prone to wind setups (i.e. wind pushing the water from one end of the lake to the other) and differences in water levels west to east of up to nearly 5 metres. (National Oceanic and Atmospheric Administration. 2016. Retrieved May 2016) The drainage basin covers 78,000 square kilometres of largely agricultural lands. Lake Erie is prone to shifting sand bars and violent storms, and has a long history of shipwrecks and other nautical lore.

Lake Ontario, meaning “lake of shining waters”, is the last in the series of Great Lakes, meaning that all of the water of the Great Lakes flows through this waterbody on its way to the Atlantic Ocean, via the St. Lawrence River. At a maximum depth of 244 metres, it lays roughly 100 metres below the level of Lake Erie. The human impacts on this relatively small lake are enormous as the largest population in the country lives within its 64,030 square kilometres catchment and includes Canada's largest city, Toronto.

5.1.3 THE NIAGARA RIVER

Famous for its world-renowned waterfalls, the Niagara River is a connecting channel between Lake Erie and Lake Ontario. The falls mark the head of the Niagara Gorge, a deep cut excavated over the last 12,000 years by the erosive force of the River. The original location of the falls was at the Niagara Escarpment, which is at present day Queenston. Niagara Falls has been cut back more than 10 kilometres to its current location; this includes a sharp, nearly 90-degree, bend at what is known today as the Whirlpool. This odd bend in the river is the result of the unconsolidated material below the surface in what is described as the St. David's Buried Gorge.

An international waterway 58 kilometres in length, the river is the federal boundary between Canada and the United States with 83% of the water flowing into Lake Ontario coming from the river. It is the source of drinking water for millions of Ontarians.

There is a long history of power generation and industrial development along the Niagara River. The advent of hydroelectric power harnessed from Niagara Falls led to the proliferation of heavy industry along the river around the turn of the century. (Niagara Peninsula Conservation Authority. 2016. Retrieved: May 2016. <https://npca.ca>)

5.1.4 THE NIAGARA ESCARPMENT

The Niagara Escarpment is a long escarpment, or cuesta. It runs predominantly east to west from New York State, through Ontario, Michigan, Wisconsin and Illinois. The landform is a largely forested ridge of fossil-rich sedimentary rock (dolostone) roughly 1,600 kilometres in length. At its highest elevation, the cliffs of the escarpment soar to 535 metres above sea level at Blue Mountain. The escarpment is most famous for its cliffs over which the Niagara River plunges at Niagara Falls.

The 725 kilometres of the escarpment in Canada span the Niagara Peninsula, closely following the Lake Ontario shore through the cities of St. Catharines and Hamilton, where it takes a sharp turn north in the town of Milton towards Georgian Bay. It then follows the Georgian Bay shore northwestward to form the spine of the Bruce Peninsula and Manitoulin Island, as well as several smaller islands located in northern Lake Huron. The escarpment then turns westward into the Upper Peninsula of northern Michigan, south of Sault Ste. Marie and finally, southward into Wisconsin following the Door Peninsula through the Bayshore Blufflands. As it travels more inland it forms the western coast of Lake Michigan and Milwaukee, ending northwest of Chicago near the Wisconsin-Illinois border.

The Niagara Escarpment's vibrant ecosystems support an estimated 300 bird species, 53 mammals, 36 reptiles and amphibians, 90 fish, and 100 varieties of special interest flora, including 37 types of wild orchids.

BIOSPHERE

ALL OF THE LAND, WATER
AND ATMOSPHERE
THAT SUPPORT LIFE

5.1.5 UNESCO BIOSPHERE RESERVE

A biosphere is all of the land, water and atmosphere that support life. A biosphere reserve is an international designation of recognition from the United Nations Educational, Scientific, and Cultural Organization (UNESCO) for an area in the world that is deemed to demonstrate a balanced relationship between humans and the biosphere.

A Biosphere Reserve designation gives an area international recognition for its important ecological and cultural values. It also provides a mechanism, based on local commitment and local ability, to apply sound stewardship (and protection, where necessary) to use of resources in an area to support present and future generations. (Niagara Escarpment Commission. 2016. Retrieved: May 2016. <http://www.giantsrib.ca/the-niagara-escarpment-overview>) Under the “Man and the Biosphere” program, UNESCO named Ontario’s Niagara Escarpment a world biosphere reserve on February 8, 1990. Ontario’s Niagara Escarpment is one of 16 reserves in Canada, and is part of a network of 631 reserves found in 119 countries worldwide.

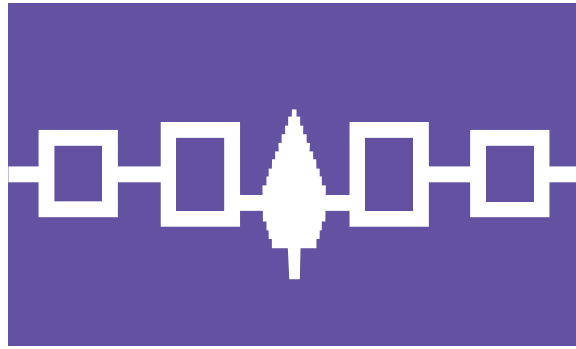
The Niagara Escarpment Biosphere Reserve conserves the Province of Ontario’s natural and social capital by protecting prime agricultural lands, forests, wetlands, heritage properties and recreational spaces.

The Niagara Escarpment Biosphere Reserve is defined by the Niagara Escarpment Plan Area. It consists of 725 kilometres of escarpment in Canada from Lake Ontario (near Niagara Falls) to the tip of the Bruce Peninsula (between Georgian Bay and Lake Huron). The Biosphere Reserve consists of the provincially adopted Niagara Escarpment Plan Area (194 555 ha) including two national parks. (Niagara Escarpment Commission. 2016. Retrieved: May 2016 www.escarpment.org/home/index.php) The area covered by the Niagara Escarpment Plan is located within portions of eight counties or regions, which include 22 local municipalities.

Much of the Escarpment corridor is forested and crosses two major biomes: boreal needle leaf forests in the north, and temperate broadleaf forests in the south. The biosphere reserve also includes wetland complexes, cliff faces, slopes and aquatic ecosystems.

5.1.6 THE PEOPLE

The Neutral Confederacy was a political and cultural union of Iroquoian nations who lived in the Hamilton-Niagara district of southwestern Ontario and across the Niagara River to western New York before their dispersal by the Seneca in the mid-17th century. The name “Neutral” was applied to them by the French (Jesuits) because of their ability to trade peacefully with the feuding Five Nations and Huron-Wendat. The Neutral were pitted against former allies



By Himasaram, Zscout370:
<https://commons.wikimedia.org/w/index.php?curid=997266>

during the Iroquois Wars of the mid-17th century and despite strong resistance, the Nation was destroyed with survivors dispersed and assimilated amongst other Nations to the west and south.

At the time of the arrival of the United Empire Loyalists following the Revolutionary War, the area was only sparsely inhabited and became one of the first settlements of Upper Canada with its capital at Niagara-on-the-Lake, then called Newark.

The establishment of the area as an agricultural center was driven by the nutrient rich soils below the escarpment. Fruit farming in particular has remained important with the growth of the escarpment and associated bench areas is one of the prime grape-growing regions of the world.

Following the rise of the agricultural period, Niagara became a hub of industrial development. Water-powered mills and later hydro-electricity generation at Niagara Falls were a source of inexpensive power.

A succession of canals were built to connect the markets and mineral resources of the upper Great Lakes with the St. Lawrence Seaway and beyond. Many jobs were created in association with shipping and the repair of the Great Lakes fleet as dry docks were constructed at Port Weller on Lake Ontario.

By the 1970s, there were approximately 700 chemical plants, steel mills, oil refineries and other industries lining both sides of the Niagara River. Heavy industry has been diminishing over the past few decades, and an emphasis on the tourism sector, and ecotourism in particular, have gained popularity in the Peninsula.

Today, more than ten million guests visit Niagara annually. New developments, which began in the mid-1990s, have spun off an upscale hospitality sector anchored by the wine industry, fine restaurants, casinos, theatre, historical landmarks, and festivals.

Niagara's proximity to the two Great Lakes and the protective influence of the Niagara Escarpment afford it a moderate year round climate thus making the Peninsula an attractive retirement destination. The population of the peninsula is roughly one million people.



5.2 STUDY CONTEXT: NATURAL HERITAGE FEATURES

5.2.1 STUDY PURPOSE

The purpose of the Natural Heritage Study (Appendix A) was to produce a baseline from which the ecological health of the Site could be understood. Plants and animals carrying out any part of their lifecycle, as well as their corresponding ecosystems, were assessed for their provincial and national significance.

The baseline provides important information for the protection of the Site's unique ecological features. It will be used to achieve the purpose and objectives set out in the Niagara Escarpment Plan (NEP) and NEPOSS as well as the UNESCO World Biosphere Reserve designation based on the *Endangered Species Act*. The baseline information will be used as part of the site assessment in order to challenge the land classification of Nature Reserve that is currently assigned to the Site in the NEP and propose the classification of Natural Environment.

The findings of the Natural Heritage Study (Appendix A) determined the Site specific protection zones, in accordance with NEPOSS, including the most appropriate areas for programming. These protection zones correspond to the degree of sensitivity of the many ecologies of the Site in conjunction with its hydrology and the existing cultural assets. Using this data, recommendations for ecosystem restoration, environmental maintenance, and monitoring and protection can be established and implemented in conjunction with the implementation of the Management Plan.



5.2.2 STUDY METHODOLOGY

To accomplish the study purpose, the Ecological Inventory for Cave Springs Conservation Area involved assessment of the following:

- Ecological Land Classification
- Vegetative communities/habitat
- Species At Risk (SAR) (trees, shrubs, groundcover)
- Old Growth/ Snags
- Spring Ephemerals
- Reptiles (snakes and turtles)
- Amphibians (frogs, toads, salamanders)
- Large mammals
- Bird Survey (breeding bird, owls, crepuscular, and incidentals)
- Small mammals
- Bats

To maximize the effectiveness of the studies, existing documentation on the Site and surrounding area was reviewed for species and habitat information. Existing studies, inventories, conservation statements and files, as well as documentation on flora, fauna, ecosystems, soil and Species at Risk were reviewed and study methodologies were tailored to the Site for this purpose. This allowed for a thorough and efficient study of the natural heritage of Cave Springs. Throughout the study process, qualified individuals were employed to execute the monitoring tasks.

In combination with these methodologies, each component of the Site Natural Heritage Study Resource Inventory included:

- Placing an emphasis on identifying suitable habitats to investigate, as well as determining appropriate times of day and season to complete the different studies.
- Using appropriate, updated protocols for each category or species.
- Targeting a completion date of 2015, with the exception of the salamander study, which may need to continue in order to maximize potential detection of SAR.

5.2.3 SUMMARY OF SITE CHARACTERISTICS

The Natural Heritage Study (Appendix A) highlights the Cave Springs Conservation Area as having diverse, unique and sensitive vegetative communities, which support a variety of habitats and species. These communities are composed of treed slopes below the escarpment cliff face containing Niagara's most extensive and best large stone boulders (talus) below, and include exposed raised rock blocks and crevasses found on top of the escarpment. An interior forest within a mature tableland woodlot hosts many habitat trees as well. There are meadows, streams and wetlands. These components support combinations of forage, roosts, dens and nests. The overall effect is a well-integrated and balanced ecosystem.

5.2.4 AREAS OF NATURAL AND SCIENTIFIC INTEREST

"Areas of Natural and Scientific Interest (ANSIs) are areas of land and water containing unique natural landscapes or features. These features have been scientifically identified as having life or earth science values related to protection, scientific study or education." (MNRF, 2016)

More than 1,000 ANSIs exist in Ontario. In conjunction with Conservation Authorities, and other government bodies, they are used to conserve significant features. Two types of ANSIs exist:

- Earth Science ANSI, which reflect unique geology
- Life Science ANSI, which reflect unique biodiversity and natural landscapes

Cave Springs is encompassed by life science and geologic features that have provincial and regional significance.

Additionally, the Site provides rare and healthy habitat components made up of interior forest, a contiguous migratory natural forested corridor, and a wide diversity of vegetative communities. Communities of meadow, aquatic stream, marsh, cultural thicket, talus slope, cliff, and escarpment rim also exist.



5.2.5 ECOLOGICAL LAND CLASSIFICATION

Ecological Land Classification (ELC) is used to define the geographic limits of certain natural heritage policies. The ELC guide the land use planning process based on ecological factors, which define natural regions (Ministry of Natural Resources, 2015). The ELC located on the Site were identified as per the “Ecological Land Classification for Southern Ontario First Approximation and Its Application 1998” and were used to standardize land unit descriptions and classifications for ecosystem based management in Ontario.

5.2.6 NATURAL HERITAGE STUDIES

5.2.6.1 VEGETATION INVENTORY

In addition to the natural heritage landscape, Cave Springs Conservation Area contains a variety of vegetative communities and unique habitat features making it a quintessential habitat to a variety of flora and fauna.

The purpose of the vegetation survey of plants was to identify Ecological Land Classification types and significance, as well as significant species in need of protection or restoration. Studies of the ELC for Southern Ontario, Ephemeral Plants, and SAR, old growth and snags were undertaken to quantify the plant resources and habitat at the Site. They were undertaken at various times and seasons to ensure a thorough record of species at the Site. Incidental Observations were also included.

Throughout the duration of the studies, over 190 native plant species were identified on the Site. This is directly related to the rich habitat and biodiversity of species on the Site. In addition, 21 invasive species and ten vegetative communities were also recorded.

THE ONTARIO MINISTRY OF NATURAL RESOURCES AND FORESTRY HAS DESIGNATED TWO AREAS OF NATURAL AND SCIENTIFIC INTEREST (ANSI), WHICH ADD TO THE OVERALL SIGNIFICANCE OF CAVE SPRINGS CONSERVATION AREA. THESE INCLUDE:

i) “The Beamsville Escarpment” overhang rubble having produced “some of the most extensive and best large block talus slopes on the Niagara Peninsula” (Jalava et.al., 1992), as well as “some of Niagara’s largest exposed grikes/clints”, (dolostone exposed and raised blocks (grikes) separated by solution-weathered cracks (clints) (Jalava et.al., 1992)), and a moderate representation of Niagara Escarpment terrace and terrace valley features

ii) “Cave Springs Farm”, identified by Lockport caprock crevassing along rock joints and providing a good example of post-glacial and “perhaps periglacial crevasse development” on the Niagara Escarpment (Ministry of Natural Resources, Central Region, Parks and Recreation Section, 1983. Regional and Local Earth science Areas of Natural and Scientific Interest In Niagara District).

5.2.6.2 SPECIES AT RISK SURVEY

A total of eight plant species were observed that fell under the Species at Risk (SAR) definition, with another two species unobserved but existing in the historical records of the Site. These species are comprised of the three highest levels of protection required as legislated by the SAR Act and *Endangered Species Act*. Acknowledging these findings, there are a number of different specie habitats that must be protected to ensure the survival of the various SAR, including the trees planted in the Site’s arboretum.

5.2.6.3 ECOLOGICAL LAND CLASSIFICATION AT CAVE SPRINGS

The Cave Springs Site was found to have a total of ten different Ecological Land Classification(s) (ELC). As a result, the Site habitat is diverse with: dense shrub layer; closed canopy and moderate to understory/ground cover; uneven age forest in later successional stages, with a number of snags/cavity trees, and moist, cooler interior forest areas with higher insect diversities; caves/cracks that provide unique and often critical habitat for dependent species, such as interior bird



species, and bats; as well as forage areas, dens and potential hibernacula for a variety of animals. Within these areas, the older, more mature trees, mast trees and snags/cavity trees were found in areas with less human disturbance. Areas of habitat disturbances observed included evidence of rock climbing and Site activities along the cliff face and cliff face bottom, lower building activity area, and some ATV/informal trail activity locations.

5.2.6.4 LARGE MAMMAL SURVEY

LARGE MAMMAL

Large mammals are a major component of the ecosystem playing an important role as they maintain small mammal populations, modify vegetation structure, alter nutrient pathways and change species composition, and therefore influence ecosystem function and biodiversity.

FINDINGS

To identify the large mammal component of the Cave Springs Conservation Area, a variety of survey methods were used. These methods included:

- A large mammal snow track survey
- A den survey
- A cavity tree/snag survey
- Any incidental observations

As a result of the various survey methodologies, a total of nine species of large mammals were observed, including all historical accounts. Of the nine identified species, two were recognized as domesticated cat and dog. Of the total species identified, there were no endangered, threatened or species of special concern.

5.2.6.5 MULTIPLE BIRD SURVEYS

BIRDS

Birds are another essential component of the ecosystem, providing various benefits to the ecosystem through methods such as seed dispersal, pollination, insect management, habitat creation for other dwellers, etc. Ideally, supporting a greater number and diversity of bird species will support a more diverse and stable ecosystem.

FINDINGS

The purpose of the bird survey at Cave Springs Conservation Area was to determine the diversity and species of birds present, in addition to any SAR and SAR habitat in need of protection. Three types of Bird Studies were completed at the Site in 2015, including:

- An owl survey
- A crepuscular survey
- A breeding bird survey

The studies resulted in the finding of 46 species of bird.

5.2.6.6 HERPETOFAUNAL SURVEY

REPTILES

Snakes comprise the middle-order predator component in the ecosystem. Without them the numbers of prey species would increase to unnatural levels and the predators (birds, etc.) that eat snakes would struggle to find food. Turtles aid seed dispersal, plant and aquatic species population control, nutrient cycling of aquatic systems, and provide food (turtles and eggs) for other species, such as raccoons and coyotes.

FINDINGS

As part of establishing the resource baseline information for the development of the Management Plan, surveys of snake and turtle species were conducted at Cave Springs Conservation Area. These surveys were conducted in order to determine the diversity and presence of snake species, in addition to any SAR and SAR habitat in need of protection. Three different survey methods were used including coverboards, transect searches, and incidental observations resulting in the completion of seven surveys. Turtle species presence at the Site was determined using turtle basking surveys as well as incidental observations resulting in the completion of eight different surveys. Both the snake and the turtle surveys were completed during a wide range of atmospheric conditions.

One species of snake was observed on the Site. Habitat requirements for this species tend to be quite versatile. Historically, another species of snake had also been observed on the Site, but was not found during this study. Similarly, one species of turtle was observed during the study and it is an invasive species. No species of special concern were observed during the study. A historically noted species of special concern was not observed during the study.

AMPHIBIANS

As secondary consumers in many food chains, amphibians provide nutrient cycling, are biological pest controllers (eating both invertebrates and vertebrates), and are a food source for other species in the food chain. They are also indicators of the environment's health due to their dual life forms (aquatic and terrestrial) and the fact that their porous skin has a high degree of sensitivity to environmental changes.

FINDINGS

Four types of surveys were used to assess the species of frogs, toads and salamanders present at the Site. Frog and toad surveys were undertaken using nighttime call monitoring surveys as well as incidental observations culminating in three surveys being completed. Salamanders were monitored through transects (grids), minnow traps in shallow water and incidental observations. Four species of frogs and toads, and five species of salamander were found at the Site. One species of salamander historically observed in the greater area was not observed. Although no SAR were observed, patterns of observed salamanders are indicative of a SAR salamander that was unobserved. As a result further study will be required. Four species of frogs and toads, and 5 species of salamanders were observed. No rare salamanders were found therefore an additional 2 year study is needed to assess presence and absence of any rarer species.

5.2.6.7 SMALL MAMMALS SURVEY

SMALL MAMMALS

Small mammals provide an important food source for snakes, bird/raptors, fox, coyote/other mammals, create habitat for other species, consume and disperse seeds, and maintain plant and insect populations. They are also carriers of diseases and pests, which directly influences population levels of other species.

FINDINGS

A small mammals study was conducted at Cave Springs Conservation Area to inventory the diversity of species, the occurrence of rare species and to determine habitat considerations and/or needed restoration measures for any SAR found. To decrease biases of inventories and improve detectability of species, a variety of inventory methods were used throughout the season including Sherman traps, cavity tree searches, building exit surveys, and incidental observations. The geology of the Site limited the effectiveness of some of the survey typologies requiring an increased dependence on others. This contributes some possibility of bias to the study results. These surveys resulted in the discovery of seven species of small mammal including one species of special concern under COSEWIC. 7 small mammal species were observed at the Site.

5.2.6.8 BAT SURVEY

BATS

Bats provide high economic value to adjacent farmland and forest industry with the natural removal of insects.

FINDINGS

Species of bat present, including SAR, as well as special Site considerations and management required the study of bats on the Site. These included:

- Bat Acoustic Monitoring
- Interior Building Surveys (daytime)
- Bat Building Exit Surveys (nighttime)
- Incidental Observations

The qualified NPCA Ecologist conducted all surveys. Volunteers also assisted with species existing observation for bat building exit surveys.

Over five species of bats were observed on the Site of which four are endangered and another four are migratory. This uncommon diversity of bat species in Ontario suggests unique and diverse habitats in and around the Site, likely including healthy year round habitat facilitated by hibernation sites. Disturbance during hibernation can be fatal to bats. Elimination or mitigation of disturbances to bat habitat are required on the Site.

5.3 STUDY CONTEXT: CULTURAL HERITAGE FEATURES

Portions of the following section are taken from the *Cultural Heritage Inventory and Planning Study, Cave Springs Conservation Area Management Plan* (Cultural Heritage Study: Appendix B).

The Niagara Peninsula has a cultural history that began approximately 11,000 years ago. At the time of contact with the Europeans, the Niagara Peninsula was populated by the “Neutral Nation”, a term coined by the French, in reference to the fact that this group took no part in the long-term conflicts between the people of the Wendat (Huron) Confederacy of Simcoe County and the Five Nations Iroquois in New York. The Neutral primarily settled along the shore of Lake Ontario between Grimsby and Niagara-on-the-Lake and along Lake Erie. By 1650 the Neutral were involved in a full-scale conflict with the Seneca, who were assisted by the Mohawk, which resulted in the termination of the Neutral occupation of the Niagara Peninsula between the fall of 1650 and the spring of 1651.

There is no direct evidence of pre-European settlement at Cave Springs itself; however arrowheads and other artifacts unearthed during farming activity over the years may speak to regional occupation and perhaps hunting in the immediate vicinity. Local lore hints at a large arrowhead cache and possible longhouse site somewhere below the escarpment, however there is no documented evidence of such. There are two registered sites nearby, the Stanley Site, a probable Neutral village 1.5 kilometres to the southeast, and the Stanley Ossuary, a presumably related burial site.

European settlement of the Cave Springs Conservation Area began in the late 1780s when the land of the Niagara Peninsula was purchased from the Mississaugas and surveyed into farm lots. These farm lots were first granted to Loyalist families, and mainly comprised of the disbanded soldiers from Butler’s Rangers.

The early period of Loyalist settlement at Cave Springs was quickly superseded by a long period of land ownership by an influx of Mennonite settlers at the turn of the nineteenth century. Mixed agricultural pursuits were carried out at Cave Springs and records show that between 1861 and 1871 there were a wide variety of cereal, root and vegetable crops being grown. Livestock (horses, cattle, sheep and pigs) were recorded in official returns, although other animals, such as poultry, were not noted. Fruit

production was restricted to apples, pears, plums and grapes. There was no evidence that stone was used for houses, with the exception of it being employed in the construction of cellars and foundations. The first system of spring fed ponds or reservoirs, and piping, date from this second period of occupation. Other structures and features on this Site, which include the “quarry” pit and the remnants of a lime kiln, were referred to in documentary sources from the 1870s.

During the early twentieth century, urban dwellers that wished to have a rural retreat began to buy up property at Cave Springs. Their lands were managed for them during their absence from the premises by hired help.

Cave Springs entered a period of slow decline from the 1920s until the 1960s. Attempts were made to subdivide the Site into smaller units, but the property retained its agrarian character. The land appears to have been primarily used for fruit growing by owners who did not all live on the Site. The United Church developed the neighbouring Cave Springs Camp during this period.

Between the 1960s and 1980s, the Cave Springs property again attracted buyers who wished to subdivide the Site into smaller parcels of land in order to provide attractive sites for housing.

The 1970s through the 1990s witnessed the development of Cave Springs as a Conservation Area, largely through the efforts of Margaret Reed. It was due to her stewardship that the remaining natural and historical features were preserved for future generations. Reed interpreted the Site for visitors through her popular lectures, series of publications and walking tours.

5.3.1 ARCHAEOLOGICAL SITE INVENTORY

Within the study area there is one registered archaeological site known as The Adam Steps as well as associated artifacts and a number of conjectural or potential sites. Approximately 1.5 kilometres beyond the Site’s boundaries exists two more registered sites associated to each other, as well as three registered sites comprised of isolated finds.

5.3.1.1 CAVE SPRINGS STUDY AREA

The Adam Steps site was registered in 1980 due to the discovery of a small number of chert flakes found at the base of the escarpment near the extreme southwest corner of the Cave Springs property. This locale had attracted the attention of archaeologists several decades earlier. In 1948, Kenneth Kidd, then of the Royal Ontario Museum, documented carvings of two human heads cut into the face of the escarpment at The Adam Steps, rendered in the round and in frontal view. Another head, reportedly from the site, was found in a private collection that now apparently resides at the Ontario Museum of Archaeology at the University of Western Ontario. It is unclear how many such carvings were originally present at The Adam Steps. No carvings remain at The Adam Steps as a result of looting. The carvings, which reportedly measured 16-20 centimetres high, have no known counterparts in the archaeological record of Southern Ontario. This has led to some uncertainty as to their age and cultural affiliation; however, it may be noted that the limited documentation available suggests that the heads bear many stylistic similarities with human faces found on many Late Woodland Ceramic and Ground Stone “effigy” smoking pipes.

There are reports of three other potential Aboriginal archaeological sites within the Cave Springs Conservation Area lands that are not formally registered within the OASD. The first is a complete Late Woodland ceramic vessel, discovered by accident at the turn of the nineteenth-century by a local farmer in a cave or fissure along the face of the escarpment. The specimen, which is now in the collection of the Royal Ontario Museum, is an example of a Lawson Incised/Opposed vessel, a very common ancestral Neutral type circa A.D. 1350-1550. The discovery of the vessel at Cave Springs points to the archaeological potential of the Site.

The second site is a reputed “Neutral long house,” located below the escarpment. The reports of this site are presumably based on collections of Dewitt Fleming (Reed 2001:12) who farmed the property in the 1890s and/or Robert Lamont who was there during the 1930s and 1940s. The whereabouts of these collections, or precise details of their contents, are not known. Fleming is said to have amassed a collection of “several hundred” artifacts, while Lamont’s hired hand supposedly uncovered a large number of native artifacts when an old apple tree was dynamited in order to clear a site for a new vineyard. The site, if any portion still survives, is likely to be located in the agricultural field(s) north

of the escarpment. The date of the site, and its function/character are entirely unknown at this time.

Finally, there is an account of a possible Aboriginal grave, known to the Allen and Ball families, discovered in a “cave” or wide fissure in the rock at the brow of the escarpment near the road leading up the mountain (Reed 2001:13). The veracity of this story is unclear. However, the burial of individuals in such locations, during the Early Iroquoian period in particular, has been documented elsewhere along the Niagara Escarpment at Winona and at Chedoke Falls in Hamilton (ASI 1989; Spence and Fox 1992). Such practices are also consistent with other Aboriginal beliefs related to the spiritual significance of specific locales and landscape features along the length of the Niagara Escarpment, such as documented at, for example, Niagara Falls (Revel 1965; Hunter 1985; Fox 2004) and in the Collingwood area (Garrahd 2010).

There is also the potential for archaeological resources related to the nineteenth-century use of the lands within the property. These include the potential remains of the lime kiln established near the base of the escarpment, as well as sites associated with other resource extraction activities related to quarrying, etc.

5.3.1.2 SURROUNDING STUDY AREA

Two sites have been registered approximately 1.5 kilometres southeast of the Cave Springs Conservation Area. The Stanley Site (AgGu-2), a probable sixteenth-century A.D. ancestral “Neutral” village and the Stanley Ossuary (AgGu-1), what is assumed to be the village’s associated cemetery.

Three sites have been registered approximately 1.5 kilometres northwest of the Cave Springs Conservation Area as a result of a 1998 archaeological assessment undertaken for a subdivision development. These include isolated finds of either a Middle Archaic or Early Woodland side-notched projectile point (AgGu-60), and a Late Archaic Lamoka projectile point (AgGu-61) and the remains of a late nineteenth-century Euro-Canadian farmstead (AgGu-62).

Given the diversity of this inventory, and the general character of the study area, the entire Cave Springs Conservation Area is deemed to exhibit potential for the presence of archaeological resources related to Aboriginal and European occupations and activities.

5.3.1.3 THREATS TO CULTURAL HERITAGE RESOURCES

Cultural Heritage Resources are generally scarce, fragile, and non-renewable. Two major factors pose threats to these resources:

- Degradation when left to natural forces such as: flooding and erosion of archaeological sites by watercourses, or disturbances and displacements caused by tree growth or burrowing rodent activities
- Human activity, which may result in adverse effects. Looting and imprudent planning can be highly detrimental to a cultural heritage landscape.

(ASI Archaeological & Cultural Heritage Service, 2015)

5.3.2 ANALYSIS OF LITERATURE AND FOLKLORE

The colourful folklore surrounding Cave Springs has lent a particular character and air of mystery to the Site that has inspired generations of visitors. The Site has influenced several books as well as other forms of artistic expression for example: “Cave Springs Farm in Lore and Legend” by William F. Rannie, “Tempest in a Tea Cup: the Cave Springs Soap Opera” and “the Cave Springs Mystique” by Margaret Reed, “The Spirit of Cave Springs” by Susan Vida Schutten. An artist named Jason Potyok, a contemporary of Robert Bateman, painted images of the Adam Steps.

A sample of the folklore at Cave Springs is as follows:

At the turn of the last century, a farmer walking home from Beamsville cut through Cave Springs Farm and stopped to have a drink at the spring before ascending the escarpment. Barely able to mark his path in the darkness of the night, he stumbled down a fissure and didn't wake until the morning where he found himself in a crevice surrounded by First Nation artifacts including a ceramic vessel, which he brought home. Upon his return to the Site to retrieve more artifacts he could no longer locate the entrance to the cave. The only proof of the cave and its artifacts lay with the earthen clay vessel that was eventually donated to the Royal Ontario Museum and was referenced in the Minister of Education's archaeological report in 1900.

Having read the story about the clay vessel, an American Professor asked the landowner at the time if he could explore his property. Legend has it that the professor was able to locate the cave and



Artist: Jason Potyok
Painting Title: Adams Steps

retrieved several artifacts from it, bringing them back to the United States for study. His intentions to return to the Site were short-lived, as not long after he perished in a car accident, taking with him to his grave the whereabouts of the lost cave.

The mystique of Cave Springs continued through the storytelling and writing of Margaret Reed, who proclaimed herself as the “Witch of Cave Springs” and claimed to be over 300 years old as a result of drinking the local spring water. She revived the tradition of touring school children around the Site while highlighting its key features and reiterating its folklore. In Margaret Reeds' early days on the property there were several legal disputes with adjacent landowners. Fortunately, a string of people with past ties to the property kept showing up for visits and entertaining Reed with stories of their experience there. These stories provided factual evidence to assist Reed in her legal battles in addition to providing endearing folklore about the property. Reed would later reflect upon these encounters as an expression of the mystique and the spirits that embody Cave Springs.

(ASI Archaeological & Cultural Heritage Service, 2015)

5.4 STUDY CONTEXT: WATER RESOURCE FEATURE DETAILS

I. SPRINGS

“The flow is fairly full until about July of each year, when it diminishes somewhat, though the spring (Cave Springs Camp Water Supply) has never been known to dry up completely....”
(Rannie, W.F., 1968)

Spring flows generally decreased between April and June in 2015. The temperature of the springs was fairly consistent, similar to off-site groundwater monitoring. The results corroborate the springs being sustained by a groundwater source.

Field measurements of spring conductivity (amount of dissolved ions) were relatively stable and followed a slight upward trend after the spring freshet. This suggested a similar groundwater source (i.e. the Lockport Group dolostone aquifer) for these springs, with lessening recent infiltration from April to June. Springs A and C showed influence of upgradient surface water effects in the conductivity results.

Mr. Murphy noted mineral precipitate of CaCO_3 (potentially aragonite) below the Reed Spring (D), which is to be reasonable for that location and matches similar mineral deposition in the Niagara Gorge.

A set of general chemistry samples were collected from the springs in April 2015. Based on the conductivity trends, it is believed that these samples represent groundwater post-spring freshet. Biological results from the Reed (D), Lamont (E), F and Camp Water Supply show a high degree of filtering at or close to undisturbed groundwater. While biological results for Springs B and C show a distinct surface water influence. Samples from Springs A and Etherington were between these two classifications.

“...[I]n 1950...samples were...tested in the laboratory of the Department of Chemistry at Ontario Agricultural College in Guelph. (Because the waters from both springs would be used by the campers at Cave Springs United Church Camp.) ‘The samples are of about equal hardness, but the sample of water from the Etherington spring does not contain as much magnesium as the water from the other spring. The presence of a relatively large amount of magnesium sulphate in the water from the Camp spring, is no doubt responsible for its flavor and medicinal properties.

Both water samples contain traces of chloride, but not iron. The pH of both samples was about 7. The hardness of the water was about 388 parts per million for the Etherington Spring and 404 parts per million for what is now known as the Magnesium Spring, both calculated as calcium carbonate.

The Magnesium Spring contained in 1950, about 50 percent more magnesium sulphate than the Etherington spring ... the analyses both in 1950 and 1981, show higher concentrations of magnesium sulphate in water from the springs from the base of the Escarpment than the sample taken from higher on the Mountain (the Reed spring).”
(Reed, 1998)

The water sampled from the former Magnesium Spring in April 2015 was not enriched in magnesium and in fact was less so than at the Etherington Spring. The reason for a decrease in magnesium 60 years later is unknown. Otherwise, the springs are classed as “fresh” and would be considered safe for drinking for the parameters tested at Springs Reed (D), Lamont (E), F, Etherington and the Camp Water Supply.

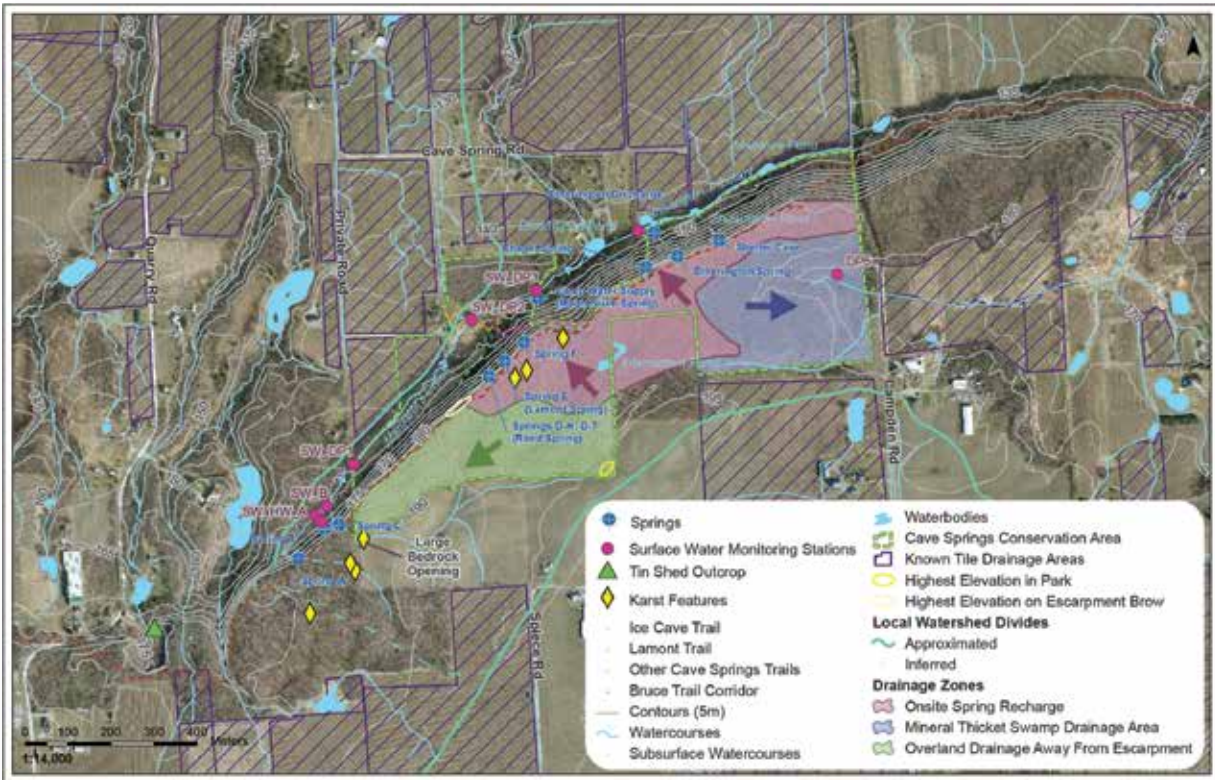


Figure 9: Topography and Surface Water Drainage





II. SURFACE WATER

MARGARET'S CREEK (INTERMITTENT WATERCOURSE, TYPE 3: FISH HABITAT)

The flow at Margaret's Creek was monitored at a number of locations on and off site between March and June 2015 (Figure 9: Topography and Surface Water Features). During flow measurements, the pH, conductivity and temperature were also measured. A series of three springs (A, B and C) provide the primary flow to Margaret's Creek. There was no indication of the creek gaining or losing flow across the Site. It is reasoned the low permeability soils of the creek bed limit interaction with shallow groundwater.

Surface water temperatures in Margaret's Creek rose seasonally from 1° to 4°C in March, to 17° to 18°C in June. The surface water temperatures closely followed the ambient air temperature. Measurements taken closer to, or at the springs, before mixing with the main channel, showed the spring water warmed following discharge (April through June).

Surface water conductivities increased after the spring freshet by June showing values closer to that of the springs. This is interpreted to represent a higher percentage of Lockport aquifer groundwater than recent precipitation in the creek flow (i.e. baseflow).

ETHERINGTON TRIBUTARY

The flow in the Etherington Tributary was monitored between April and June 2015. It is believed the Etherington Spring provides the primary flow to this tributary. A decrease in water flows over the monitoring period appears to reflect a seasonal decrease in groundwater discharge similar to that of Spring D-T (Reed).

Surface water temperatures at the Etherington Tributary rose seasonally following the average ambient air temperature, which is to be expected as there is a pond on line to the tributary from the spring, however the Etherington Spring maintained groundwater-like temperatures from April to June.

Surface water conductivities were in the range of "fresh", and the conductivity in the surface water was fairly stable reflecting the pattern and influence of the spring source with some dilution, likely the on line pond.

5.5 VISITOR SUPPORT INFRASTRUCTURE

Visitor support infrastructures are a carefully considered component of the Cave Springs Management Plan. Proper visitor infrastructure is necessary in order to ensure the integrity of the property as well as its uses remain within the proposed classification.



The following is a proposed visitor support infrastructure:

1. **Cave Springs Road Entrance Concept:** Features include a Cave Springs Conservation Area sign, a Small Armour Stone rock wall, native plantings, gates and fencing.
2. **Green Parking Lot:** A permeable "green" parking lot is proposed for the property, as represented on the adjacent map. Features include a permeable surface (allowing grass to grow), parking for 16-20 cars, plus handicapped parking spaces. Native plantings would also be included.
3. **Existing Barn:** The existing barn and surrounding area would be restored for use at special events and meetings. Features include a reinforced foundation. Renovations will meet special events standards and regulations, be Accessibilities for Ontarians with Disability Act (AODA) compliant with new restrooms and improved north-south views (doors and windows) with fencing delineating an outdoor event space.
4. **Gravel Laneway:** The gravel laneway from the main entrance to the former Reed house will be reestablished, including replacing the deteriorating culvert under the laneway. The updated laneway will allow for emergency and service vehicle access as requested by the Town of Lincoln.
5. **Reed House Deconstruction:** Deconstruction will include trying to salvage as much of the building as possible. A detailed plan will provide an inventory of reusable items.
6. **Reed House Rebuild:** An updated building of similar size will be built on the site of the former Reed house. A design competition will be held to determine the look of the new structure. Features will include a gathering space for 30-40 people, office space on the upper floor and a 25 metre long by 8 metre wide wraparound viewing platform with interpretive signage and benches. There will be restrooms in the building. The distinctive gable end of the house will be a part of the design.
7. **Constructed Wetland and Septic System:** A constructed wetland and septic system will be established on the Cave Springs property to serve both the house and barn structures.
8. **Escarpment Trail:** Features may include stairs and / or alternative trail improvements and will be AODA compliant, as per a local AODA committee, with 2-3 platform/rest areas including benches, interpretive signage, garbage bins, improved safety, and ecological protection.
9. **Two Small Viewing Platforms:** The two viewing platforms will be built on top of

the escarpment, along the Bruce Trail allowing for safe viewing of the vistas. There will also be interpretative signage.

10. **Campden Road New Entrance and Signage:** A new entrance and parking area will be established along Campden Road. Features will include room for five to six cars, a rock wall, native plantings, signage (ex. reduction of illegal dumping at this site), and access to the Bruce Trail.
11. **Water System:** A new water system will be installed to provide water for drinking and to the restrooms.
12. **Updated Electrical:** The barn and former Margaret Reed House will be brought up to code for fire and electrical and any other building code requirements prior to being used for any events, gatherings, etc.

5.5 SOCIAL AND ECONOMIC BENEFITS

Social and economic advantages of the Site include a variety of direct usage, as well as community, scientific and educational benefits.

Direct on-Site activities include birding, hiking and biking, nature appreciation, meditation/relaxation, and cultural heritage and folklore appreciation. Currently, unsanctioned dirt biking and all terrain vehicle usage, bouldering and rock climbing, and camping occur on the Site.

Community benefits include an enhanced quality of life for local and regional communities, increased ecological diversity/shade and temperature moderation, groundwater recharge areas, dolostone aquifer and contact springs. Local and regional communities include area residents five to 80 years old, and campers approximately seven to 15 years old. There are also economic benefits indirectly related such as binoculars, outerwear and hiking and rock climbing equipment.

Scientific and educational benefits include historic natural information, maintenance of ecological diversity and sustainable environment for the area, water resource quality-infiltration and retention, and educational opportunities for summer campers' use.

5.5.1 PARTNERSHIP OPPORTUNITIES

Throughout the development of the Cave Springs Management Plan the NPCA has been consulting with, and engaging its stakeholders. Over the course of many months, the Project Lead, Mark Brickell, and Coordinator of Community Outreach, Kerry Royer, met one-on-one with many NPCA stakeholders. In each of these meetings an opportunity for further partnership with the Cave Springs Conservation Area emerged. Each of these proposed partnerships presents a unique opportunity to further the goals of the Management Plan. The Niagara Peninsula Conservation Authority is committed to an evolving model of partnerships with those that are interested in the Cave Springs Conservation Area. The NPCA realizes that these partnerships will change and develop over time. The NPCA is passionate about working with its stakeholders, community partners, local businesses and government organizations to ensure that the beauty, magic and ecology of Cave Springs is preserved for years to come. This section of the Management Plan will highlight the robust partnership opportunities identified in stakeholder meetings. The partnership opportunities have been put into four different categories: tourism, education, conservation/science and recreation, but many of the opportunities can fit into multiple categories.

5.5.2 TOURISM

The Town of Lincoln, Twenty Valley Tourism, and private nature operators have identified the Cave Springs Conservation Area as a historical, cultural and natural gem in Lincoln. This property provides another story to tell tourists, and perhaps a lesser-known story compared with Ball's Falls Conservation Area. Opportunities for education, exploration, weddings, day trips and corporate team building sessions were identified as areas of interest to be explored. The Town of Lincoln, Twenty Valley Tourism and private operators are willing to be partners with the NPCA because they see this area as the next corridor of interest in Niagara, providing a different and completely authentic experience for visitors.



5.5.3 EDUCATION

The NPCA met with representatives from two Niagara school boards, the Niagara Catholic District School Board (NCDSB) and the District School Board of Niagara (DSBN). Representatives from Brock University, Niagara College and Willowbank School of Restoration Arts were also consulted. Other educational representatives that the NPCA met with included the Niagara Escarpment Biosphere Fund (NEBF) and the Giant's Rib Escarpment Education Network (GREEN). Many of these representatives identified ways of partnering with the NPCA at the Cave Springs Conservation Area. The post-secondary institutions identified many ways in which students could engage with the property, including research opportunities, co-op/ internship opportunities and using the property for field trips to further student understanding of Niagara's geography, geology, the Niagara Escarpment, biodiversity, culture, history, etc. Specifically, the Sustainability Science and Society Masters of Sustainability programs at Brock University mentioned a UNESCO field course called "Biodiversity in the Biosphere Reserve". These groups mostly viewed the 1.416 hectares of

abandoned vineyard as an educational and research opportunity for students. The NCDSB and the DSBN both stated that they would be interested in Site-specific curriculum for the Cave Springs Conservation Area. The NCDSB indicated that many of their technical programs work on projects outside of the school and that perhaps there would be an opportunity for their students to be involved in the deconstruction and rebuild of the Margaret Reed house. In 2015/2016, a group of three students from Willowbank School of Restoration Arts took on aspects of the Cave Springs Management Plan as their school project. The students participated in background research, including the development of a statement of significance for the Site, and assisted in writing the Management Plan. GREEN noted a need for office space for their organization, as did NEBF, and suggested that the top floor of the new building might be used as rental space for a similar group/organization. A representative from DSBN, the Curriculum Consultant for First Nation, Métis and Inuit Education K-12, agreed that Site-specific curriculum would be important to them.

5.5.4 CONSERVATION

The NPCA met with members of the Bert Miller Nature Club, Niagara Falls Nature Club, and Peninsula Field Naturalists. The main partnership opportunity with these nature clubs is to continue to assist with research and monitoring of the property. Many nature clubs have experts in different areas, including botany, bird studies, herpetofaunal studies, etc. Going forward, these partnerships will be extremely valuable as the NPCA implements the long-term monitoring plan for the Cave Springs property. These groups also proposed having a small rental space for their meetings. They also supported the idea of hosting educational hikes on the property and could likely provide some volunteers to lead the hikes.



5.5.5 RECREATION

The two main stakeholders interested in recreation opportunities at Cave Springs include the Ontario Access Coalition (OAC) and the Bruce Trail Conservancy (BTC). The OAC expressed an interest in entering into an agreement with the NPCA regarding use of, and access to, the Cave Springs Conservation Area. They have entered into similar agreements with Grey Sauble Conservation, Hamilton Conservation Authorities and Niagara Parks. The OAC has submitted a proposal to the NPCA for consideration. They have identified Cave Springs as a unique climbing area in Niagara and suggested that it is the only dolostone area in Niagara fit for climbing. Bruce Trail Conservancy members predominantly use the site to walk the Bruce Trail. The Bruce Trail Conservancy proposed working with the NPCA to create a switch back trail, or a loop trail, at the Campden Road entrance. They also indicated that they would be interested in partnering with the NPCA to lead guided hikes, etc.



5.6 PLANNING CONSIDERATIONS

One of the goals of the Management Plan is to propose a change to the current NEPOSS Classification of Nature Reserve to the classification of Natural Environment based on the following information. The outcome of the studies and public consultation have supported this proposed change.

The NEC classifies a park as Nature Reserve when it represents the most significant and distinctive natural areas and landforms found along the Niagara Escarpment. These areas serve to protect selected life science and earth science ANSIs. Management direction includes management practices and uses in a Nature Reserve to ensure that the features and values for which it was established remain protected in perpetuity with permitted uses (subject to management planning). Nature Reserve class parks will not be widely promoted due to the sensitivity of the features in them. Activities will be limited to those that can further scientific understanding and education (e.g. scientific research, natural history interpretation, nature trails or the Bruce Trail). Facilities will be kept to a minimum and forestry or tree cutting in a life science ANSI in public ownership will be permitted where it is necessary to maintain the features for which the area was designated, for emergency access or to implement uses permitted in an approved NEPOSS Management Plan that are not in conflict with NEP.

The Natural Environment description includes lands that are characterized by the variety and combination of outstanding natural heritage features, cultural heritage features and outstanding landscapes. Management direction for Natural Environment lands provide opportunities for the protection of important natural heritage features and cultural heritage features. Permitted uses (subject to management planning) include activities ranging from back-



country hiking in the interior to car-camping and day use activities in the more developed or accessible areas. Agencies should consider compatible uses within the park or open space.

Currently, the Site has recreational facilities and trails supporting low impact activities including hiking. Unevaluated and unsanctioned rock climbing, bouldering, all-terrain vehicle use and unofficial trail development occur on the Site. These unsanctioned activities are believed to have negative impacts on the property.

The NPCA would like to propose that NEC and MNRF support future park operations and activities such as reconstruction of existing buildings with restroom facilities, an updated septic system, viewing platforms, signage, parking areas, and utilities. These buildings will be used for scientific and educational purposes and special events.

The NEPOSS Planning Manual indicated that Nature Reserve parks and Natural Environment parks may include facilities, limited in scope and impact, but critical to support park operations and activities. Where feasible, the agency shall utilize design and development techniques that avoid

or minimize negative impacts to features. Limited support infrastructure may include the following:

- Recreational facilities and trails supporting low impact activities and causing minimal disturbance to the environment and existing park features.
- Small structures such as shelters or restroom facilities.
- Essential utilities and access routes for park maintenance and emergency vehicles provided there are no other feasible alternatives available.

The NEPOSS Planning Manual also indicated that special care should be taken during the planning, design and development of support infrastructure in these parks and the Nature Reserve Zone and the Natural Environment Zone in order to protect natural heritage features and cultural heritage features.

It is the foremost goal of the NPCA to ensure that the design and development techniques avoid or minimize negative impacts to all of the features on Site and on immediate adjacent land.

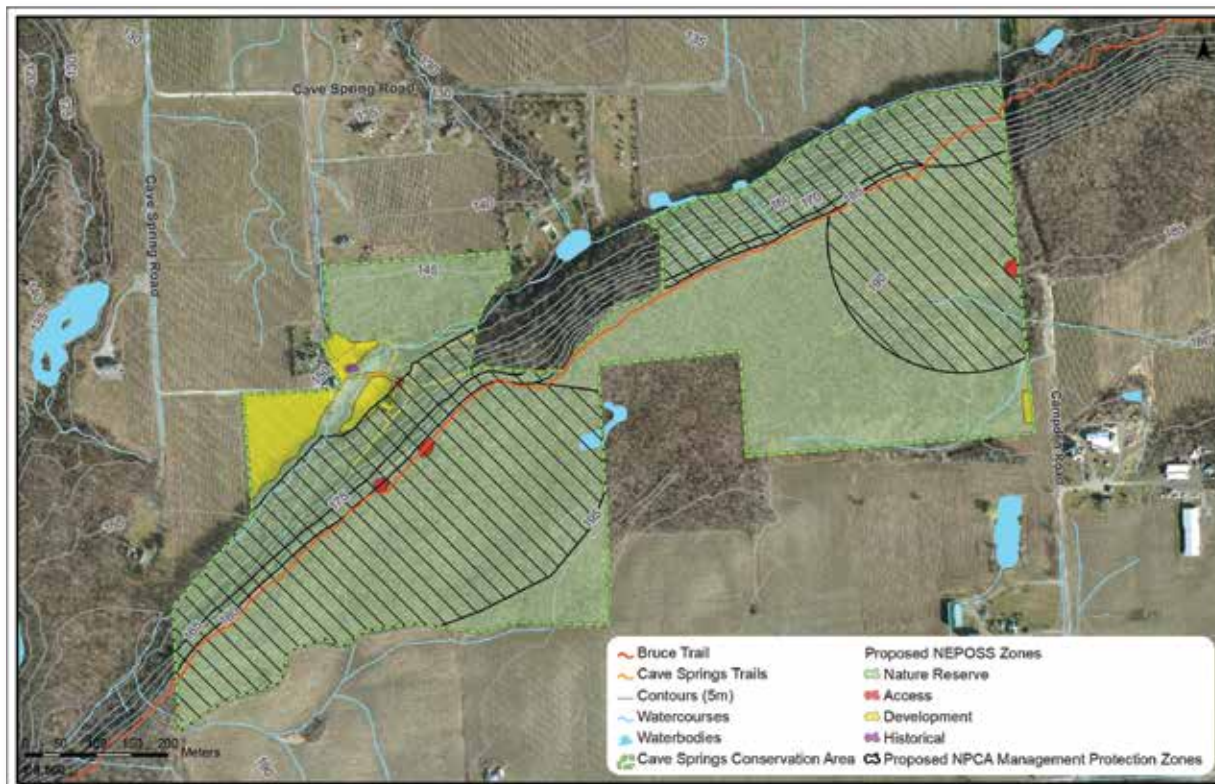


Figure 14: Proposed NEPOSS Zones

5.6.1 NEPOSS CLASSIFICATION AND PARK MANAGEMENT ZONES: CURRENT AND PROPOSED DESIGNATIONS

The NPCA would like to propose a new designation of Natural Environment for the following reasons:

Policy in Part 1.2.2 (i) of the Niagara Escarpment Plan, a change to the Park Descriptions and Classification in the Natural Heritage Study (Appendix A) of the NEP does not require an amendment to the NEP provided the change is justified through the Management Plan process as set out in Part 3.1.6.6 of the NEP

The Cave Springs Conservation Area is currently designated as “Nature Reserve” under the NEPOSS Parks and Open Space Classifications. The current description in Table 5.1 of the NEPOSS Planning Manual for a Nature Reserve describes “the most significant and distinctive natural areas and landforms found along the Niagara Escarpment”. This description does not specifically address cultural heritage features. The “Natural Environment” description specifies that these lands “are characterized by the variety and combination of outstanding natural heritage features, cultural heritage features and outstanding landscape”. The Natural Environment designation allows for the protection of the natural features while recognizing the cultural heritage features.

A group of students from Willowbank School of Restoration Arts used the Cave Springs Conservation Area as their research project for the year. After spending a number of months doing background research on the property and its history, they noted that the “patterns of occupation” on the Site are of significance. They also noted that the presence of Neutral Indians, beginning approximately 11,000 years ago, followed by the Loyalists and finally by Margaret Reed until her death in 2005, are integrally important to the history of the Site and are a major part of its significance along the Niagara Escarpment. The Statement of Significance developed by these students for the Site further defines Cave Springs as a cultural landscape: **“a cultural landscape can be defined as a living site that has retained evidence of its previous communities, which provides context for its current state. Cave Springs as a cultural landscape is its primary heritage value. Its role as an edge ecosystem provides a bridge to the gap in the perception of natural and cultural heritage”**. The significance of the Site as a bridge between the natural and cultural world is important and should be recognized (Figure 14: Proposed NEPOSS Zones).

PARK MANAGEMENT ZONES

Figure 14 suggests the proposed NEPOSS Zones within the park. If these zones are accepted, the newly proposed development and zones will include the following:

PROPOSED INFRASTRUCTURE	PROPOSED ZONE	
Cave Springs Road Entrance Concept	Development	
Green Parking Lot	Development	
Renovate Existing Barn	Historical	
Gravel Laneway	Development	Nature Reserve
Deconstruction and Rebuilding of the Reed House	Development	
Constructed Wetland and Septic System	Development	
Escarpment Trail	Nature Reserve	
Two Small Viewing Platforms	Access	
Campden Road New Entrance and Parking	Development	Access
Water Supply System	Development	Nature Reserve
Update and Bury Electric Lines	Development	Nature Reserve

Table 2: Proposed Infrastructure and Zones

PROPOSED INFRASTRUCTURE	PROPOSED ZONE	CULTURAL HERITAGE IMPACT	NATURAL HERITAGE IMPACT	WATER RESOURCE IMPACT
Cave Springs Road Entrance Concept	Development	Low	Low	N/A
Green Parking Lot	Development	Low	Low	Low
Renovate Existing Barn	Historical	High	Low with mitigation	N/A
Gravel Laneway	Development, Nature Reserve	Low	Low with mitigation	Low with engineering and mitigation
Deconstruction and Rebuilding of the Reed House	Development	Medium	Low	N/A
Constructed Wetland and Septic System	Development	Medium/unknown at this time	Low with mitigation	Low with engineering and mitigation
Escarpment Trail	Nature Reserve	Unknown at this time	Low with mitigation	Low with engineering and mitigation
Two Viewing Platforms	Access	Medium/unknown at this time	Low with mitigation	Low with engineering and mitigation
Campden Road New Entrance and Parking	Access/Development	Medium/unknown at this time	Low with mitigation	Low
Water Supply System	Development, Nature Reserve	Unknown at this time	Low with engineering and mitigation	Low with engineering and mitigation
Update and Bury Electric Lines	Development, Nature Reserve	Low	Low	Low with engineering and mitigation

Table 3: Cave Springs Potential Development and Feature Impact Considerations

FEATURE IMPACT CONSIDERATION WITH DETAILS

The following is an outline of feature impact considerations with details as to how the proposed feature will impact the Site.

CAVE SPRINGS ROAD ENTRANCE

Planning Considerations for Niagara Region Environmental Policy and NPCA Regulation 155/06: This development would be permitted within an area that is already disturbed. There would likely be little to no risk from an NPCA policy perspective if the scope and location are within the already disturbed area. There would be very little impact to natural features.

Cultural Heritage Impact: LOW: If land is to be disturbed, an archaeological assessment should be conducted as per the requirements of the Ministry of Tourism, Culture, and Sport's Standards and Guidelines for Consultant Archaeologists (ASI Recommendation 2).

Natural Heritage Impact: LOW: Minimal disturbance to area meadows used by common species of birds, reptiles and small mammals. Development would be outside of the thicket area used by SAR. Mitigation would include a construction-timing window to reduce noise for breeding birds in the area. (Construction timing: September 1 through February 28.) The design will avoid the thicket.

Water Resource Impact: NOT APPLICABLE

GREEN PARKING LOT

Planning Considerations for Niagara Region Environmental Policy and NPCA Regulation 155/06: Adjacent to this green parking lot area the NPCA staff has identified a Significant Woodland. Depending on the scope, nature, and location of the parking lot, there may be a need for either an Environmental Impact Study (EIS), or the assurance that mitigative measures have been taken to minimize the level of impact.

Cultural Heritage Impact: LOW: If land is to be disturbed, an archaeological assessment should be conducted as per the requirements of the Ministry of Tourism, Culture, and Sport's Standards and Guidelines for Consultant Archaeologists (ASI Recommendation 2).

Natural Heritage Impact: LOW: Potential impact of construction noise to area breeding birds. There should be minimal disturbance to area meadows used by common species of

birds, reptiles and small mammals. Mitigation includes ensuring the design is located outside of the existing thicket (used by SAR birds), and working within a construction timing window to reduce noise for breeding birds (Construction timing: September 1 through February 28)

Water Resource Impact: LOW: Although a parking lot, the proposed design could reduce runoff and promote infiltration. The parking lot would likely be overlying Chinguacousy soils (imperfectly drained, moderately to slowly permeable, with moderate to rapid surface runoff). The area should be graded towards the northwest draining to the road.

RENOVATE EXISTING BARN (SIMILAR FOOTPRINT)

Planning Considerations for Niagara Region Environmental Policy and NPCA Regulation 155/06: The existing barn is adjacent to a watercourse and future renovations would require review to ensure the development is set back sufficiently from ECA/EPA features. Mitigation measures during the construction phase may be implemented to minimize any impacts, however there is likely a very low impact as this development already exists.

Cultural Heritage Impact: HIGH:

ASI Recommendation 2 - If land is to be disturbed, an archaeological assessment should be conducted as per the requirements of the Ministry of Tourism, Culture, and Sport's Standards and Guidelines for Consultant Archaeologists.

ASI Recommendation 5 - Identified cultural heritage resources associated with Cave Spring Conservation Area should be retained in situ. In particular, the existing buildings and cultural heritage landscape features identified should be preserved. Explicit within this recognition would be the assertion that a primary mandate of the Cave Springs Conservation Area is the conservation of cultural heritage resources.

ASI Recommendation 6 - Any land-disturbing activities associated with the development or maintenance within, or adjacent to, an identified cultural heritage feature should be preceded by a heritage impact assessment conducted according to the requirements of the Ministry of Tourism, Culture and Sport's Heritage Tool Kit.

ASI Recommendation 7 - Every effort should be made to ensure that the significance and character of the Cave Springs Conservation Area is protected and conserved in the long-term by managing change to the resources within it

through the development of a conservation plan to identify the cultural and historic significance of the site. Policies and strategies should be developed for maintaining this significance, and should consider the long-term planning of the site as well as how to retain the identified heritage values, attributes and integrity of the resource in any future use, alteration, repair or development.

ASI Recommendation 8 - Conservation objectives as proposed by Parks Canada's Standards and Guidelines for the Conservation of Historic Places in Canada and the Ministry of Culture's Eight Guiding Principles in the Conservation of Built Heritage Properties should be adopted.

ASI Recommendation 9 - Where conservation of the cultural heritage resources identified within the Cave Springs Conservation Area is not feasible, the resource must first be considered for relocation to an appropriate site for reuse through the development and implementation of a relocation plan. Where this option is not feasible, the resource must be documented and salvaged in accordance with provincial standards. For identified built heritage resources, consider maintaining or selecting an appropriate and sustainable use that is compatible with its heritage value. (ASI Recommendation 2, 5 – 9)

Natural Heritage Impact: LOW WITH MITIGATION: Assuming mitigation to ensure additional housing for Squirrels. Project timing should be during late summer (mid-August) to minimize the impact on any Squirrels or building foundation on groundhogs.

Water Resource Impact: NOT APPLICABLE

GRAVEL LANEWAY

Planning Considerations for Niagara Region Environmental Policy and NPCA Regulation 155/06: An updated laneway will likely require a culvert to be replaced as there is a watercourse that traverses the Site. An NPCA Work Permit would be required, which would include mitigation measures to ensure the protection of features and drainage.

Cultural Heritage Impact: LOW: If land is to be disturbed, an archaeological assessment should be conducted as per the requirements of the Ministry of Tourism, Culture, and Sport's Standards and Guidelines for Consultant Archaeologists (ASI Recommendation 2).

Natural Heritage Impact: LOW WITH MITIGATION: Assuming mitigative measures that the design addresses surface water and groundwater infiltration so that pre-development equals post-development conditions.

Water Resource Impact: LOW WITH ENGINEERING AND MITIGATION: Assuming engineering and mitigation. As the laneway is already paved with gravel, minimal change in recharge and runoff is expected. However, a design review for the culvert crossing of Margaret's Creek (Lake Ontario Tributary 20) is recommended to ensure that there are no negative impacts.

DECONSTRUCTION AND REBUILDING OF THE REED HOUSE (SIMILAR FOOTPRINT)

Planning Considerations for Niagara Region Environmental Policy and NPCA Regulation 155/06: Located at the toe of the escarpment slope and in close proximity to ECA/EPA features. An EIS may be required to ensure no negative impact to the natural heritage features. Geotechnical work may be required if the proposed development requires major regrading or cutting into the base of the Escarpment. Moderate risk is dependent upon the scope and nature of construction. A wraparound deck/platform featured around the house should be located outside of the EPA. The location of the deck will dictate the level of risk.

Cultural Heritage Impact: MEDIUM:

ASI Recommendation 2 - If land is to be disturbed, an archaeological assessment should be conducted as per the requirements of the Ministry of Tourism, Culture, and Sport's Standards and Guidelines for Consultant Archaeologists.

ASI Recommendation 5 - Identified cultural heritage resources associated with Cave Spring Conservation Area should be retained in situ. In particular, the existing buildings and cultural heritage landscape features identified should be preserved. Explicit within this recognition would be the assertion that a primary mandate of the Cave Springs Conservation Area is the conservation of cultural heritage resources.

ASI Recommendation 6 - Any land-disturbing activities associated with development or maintenance within or adjacent to an identified cultural heritage feature should be preceded by a heritage impact assessment conducted according to the requirements of the Ministry of Tourism, Culture and Sport's Heritage Tool Kit.

ASI Recommendation 7 - Every effort should be made to ensure that the significance and character of the Cave Springs Conservation Area is protected and conserved in the long-term by managing change to the resources within it through the development of a conservation plan to identify the cultural and historic significance of the site. Policies and strategies should be developed for maintaining this significance, and should consider the long-term planning of the site as well as how to retain the identified heritage values, attributes and integrity of the resource in any future use, alteration, repair or development.

ASI Recommendation 8 - Conservation objectives as proposed by Parks Canada's Standards and Guidelines for the Conservation of Historic Places in Canada and the Ministry of Culture's Eight Guiding Principles in the Conservation of Built Heritage Properties should be adopted.

ASI Recommendation 9 - Where conservation of the cultural heritage resources identified within the Cave Springs Conservation Area is not feasible, the resource must first be considered for relocation to an appropriate site for reuse through the development and implementation of a relocation plan. Where this option is not feasible, the resource must be documented and salvaged in accordance with provincial standards. For identified built heritage resources, consider maintaining or selecting an appropriate and sustainable use that is compatible with its heritage value. (ASI Recommendation 2, 5 – 9)

Natural Heritage Impact: LOW WITH MITIGATION:
Potential impact to breeding birds in the area. Mitigation to include construction/activity timing window September 1 to February 28.

Water Resource Impact:
NOT APPLICABLE

CONSTRUCTED WETLAND AND SEPTIC SYSTEM

Planning Considerations for Niagara Region Environmental Policy and NPCA Regulation 155/06: As the property falls within a Highly Vulnerable Aquifer (HVA), further hydrogeology studies may be required, or a review may be required, to identify and mitigate potential risks. Regional Policy 7.A.2.9 requires further assessment of the proposed development to ensure no significant impacts to the quality and quantity of the sensitive groundwater features.

Cultural Heritage Impact:

MEDIUM/UNKNOWN AT THIS TIME:

If land is to be disturbed, an archaeological assessment should be conducted as per the requirements of the Ministry of Tourism, Culture, and Sport's Standards and Guidelines for Consultant Archaeologists (ASI Recommendation 2.)

Natural Heritage Impact: LOW WITH MITIGATION:

Potential short-term forage habitat loss for bats. Mitigation would include a design to ensure that the same pre and post development stormwater condition, and native plantings are present. Planting will take place as soon as possible upon completion. The plantings will be monitored for non-surviving plants, which will be replaced for two years.

Water Resource Impact:

LOW WITH ENGINEERING AND MITIGATION:

No negative impacts to hydrologic features or function are expected for the sewage disposal system. This is because: (i) additional water quality treatment is proposed using at least a constructed wetland and potentially Level IV/tertiary treatment and (ii) the system will be set-back 30 metres from Margaret's Creek meeting NEC Policy 2.6 (2). Also, a water monitoring program will be conducted adjacent to Margaret's Creek and the Camp Water Supply to monitor for impacts.

ESCARPMENT TRAIL

Planning Considerations for Niagara Region Environmental Policy and NPCA Regulation 155/06: Significant Woodland and ANSI may be impacted from a Regional perspective. Slope/Escarpment face will be impacted from an NPCA policy perspective. Under NPCA policy, a geotechnical investigation and NPCA Work Permit would be required to assess potential risks to slope stability. Mitigation measures would be discussed by an Engineer and implemented to avoid slope stability risk. Under Regional Policy, the proposed development can be considered passive recreational. Further assessment may be required as there may be potential impacts to natural heritage features including pre and post development.

Cultural Heritage Impact:

UNKNOWN AT THIS TIME:

ASI Recommendation 2 - If land is to be disturbed, an archaeological assessment should be conducted as per the requirements of the Ministry of Tourism, Culture, and Sport's Standards and Guidelines for Consultant Archaeologists.

ASI Recommendation 5 - Identified cultural heritage resources associated with Cave Spring Conservation Area should be retained in situ. In particular, the existing buildings and cultural heritage landscape features identified should be preserved. Explicit within this recognition would be the assertion that a primary mandate of the Cave Springs Conservation Area is the conservation of cultural heritage resources.

ASI Recommendation 6 - Any land disturbing activities associated with development or maintenance within or adjacent to an identified cultural heritage feature should be preceded by a heritage impact assessment conducted according to the requirements of the Ministry of Tourism, Culture and Sport's Heritage Tool Kit.

ASI Recommendation 7 - Every effort should be made to ensure that the significance and character of the Cave Springs Conservation Area is protected and conserved in the long term by managing change to the resources within it through the development of a conservation plan to identify the cultural and historic significance of the Site, develop policies and strategies for maintaining this significance, and considering the long-term planning of the Site and how to retain the identified heritage values, attributes and integrity of the resource in any future use, alteration, repair or development.

ASI Recommendation 8 - Conservation objectives as proposed by Parks Canada's Standards and Guidelines for the Conservation of Historic Places in Canada and the Ministry of Culture's Eight Guiding Principles in the Conservation of Built Heritage Properties should be adopted.

ASI Recommendation 9 - Where conservation of the cultural heritage resources identified within the Cave Springs Conservation Area is not feasible, the resource must first be considered for relocation to an appropriate Site for reuse through the development and implementation of a relocation plan. Where this option is not feasible, the resource must be documented and salvaged in accordance with provincial standards. For identified built heritage resources, consider maintaining or selecting an appropriate and sustainable use that is compatible with its heritage value.

Special Note - cultural heritage feature - Petroglyph Aboriginal carving is located along this trail (ASI Recommendation 2, 5 – 9)

**Natural Heritage Impact:
LOW WITH MITIGATION:**

Potential impact to plant and animals as well as the Treed Limestone Talus Vegetative Community (S3). Mitigation will include choosing a location and design to ensure that light and moisture sources are maintained for the moss while leaving a minimal footprint. Minimized noise during breeding bird season March 1 through August 31 (i.e. construction window September 1 through February 28) would also be considered.

**Water Resource Impact:
LOW WITH ENGINEERING AND MITIGATION:**
Improvements to the Escarpment (Lamont) trail are not expected to impact hydrologic features or functions. However, any deep excavations near the base will need to maintain flow from southwest to northeast for the Camp Water Supply.

**TWO VIEWING PLATFORMS ON
TOP OF THE ESCARPMENT**

Planning Considerations for Niagara Region Environmental Policy and NPCA Regulation 155/06: The Escarpment slope, Environmental Protection Area (EPA) ANSI and Significant Woodland would likely be impacted by this development. The potential Geotechnical study required under NPCA policy which will provide mitigation measures to ensure long term protection to structures and feature and to minimize any risk. An NPCA Work Permit would likely be required. This proposed development may be permitted if considered passive recreational (Regional Policy 7.B.1.10).

**Cultural Heritage Impact:
MEDIUM/UNKNOWN AT THIS TIME:**
If land is to be disturbed, an archaeological assessment should be conducted as per the requirements of the Ministry of Tourism, Culture, and Sport's Standards and Guidelines for Consultant Archaeologists. (ASI Recommendation 2).

Natural Heritage Impact: LOW WITH MITIGATION:
Potential impact to the CLO1-5 Open Carbonate Cliff Rim Type (S2 rank) and TAT 1-4 Sugar Maple Moist Treed Limestone Talus Type (S3 rank). Mitigation includes a design to minimize impact.

**Water Resource Impact:
LOW WITH ENGINEERING AND MITIGATION:**
Geotechnical assessments should ensure engineering designs do not negatively affect the Niagara Escarpment and the underlying aquifer.

CAMPDEN ROAD NEW ENTRANCE AND PARKING

Planning Considerations for Niagara Region Environmental Policy and NPCA Regulation 155/06: There will likely be an increase in impervious surface, therefore, there may be stormwater management requirements. This entrance is located adjacent to the EPA feature. It is recommended that this development should remain on agricultural field. Mitigation measures during the construction phase would ensure no negative impact.

Cultural Heritage Impact: MEDIUM/UNKNOWN AT THIS TIME:

If land is to be disturbed, an archaeological assessment should be conducted as per the requirements of the Ministry of Tourism, Culture, and Sport's Standards and Guidelines for Consultant Archaeologists (ASI Recommendation 2).

Natural Heritage Impact: LOW WITH MITIGATION:

Mitigations to ensure no development within the existing local wetland.

Water Resource Impact: LOW:

As long as the new access is south of the Mineral Thicket Swamp, negative impacts to hydrologic features and function should be minimal. The parking area is likely overlying Chinguacousy soils (imperfectly drained, moderately to slowly permeable, with moderate to rapid surface runoff).

WATER SUPPLY SYSTEM

Planning Considerations for Niagara Region Environmental Policy and NPCA Regulation 155/06: As the property falls within a Highly Vulnerable Aquifer (HVA), further hydrogeology studies may be required or review may be required to identify and mitigate potential risks. Regional Policy 7.A.2.9 requires further assessment of the proposed development to ensure no significant impacts to the quality and quantity of the sensitive groundwater features.

Cultural Heritage Impact: UNKNOWN AT THIS TIME:

ASI Recommendation 2 - If land is to be disturbed, an archaeological assessment should be conducted as per the requirements of the Ministry of Tourism, Culture, and Sport's Standards and Guidelines for Consultant Archaeologists.

ASI Recommendation 5 - Identified cultural heritage resources associated with Cave Spring Conservation Area should be retained in situ. In particular, the existing buildings and cultural heritage landscape features identified should be preserved. Explicit within this recognition would be the assertion that a primary mandate of the Cave Springs Conservation Area is the conservation of cultural heritage resources.

ASI Recommendation 6 - Any land disturbing activities associated with development or maintenance within or adjacent to an identified cultural heritage feature should be preceded by a heritage impact assessment conducted according to the requirements of the Ministry of Tourism, Culture and Sport's Heritage Tool Kit.

ASI Recommendation 7 - Every effort should be made to ensure that the significance and character of the Cave Springs Conservation Area is protected and conserved in the long term by managing change to the resources within it through the development of a conservation plan to identify the cultural and historic significance of the site, develop policies and strategies for maintaining this significance, and consider the long-term planning of the site and how to retain the identified heritage values, attributes and integrity of the resource in any future use, alteration, repair or development.

ASI Recommendation 8 - Conservation objectives as proposed by Parks Canada's Standards and Guidelines for the Conservation of Historic Places in Canada and the Ministry of Culture's Eight Guiding Principles in the Conservation of Built Heritage Properties should be adopted.

ASI Recommendation 9 - Where conservation of the cultural heritage resources identified within the Cave Springs Conservation Area is not feasible, the resource must first be considered for relocation to an appropriate site for reuse through the development and implementation of a relocation plan. Where this option is not feasible, the resource must be documented and salvaged in accordance with provincial standards. For identified built heritage resources, consider maintaining or selecting an appropriate and sustainable use that is compatible with its heritage value.

Caveat - if involving identified heritage features CHL 8 (wells) all these apply, if not, Recommendation 2 still applies (ASI Recommendation 2, 5 – 9).

**Natural Heritage Impact: LOW WITH
ENGINEERING AND MITIGATION**

Water Resource Impact:

LOW WITH ENGINEERING AND MITIGATION:

Reestablishment of water supply collection from the Reed Spring should not negatively impact hydrologic functions or features. If further information determines that reestablishment of the water supply will occur, cisterns will be installed.

UPDATE AND BURY ELECTRICAL LINES:

Planning Considerations for Niagara Region Environmental Policy and NPCA Regulation 155/06: A NPCA Work Permit may be required which will include mitigation measures to ensure protection of feature.

Cultural Heritage Impact: LOW: If land is to be disturbed, an archaeological assessment should be conducted as per the requirements of the Ministry of Tourism, Culture, and Sport's Standards and Guidelines for Consultant Archaeologists (ASI Recommendation 2).

Natural Heritage Impact: LOW: Depending on the location of the lines mitigation measures may be required to ensure the design does not impact natural heritage features.

Water Resource Impact:

LOW WITH ENGINEERING AND MITIGATION:

However, a design is recommended to ensure no negative impacts.

5.7 EXISTING PARK AND OPEN SPACE POLICY

At this time the Cave Springs Management Plan will build upon the existing policy framework of the Niagara Escarpment Plan. Currently, this conservation area is classified as a Nature Reserve within the Niagara Escarpment Plan which is a designation that represents the most significant and distinctive natural areas and landforms along the escarpment. The plan states that access to these areas will not be widely promoted due to the sensitivity of the features in them. Activities will be limited to those that can further scientific understanding and education.

5.7.1 PAST MANAGEMENT DIRECTION DOCUMENTS

A Cave Springs plan was prepared for the Site by the NPCA, dated November 1986. NPCA files indicate it was unsigned, and there is no written or verbal confirmation if the Plan was approved or not. From 2006 to 2008 a Cave Springs Master Plan was initiated, however the process was discontinued as the NPCA decided to wait until the new NEPOSS guidelines were in place. NPCA staff are not aware of any other Master or Management Plan work being completed since 2008.



6.0 SUMMARY

Following the release of this Background Report, there will be opportunities to receive comments from the public, the Cave Springs Steering Committee and the NPCA Board of Directors. The report will then be finalized, and work will begin on the preparation of the Management Plan for the Cave Springs Conservation Area. Any issues and opportunities that have been identified to date will be further discussed and refined as the project moves forward.

Preparation of the Management Plan includes preparing a land classification system based on the Niagara Escarpment Parks and Open Space System (NEPOSS) zones, which has been included in this Background Report. The next step will be the development of the Management Plan that will guide future development. Further public consultation will occur throughout the development of the NEPOSS zones and the Management Plan, and an additional public meeting will be held to obtain feedback.

It is anticipated that the project will be complete in the winter of 2016.



7.0

references



7.0 REFERENCES

WATER RESOURCES

- Brunton, F.R., and Dodge, J.E.P., 2008.
Karst of Southern Ontario and Manitoulin Island. Ontario Geological Survey Groundwater Resources, Study 5.
- Chapman, L.J. and Putnam, D.F., 1984.
The Physiography of Southern Ontario. Ontario Geological Survey, Special Volume 2, 270 p.
- Fetter, C.W., 1994.
Applied Hydrogeology, 3rd Edition. Prentice Hall, University of Wisconsin – Oshkosh.
- Gale, J.E., Nadon, R.L., Mackay, D.A. and Sweezy, R.A., 1983.
Impact of Groundwater on Surface and Subsurface Mining Activities in the Niagara Escarpment. Ontario Geological Survey Miscellaneous Paper 113, Geoscience Research Grant Program, Summary of Research 1982-1983.
- Haynes, S.J., 1994.
Geology, Scenery and Wines of the Niagara Escarpment. Field Trip A3: Guidebook, Geological Association of Canada, Mineralogical Association of Canada.
- Ministry of Municipal Affairs and Housing, 2014.
2014 Provincial Policy Statement under the Planning Act.
- Ministry of Natural Resources, 2012.
Niagara Escarpment Parks and Open Space System Planning Manual.
- Murphy, B., 2015
Cave Springs, A Geologic Description. Prepared for the Cave Springs Management Plan.
- Niagara Escarpment Commission, 2013.
Niagara Escarpment Plan Review 2015, Discussion Paper, Topic 5, Niagara Escarpment Plan Water Policies.
- Niagara Peninsula Conservation Authority, 2016
Water Resource Assessment Study for the Cave Springs Conservation Area Management Plan.
- Reed, M., 1998.
The Cave Springs Mystique.
- Steele, K.G., and Haynes, S.J., 2000.
Mines and Wines: Industrial Minerals, Geology and Wineries of the Niagara Region – Field Trip Guidebook. Ontario Geological Survey, Open File Report 6029.

ECOLOGICAL REFERENCES

Arizona-Sonora Desert Museum. Animal Fact Sheet. Mexican Free-tailed Bat. November. (Accessed 6, 2015). https://www.desertmuseum.org/kids/bats/mexican_free_tailed_bat.php

Bennett, Karen P. editor. 2010. Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire (second edition). University of New Hampshire Cooperative Extension, Durham, New Hampshire "Cavity Trees, Dens and Snags". (Assessed September 8 2015). <https://extension.unh.edu/goodforestry/html/6-2.htm>

Berger, Rebekah. 2006. Fall Den Site Selection of Southern Flying Squirrels in Schmeekle Reserve. Wildlife Ecology University of Wisconsin-Stevens Point.

British Bryological Society. October 2013. BBS Field Guide. Mosses *Tortula muralis* Factsheet. (Accessed November 24, 2015). www.bbsfieldguide.org.uk/sites/default/files/pdfs/mosses/Tortula_muralis.pdf

British Bryological Society. October 2013. BBS Field Guide. Mosses *Conardia compacta* *Amblystegium compactum*. Compact Feather-moss. (Accessed November 24, 2015).

COSEWIC. 2013. COSEWIC assessment and status report on the Little Brown *Myotis Myotis lucifugus*, Northern *Myotis Myotis septentrionalis* and Tri-colored Bat *Perimyotis subflavus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxiv + 93 pp

COSEWIC. 2012. COSEWIC assessment and status report on the Wood Thrush *Hylocichla mustelina* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 46 pp

Cornell University. 2015. The Cornell Lab of Ornithology All About Birds. Barn Swallow. (Accessed November 5, 2015). https://www.allaboutbirds.org/guide/Barn_Swallow/id

Cornell University. 2015. The Cornell Lab of Ornithology All About Birds. Common Nighthawk. (Accessed November 5, 2015). https://www.allaboutbirds.org/guide/Common_Nighthawk/id

Cornell University. 2015. The Cornell Lab of Ornithology All About Birds. Eastern Phoebe. (Accessed November 5, 2015). https://www.allaboutbirds.org/guide/Eastern_Phoebe/id

Cornell University. 2015. The Cornell Lab of Ornithology All About Birds. Eastern Wood Pewee. (Accessed November 5, 2015). https://www.allaboutbirds.org/guide/Eastern_Wood-Pewee/id

Cornell University. 2015. The Cornell Lab of Ornithology All About Birds. Great Crested Flycatcher. (Accessed November 5, 2015). https://www.allaboutbirds.org/guide/Great_Crested_Flycatcher/id

Cornell University. 2015. The Cornell Lab of Ornithology All About Birds. Hooded Warbler. (Accessed November 5, 2015). https://www.allaboutbirds.org/guide/Hooded_Warbler/id

Cornell University. 2015. The Cornell Lab of Ornithology All About Birds. Red-eyed Vireo. (Accessed November 5, 2015). https://www.allaboutbirds.org/guide/Red-eyed_Vireo/id

Cornell University. 2015. The Cornell Lab of Ornithology All About Birds. Virginia Rail. (Accessed November 5, 2015). https://www.allaboutbirds.org/guide/virginia_rail/lifehistory

Cornell University. 2015. The Cornell Lab of Ornithology All About Birds. Wood Thrush. (Accessed November 5, 2015). https://www.allaboutbirds.org/guide/wood_thrush/lifehistory

Crum, Howard. 1983. Mosses of the Great Lakes Forest. Third Edition. University Herbarium, University of Michigan. Ann Arbor Michigan

Discover Southern Ontario. Ontario Wildlife. Coyotes (*Canis latrans*). (Accessed November 17, 2015). <http://www.discover-southern-ontario.com/coyotes.html>

Environment Canada and Canadian Wildlife Federation. Hinterland Who's Who. Little Brown Bat. (Accessed November 5, 2015). <http://www.hww.ca/en/wildlife/mammals/little-brown-bat.html>

Environment Canada. 2014. Recovery Strategy for the Eastern Flowering Dogwood (*Cornus florida*) in Canada. *Species at Risk Act* Recovery Strategy Series. Environment Canada, Ottawa. 16 pp. + Appendices.

Environment Canada. Species at Risk Public Registry. August 14, 2015. American Chestnut. (Accessed August 14, 2015). http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=205

Environment Canada. Species at Risk Public Registry. August 14, 2015. Southern Flying Squirrel (*Glaucomys Volans*). (Accessed November 18, 2015). <http://www.sararegistry.gc.ca/default.asp?lang=En&n=E0C39EEE-1&offset=8&toc=show>

Environment Canada. Species at Risk Public Registry. August 14, 2015. Species Profile Hooded Warbler. (Accessed November 5, 2015). http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=37

Environment Canada. Species at Risk Public Registry. August 14, 2015. Species Profile Wood Thrush. (Accessed November 5, 2015). Wood Thrush November 5, 2015. http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1197

Environment Canada. Species at Risk Public Registry. August 14, 2015. Species Profile. Kentucky Coffee tree. (Accessed November 24, 2015). http://www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=222

Environment Canada. Canadian Wildlife Service. July 2014. Consultation on the Impacts of Adding Three Bat Species to the List of Species under the *Species at Risk Act* – July 2014. Species at Risk Public Registry

Environment Canada. 2012. Recovery strategy for the Acadian Flycatcher (*Empidonax virens*) and the Hooded Warbler (*Wilsonia citrina*) in Canada. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa, Ontario. viii + 32 pp.

Environment Canada. 2015. Recovery Strategy for the Common Nighthawk (*Chordeiles minor*) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. vi + 48 pp.

Gerson, Helen. August 1984. Habitat Management Guidelines for Bats of Ontario. Ontario Ministry of Natural Resources. Ontario Ministry of Natural Resources.

Idaho Museum of Natural History. *Lasiurus cinereus* (Hoary Bat). Accessed November 17, 2015. <http://www.imnh.isu.edu/digitalatlas/bio/mammal/Bats/hoba/hobat.htm>

Jalava, J.V., B. Larson, C.A. Schaefer and S. Varga. 1992. Biological Inventory and Evaluation of the Beamsville Escarpment Area of Natural and Scientific Interest, Ontario Ministry of Natural Resources, Southern Region, Aurora, Ontario; Open File Ecological Report 9203. V+80 pages +3 folded maps

Mark Browning, OMNRF. Personal communication November 4, 5 and 25, 2015.

Ministry of Environment, Lands and Parks. Resources Inventory Branch for the Terrestrial Ecosystems Task Force Resources Inventory Committee. March 13, 1998. Inventory Methods for Pond-breeding Amphibians and Painted Turtle. Standards for Components of British Columbia's Biodiversity No. 37. Version: 2.0

NatureServe Explorer. An Online Encyclopedia of Life. *Desmatodon porter*. January 2015. (Accessed November 21, 2015). <http://explorer.natureserve.org/servlet/NatureServe?searchName=Desmatodon+porteri>

New England Wild Flower Society. 2011-2015. Go Botany. *Carex oligocarpa*. Rich Woods Sedge. (Accessed November 26, 2015). <https://gobotany.newenglandwild.org/species/carex/oligocarpa/>

Ohio Moss & Lichen Association. *Tortula porter*. (Accessed November 24, 2015). <http://ohiomosslichen.org/moss-tortula-porteri/>

Ontario Fur Managers Federation. 2012. Coyote. (Accessed November 17, 2015). <http://www.furmanagers.com/#!coyote/c1rpu>

Ontario Fur Managers Federation. 2012. Red Fox. (Accessed November 17, 2015). <http://www.furmanagers.com/#!red-fox/c1z94>

Ontario Nature. Bats *Chiroptera*. (Accessed November 6, 2015). http://www.ontarionature.org/discover/resources/PDFs/atlas/mammal_atlas_bats.pdf

Ontario Ministry of Natural Resources. 2011. A Land Manager's Guide to Conserving Habitat for Forest Birds in Southern Ontario. Queen's Printer for Ontario, Toronto.

Ontario Ministry of Natural Resources. Schaefer et al. 1992. Biological Inventory and Evaluation of Jordan Valley Area of natural and Scientific Interest

Ontario Ministry of Natural Resources and Forestry. Common Nighthawk. Scientific name: *Chordeiles minor* (Accessed November 17, 2015). <http://www.ontario.ca/page/common-nighthawk>

Ontario Ministry of Natural Resources. Kor, PSG. 1991. Earth Science Inventory and Evaluation of the Jordan Harbour Area of Natural and Scientific Interest. Aurora. Ontario Heritage Foundation Niagara Escarpment Heritage Protection and Land Stewardship Program

Ontario Ministry of Natural Resources and Forestry. Eastern small-footed bat Scientific name: *Myotis leibii*. (Accessed November 5, 2015). <http://www.ontario.ca/page/eastern-small-footed-bat#!/>

Ontario Ministry of Natural Resources. 2000. Extension Notes. Conserving The Forest Interior: a Threatened Wildlife Habitat. Queen's Printer for Ontario. Toronto.

Ontario Ministry of Natural Resources and Forestry. 'Little Brown Bat'. (Accessed November 5, 2015). <http://www.ontario.ca/page/little-brown-bat>

Ontario Ministry of Natural Resources and Forestry. Little brown bat. Scientific name: *Myotis lucifugus*. (Accessed November 17, 2015). <http://www.ontario.ca/page/little-brown-bat#!/>

Ontario Ministry of Natural Resources and Forest. Ontario. Mammals at risk in Ontario. A list of species at risk for the selected Ontario Region. (Accessed November 6, 2015). <http://www.ontario.ca/environment-and-energy/species-risk-type?name=Mammals>

Ontario Ministry of Natural Resources and Forestry. Natural Heritage Information Centre. Species List. (Accessed November 6, 13, 2015). www.ontario.ca/page/get-natural-heritage-information#1

Ontario Ministry of Natural Resources and Forestry. Northern long-eared bat. Scientific name: *Myotis septentrionalis*. (Accessed November 17, 2015). <http://www.ontario.ca/page/northern-long-eared-bat#!/>

Ontario Ministry of Natural Resources, Parks and Recreation Section, Central Region. February 1983. Regional and Local Earth Science Areas of Natural and Scientific Interest in Niagara District.

Ontario Ministry of Natural Resources. 2000. Significant Wildlife Habitat Technical Guide. OMNR. Fish and Wildlife Branch Wildlife Section. Science Development and Transfer Branch Southcentral Sciences Section

Ontario Ministry of Natural Resources. Karine Beriault. Personal Communication. All Species Occurrence for Site and Area.

Riley, J.L., J.V. Jalava and S. Varga. 1996. Ecological Survey of the Niagara Escarpment Biosphere Reserve. Volume I. Significant Natural Areas. Volume II. Technical Appendices. Ontario Ministry of Natural Resources, Southcentral Region, Peterborough, Ontario. Open File Site Report SR 9601. v+629 pp., vii +310 pp.

Stantec, Pre-Construction Monitoring Report Niagara Region Wind Farm File No. 160950269. July 23, 2014. Stantec. Kitchener, ON

State University of New York College of Environmental Science and Forestry, ESF. Adirondack Ecological Centre. ESF Newcomb Camps. Small-footed Bat (*Myotis leibii* Audubon and Bachman). (Accessed November 5, 2015). http://www.esf.edu/aec/adks/mammals/smallfooted_bat.htm

State University of New York College of Environmental Science and Forestry, ESF. Adirondack Ecological Centre. ESF Newcomb Camps. Silver-haired Bat (*Lasionycteris noctivagans* Leconte). (Accessed November 17, 2015). http://www.esf.edu/aec/adks/mammals/silverhaired_bat.htm

State University of New York College of Environmental Science and Forestry, ESF. Adirondack Ecological Centre. ESF Newcomb Camps. Southern Flying Squirrel (*Glaucomys volans Linnaeus*). From Saunders, D. A. 1988. Adirondack Mammals. State University of New York, College of Environmental Science and Forestry. 216pp. (Accessed November 21, 2015). http://www.esf.edu/aec/adks/mammals/southern_flying_squirrel.htm

Steinhoff, G. et.al. 2012 Nesting Patterns of Southern Flying Squirrels in Managed Northern Hardwoods. . Journal of Mammology . Vol. 93. Issue 2. Pg. 532-539.
Taylor, Daniel A.R., 2006. Forest Management & Bats. Bat Conservation International

United States Fish and Wildlife, 'Northern Long-Eared Bat (*Myotis septentrionalis*) Fact Sheet'. (Accessed November 5, 2015). https://www.whitenosesyndrome.org/sites/default/files/resource/national_wns_revise_final_6.25.12.pdf

USGS National Wildlife Health Centre. White-Nosed Syndrome.org A Coordinated Response to the Devastating Bat Disease. Decontamination. Current Decontamination Protocols. (Accessed November 5, 2015). https://www.whitenosesyndrome.org/sites/default/files/resource/national_wns_revise_final_6.25.12.pdf

University of Michigan. BioKids. Kids' Inquiry of Diverse Species. Hoary Bat. *Lasiurus cinereus*. (Accessed November 17, 2015). http://www.biokids.umich.edu/critters/Lasiurus_cinereus

University of Michigan. BioKids. Kids' Inquiry of Diverse Species. Silver-haired bat *Lasionycteris noctivagans* (Accessed November 17, 2015). http://www.biokids.umich.edu/critters/Lasionycteris_noctivagans/

University of Michigan. BioKids. Kids' Inquiry of Diverse Species big brown bat. *Eptesicus fuscus*. (Accessed November 17, 2015). http://www.biokids.umich.edu/critters/Eptesicus_fuscus/

USDA Forest Service. Eastern Region. September 2001. Revised Biological Assessment for Threatened and Endangered Species on the Monongahela National Forest West Virginia. September 2001. USDA Forest Service. Milwaukee, WI



80 glossary



8.0 GLOSSARY

AGRARIAN

Relating to cultivated land or the cultivation of land.

AQUITARD

A layer of low permeability that can store groundwater and also transmit it slowly from one aquifer to another.

AREA OF NATURAL AND SCIENTIFIC INTEREST (ANSI)

Areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education.

BIODIVERSITY

The variety of life in the world or in a particular habitat or ecosystem.

BIOMES

Are very large ecological areas on the earth's surface, with fauna and flora (animals and plants) adapting to their environment. Biomes are often defined by abiotic factors such as climate, relief, geology, soils and vegetation. A biome is NOT an ecosystem, although in a way it can look like a massive ecosystem.

BORROW PITTING

An excavated area where material has been dug for use as fill at another location.

BOULDERING

A form of rock climbing that is performed without the use of ropes or harnesses. While it can be done without any equipment whatsoever, most climbers use climbing shoes to help secure footholds and chalk to keep their hands dry.

BRUCE TRAIL CORRIDOR

The Bruce Trail Conservancy is committed to establish a public footpath along the Niagara Escarpment in order to protect its natural ecosystems and to promote environmentally responsible public access to this UNESCO World Biosphere Reserve. The corridor includes Main and Side Bruce Trails as well as the optimum route.

CATCHMENT

The land area over which rains falls.
Clint: a slab of limestone/dolostone pavement that is separated from adjacent clints by solutional activity along joints.

CHERT FLAKES

A hard, dark, opaque rock composed of silica (chalcedony) with an amorphous or microscopically fine-grained texture. It occurs as nodules (flint) or, less often, in massive beds.

DEVELOPMENT

As it pertains to the Planning Act, Provincial Policy Statement, Greenbelt Plan and Land Use Planning Policies.

DEVELOPMENT

As it pertains to the Conservation Authorities Act, is defined as:

- The construction, reconstruction, erection or placing of a building or structure of any kind,
- 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, site grading, or
- The temporary or permanent placing, dumping or removal of any material, originating on the site or elsewhere.

DOLOMITE

A translucent mineral consisting of a carbonate of calcium and magnesium (a sedimentary rock formed chiefly of dolomite).

ECOLOGICAL FUNCTION

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 hydrological, biological, physical, chemical and socio-economic interactions.

ECOLOGICAL LAND CLASSIFICATION (ELC)

The Ontario Ministry of Natural Resources and Forestry defines ecological units based on bedrock, climate (temperature, precipitation), physiography (soils, slope, and aspect) and corresponding vegetation, creating an Ecological Land Classification (ELC) system. This classification of the landscape enables planners and ecologists to organize ecological information into logical integrated units to enable landscape planning and monitoring.

ENDANGERED SPECIES

Species listed or categorized as an “Endangered Species” on the Ontario Ministry of Natural Resources and Forestry’s official species at risk list or on the COSEWIC list of endangered species, as updated and amended periodically.

ENDANGERED SPECIES ACT

A provincial Act with three distinct purposes including: to identify species at risk based on the best available scientific information, including information obtained from community knowledge and aboriginal traditional knowledge; protect species that are at risk and their habitats, and to promote the recovery of species that are at risk; and to promote stewardship activities to assist in the protection and recovery of species that are at risk in Ontario.

EPHEMERAL STREAMS

Flow only during and after large precipitation event or snowmelt for a period of a few days to a few weeks. A water “flow path” occurs on top of the forest floor, rarely scouring a distinct channel except on steep slopes.

FISSURE

A long, narrow opening or line of breakage made by cracking or splitting, especially in rock or earth.

GAMBREL BARN

Is a barn that has the roof built with double slope on each side of the roof, with lower slope having steeper roof pitch than the upper slope.

GRIKE

A solutional, vertical fissure developed along a joint, separating dolostone/limestone pavement into clints.

HERPETOFAUNAL

The reptiles and amphibians of a particular region, habitat, or geological period.

HYDRAULIC CONDUCTIVITY

The rate of flow of water under a unit hydraulic gradient.

HYDROLOGIC FEATURES

Permanent and intermittent streams, wetlands, lakes (and their littoral zones), seepage areas and springs, and aquifers and groundwater recharge areas.

HYDROLOGIC FUNCTION

The functions of the hydrologic cycle that include 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.

INTERMITTENT STREAMS

Usually flow during wet seasons and in the summer after a major rain event. Non-permanent flowing drainage feature having a definable channel and evidence of annual scour or deposition.

JOINT

A surface of a fracture, or parting of a rock, without displacement, and the surface is usually plane and often occurs with parallel joints.

KARST

Topography formed over limestone, dolostone or gypsum and characterized by sinkholes, caverns and lack of surface streams.

LITHOLOGIC

The gross physical character of a rock or rock formation.

NATURAL HERITAGE FEATURES

These 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 the area.

NATURAL HERITAGE SYSTEM

A system made up of natural heritage features and areas, linked by natural corridors necessary to maintain biological and geological diversity, natural functions, viable populations and indigenous species and ecosystems. These systems include lands that have been restored and areas with the potential to be restored to a natural state.

NEGATIVE IMPACTS

In regard to natural heritage features and areas, degradation that threatens the health and integrity of the natural features or ecological functions for which and areas is identified due to single, multiple or successive development or site alteration activities.

NEPOSS

The Niagara Escarpment Parks and Open Space System is a linear system of over 140 parks and open spaces owned / managed by public agencies or conservation authorities. The System is based on public lands acquired to protect significant areas and features along the Niagara Escarpment, the majority of which are linked by the Bruce Trail. Park managers are required to develop management / master plans that are not in conflict with the objectives and policies of the NEP.

NIAGARA ESCARPMENT COMMISSION (NEC)

An agency of Ontario's Ministry of Natural Resources, the NEC works to preserve the Niagara Escarpment as a continuous natural landscape and a vital corridor of green space through south-central Ontario.

ONTARIO MINISTRY OF NATURAL RESOURCES AND FORESTRY (MNR)

This Ministry manages and protects Ontario's natural resources for wise use across the province, contributing to the environmental, social and economic well-being of Ontario.

OVERBURDEN

The loose soil, silt, sand, gravel or other unconsolidated material overlying bedrock.

PERMANENT STREAMS

Usually flow for most of the year but can run dry during drought conditions. The stream bed is typically located below the water table and groundwater or a permanent water feature is the primary source of flow.

PETROGLYPH

A rock carving, especially a prehistoric one.

PROVINCIALY SIGNIFICANT WETLANDS (PSW)

Provincially Significant Wetlands are wetlands that, in the opinion of the Ontario Ministry of Natural Resources and Forestry contain habitats of critical importance to fish or wildlife, have a significant hydrologic role in the watershed in which they exist, provide significant social or economic benefits and have unique or provincially significant features. Development is not permitted in Provincially Significant Wetlands.

SPECIES AT RISK (SAR)

A federal Act for the purposes of preventing wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened. Threatened Species: As defined by the Ontario Ministry of Natural Resources and Forestry, a species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.

TABLELAND

A broad, high, level region; a plateau.

TALUS SLOPE

Geologists define talus as the pile of rocks that accumulates at the base of a cliff, chute, or slope. The formation of a talus slope results from the talus accumulation.

WATERSHED

The land area that contributes surface runoff to any point of interest.

WETLAND

As defined in the Provincial Policy Statement (2005) are lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface. In either case the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic plants or water tolerant plants. The four major types of wetlands are swamps, marshes, bogs and fens.

WHALEBACK

A large mound having the general shape of a whale's back, smooth elongated ridge having a rounded crest.

WILDLIFE

All wild mammals, birds, reptiles, amphibians, fish, invertebrates, plants, fungi, algae, bacteria and other wild organisms.

WILDLIFE HABITAT

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

WOODLANDS

Treed areas that provide environmental and economic benefits to both private landowners and the public, such as erosion protection, hydrological and nutrient cycling, provision of clean air, provision of wildlife habitat, outdoor recreational opportunities and the sustainable harvest of a wide range of woodland products. These include treed areas, woodlots or forested areas and can vary in their level of significance at the local, regional and provincial levels.



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