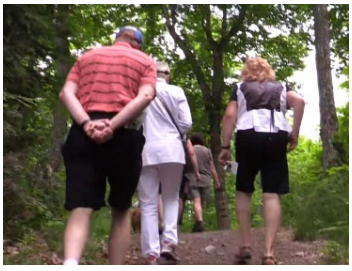
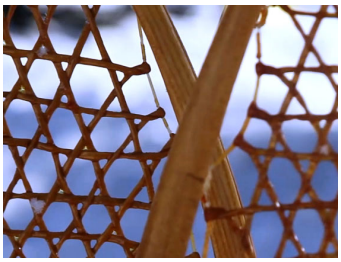
Glebe Park Stewardship Plan






2023-2033

Municipality of Dysart et al

Adopted at the April 23, 2024 Meeting of Regular Council by Resolution #24-156.

Acknowledgements

We would like to thank the students of the 2020 Credit for Product course in Ecosystem Management Technology Program, School of Environmental and Natural Resource Sciences, Fleming College, Hayden Nielsen, Jade Schwartzentruber, and Celeste Thompson and their professor Sara Kelly, as well as the professional advisors, members of the Glebe Park and Museum Committee of the Municipality of Dysart et al, and the key stakeholders for their contributions to this plan.

Executive Summary

This stewardship plan for Glebe Park builds on the 2011-2021 Stewardship Plan created by Forest Design in association with Glenside Ecological Services Limited and reflects the environmental, recreational, and cultural values identified in that plan.

The Stewardship Objectives for Glebe Park are to provide opportunities for cultural and self-propelled recreational activities, while maintaining the ecological integrity of the forest and a safe environment for visitors.

The plan includes:

- A detailed history of the parkland,
- A report on Completed Stewardship Activities since 2011,
- A review of the Stewardship Values,
- A description of Recreational and Cultural Uses of the park and recommendations for management into the future,
- A description of issues related to safety and recommendations for action,
- A description of the state of the forest and the impacts of Beech Bark Disease, climate change and an increased population of deer, recommendations for safety, forest management and trail maintenance/development,
- Maps of all of the trails in the park and the adjacent lands for skiing, snowshoeing, walking, mountain-biking, and the Haliburton Sculpture Forest,
- An inventory of flora and fauna, and
- Operational Procedures for Managing Hazard Trees.

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1.0 Introduction

Located on the north shore of Head Lake in the village of Haliburton, Glebe Park is 175 acres (71 hectares) of woodlands and rolling hills with networks of trails for walking, mountain-biking, cross country-skiing and snowshoeing. It is also a great place to engage with art, culture and heritage. Glebe Park is home to the Haliburton Highlands Museum, Haliburton Sculpture Forest and Fleming College, Haliburton School of Art + Design.

1.1 Property owner information

The Park area has two sections. The northern section of 150.3 acres (61 hectares) is owned by the Municipality of Dysart et al. The southern section of 24.7 acres (10 hectares) is owned by Fleming College. This portion was donated to Fleming College by the municipality for a college campus for the Haliburton School of Art + Design with the understanding that the public would continue to have access to the property as parkland for recreational and cultural activities. To the visitor, there is no differentiation between the two sections.

1.2 Property Management

The municipally owned portion of the park is managed by the Glebe Park and Museum Committee of the Municipality of Dysart et al with the support of the Parks and Recreation Department of the municipality. The portion of the park owned by Fleming College is managed by Fleming College in collaboration with the Haliburton Sculpture Forest, the HHNTA and the HCSA. The Glebe Park and Museum Committee is comprised of volunteers and staff representing the key stakeholder groups that are involved in the management of the park and recreational areas. The following organizations are represented on the committee:

- Haliburton-By-The-Lake Neighborhood Association
- Haliburton County Snowmobile Association
- Haliburton Highlands Museum
- Haliburton Highlands Nordic Trails Association
- Haliburton Sculpture Forest
- Haliburton Mountain Bike Club
- Municipality of Dysart et al (one Municipal counselor)
- Fleming College

The Glebe Park and Museum Committee and the College collaborate on areas of overlapping responsibility and mutual interest related to the properties such as mapping, signage, trail management, programming and use of space. When the College was deeded its portion of the park for the campus of the Fleming College, Haliburton School of Art + Design, it was agreed that the public would continue to have access to the property.

The Haliburton Highlands Nordic Trail Association, the Haliburton Sculpture Forest, and the Haliburton County Snowmobile Association have land use agreements with the Municipality and the College since their activities occur on both sections of the park. The Haliburton Highlands Mountain Bike Club has a land use agreement with the Municipality. These organizations manage and fund their respective areas of responsibility.

1.3 Glebe Park Location Information

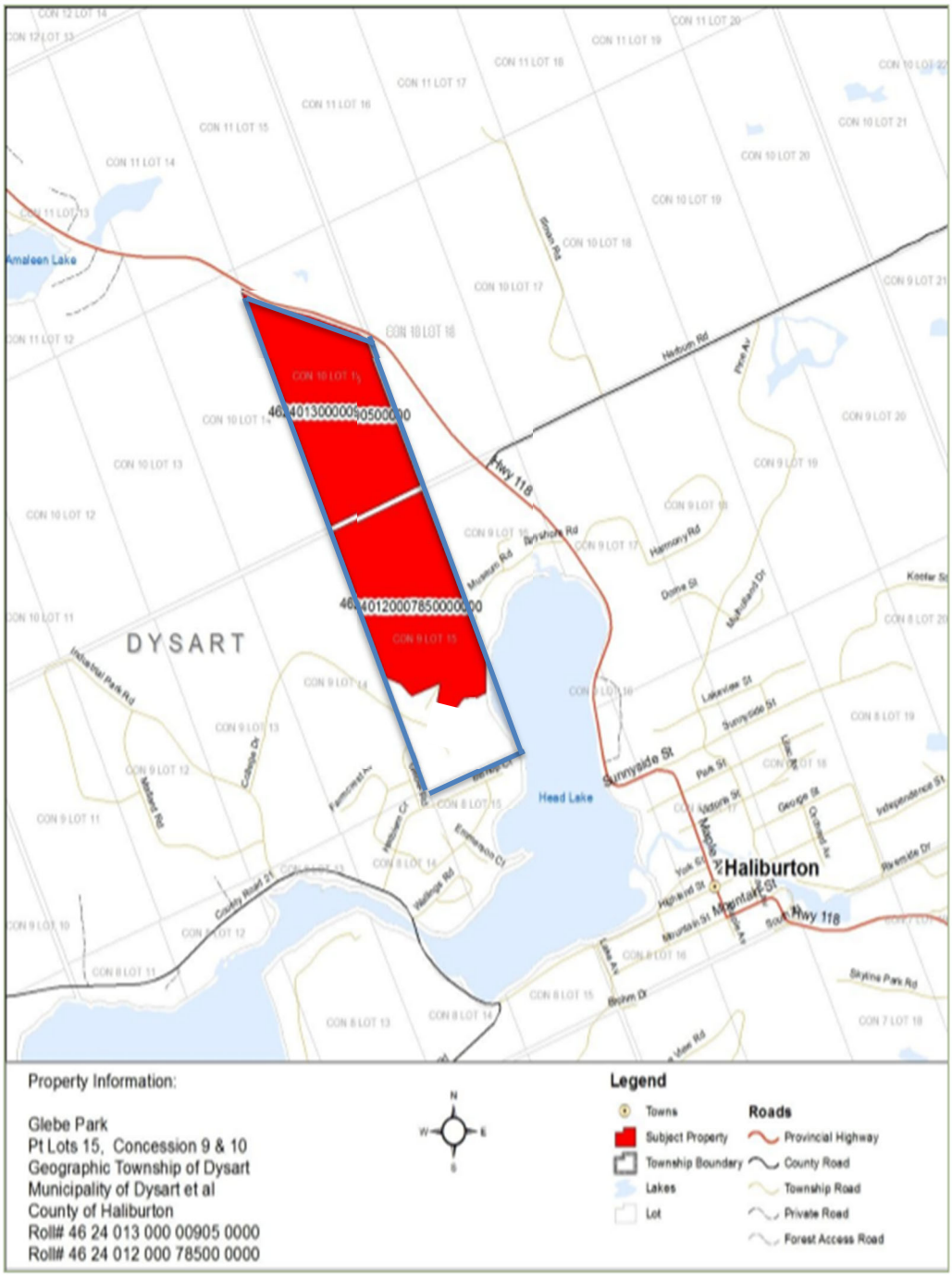

Figure 1: Detailed location map of municipally owned portion Glebe Park. (Forest Design 2011)

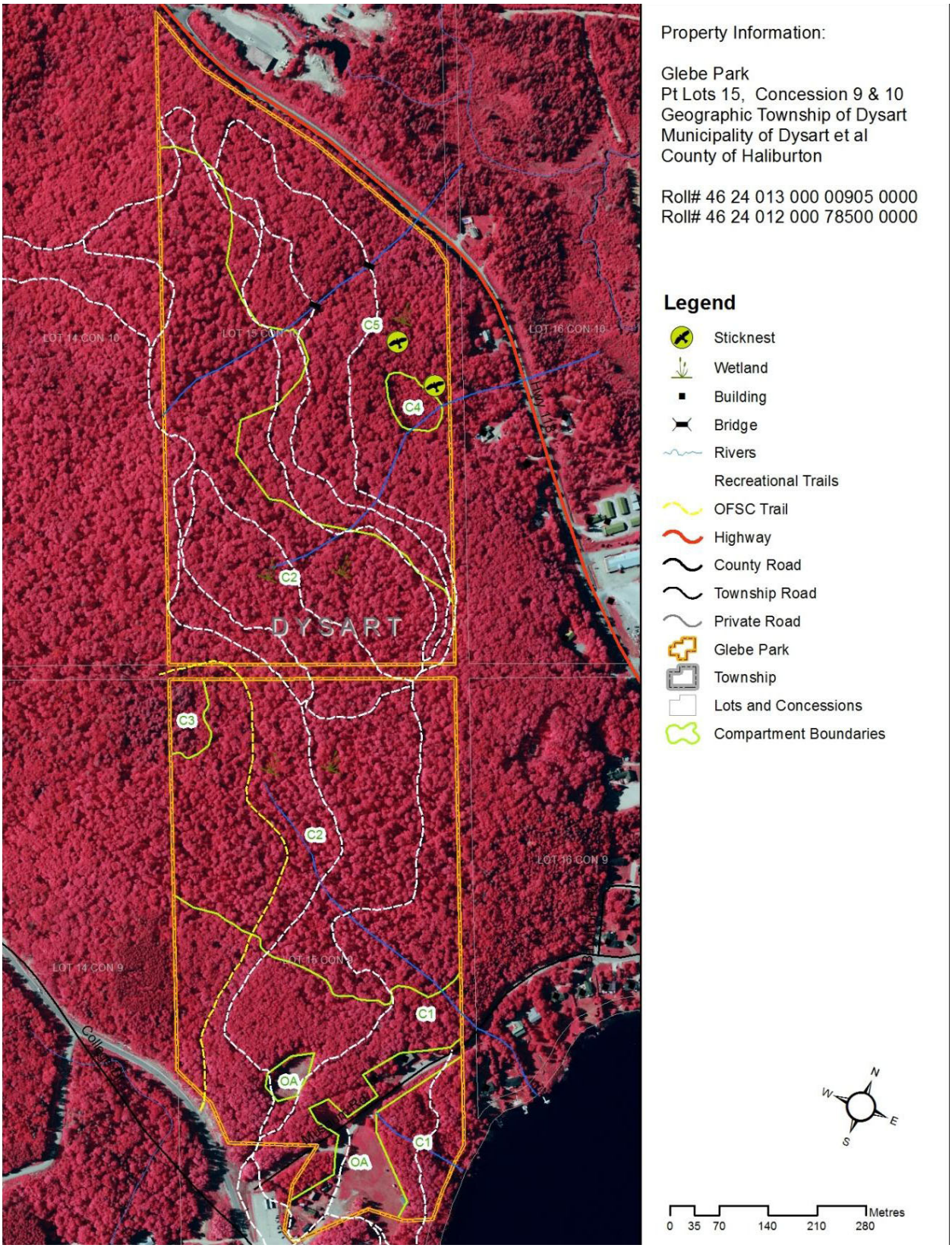

Figure 2: Aerial image of municipally owned portion of Glebe Park forest cover including ski trails and snowmobile trail. (Forest Design, 2011)- Some trails were moved in the period 2012-2023

1.4 Forest Compartments

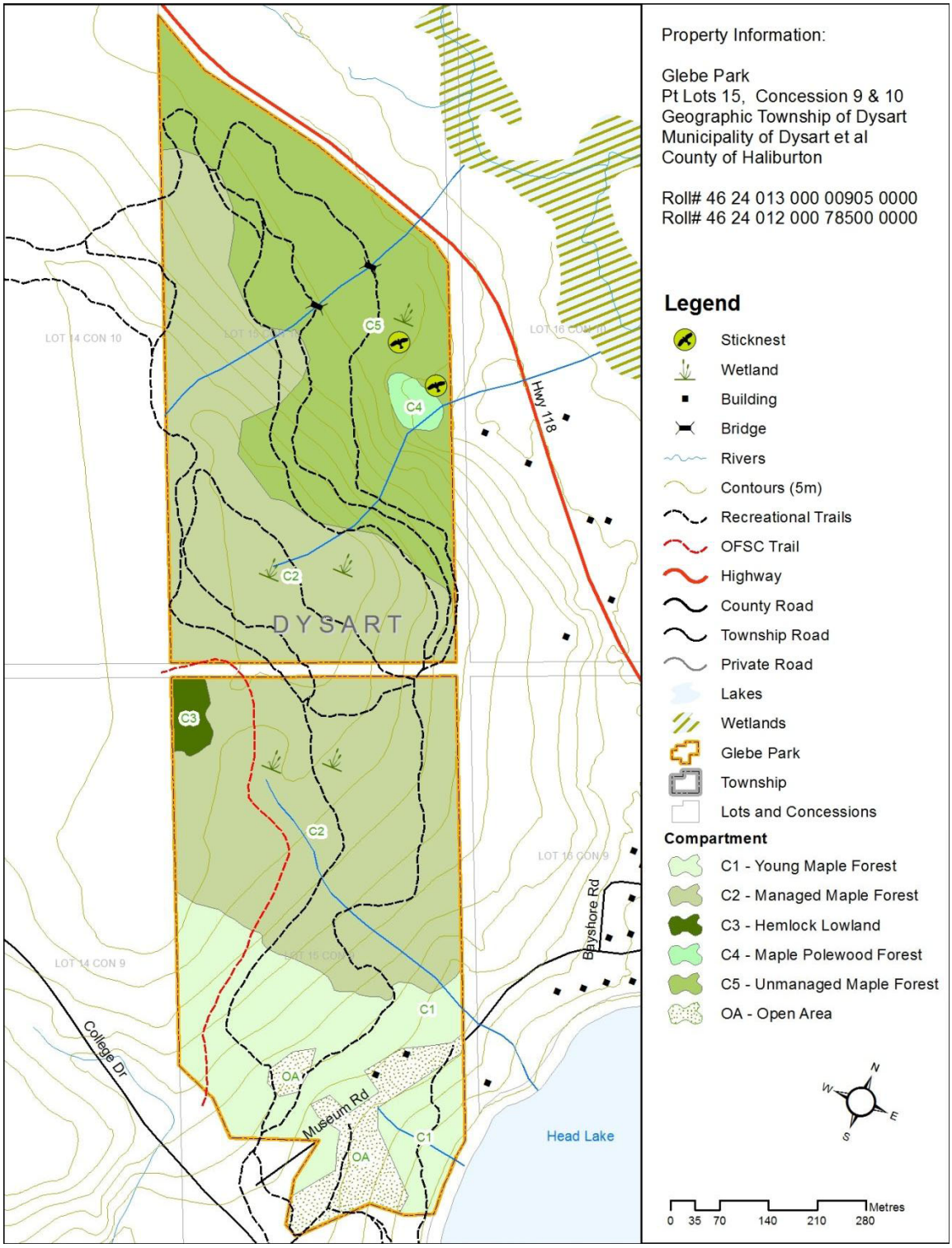

Figure 3: of municipally owned portion of Glebe Park forest showing Forest Compartments. (Forest Design, 2011) – note: Some trails were moved in the period 2012-2023

1.5 Property History of Glebe Park

In 1862, the Crown sold the nine townships of what is now the Municipality of Dysart et al to the Canadian Land and Emigration Company, an English company formed in 1861 to promote the sale of lands and settlement within those townships. The company in turn donated land, in what became the village of Haliburton, for the building of St. George's Anglican Church and in a property deed, dated December 15,1868, gave the church two 100-acre (40.5 hectare) plots on the other side of Head Lake (Lot 15, Concessions 9 & 10) as glebe lands (church lands) to provide a source of firewood to heat the church and rectory and to provide the church with income from selling lumbering rights.

It is not known when the glebe lot was first lumbered, or by whom (since St. George's church burned down in 1920 and many of the church's records were lost), but this likely occurred in the 1860's or 1870's. It is known that Haliburton lumberman Clayton W. Hodgson logged the property twice. In the winter of 1920, he harvested selected lumber species. In 1936 he cut cordwood to supply the Standard Chemical Company's factory in nearby Donald. A large volume of timber was taken out at this time—virtually a clear-cut, for only bushes remained. Within a couple of years, raspberry bushes appeared among the stumps and the property became a prime berry-picking field for the people of the village for the next few years. Over the years, the church granted hunting privileges to local sportsmen during the annual fall deer hunt. In the spring, some parishioners set up sap-boiling pits for small scale maple syrup production for home use. It is presumed that the church was paid in venison or syrup for this courtesy.

In the mid-1960's, the property was logged again (parties unknown), providing the church with some additional income. By this time, the church had converted from wood to oil for their heating source so their need for the firewood no longer existed. It was decided by St. George's to sell the property to raise additional money for the church. When it became public knowledge that the property was for sale, a bidding war ensued between the Municipality of Dysart et al and a team of local developers, (Curry Bishop & William (Bill) Emmerson). In the end, the Municipality outbid the developers. Roy Brohm was the reeve at this time. The municipal clerk Wayne Wood did much of the footwork for this transaction. In a letter dated May 29, 1967 from the Municipality to the Church, the Municipality acknowledged acceptance of the Church's terms of sale. The Municipality was bound by the agreement to use the land as "…sites for public buildings, such as schools, and for recreational parks". The deed for the sale of the lands from the Church to the Municipality is dated July 17, 1968.

The ten hectares (25 acres) of this property on the north of HWY 118 was converted into a municipal yard. The present municipal garage/shop building was erected at the municipal yard in 1970. The 70.8 hectares (175 acres) south of the highway was reserved as parkland.

While the Municipality did not act immediately to develop the glebe lot, one of the first things they did was to seek public input for naming their newly-acquired parkland. A naming contest was held and the Municipality chose the name Glebe Centennial Park. This name had been submitted by (reputedly) J. Douglas Hodgson of Haliburton. The name was shortened to simply Glebe Park soon afterwards.

It would appear that the Municipality's development of Glebe Park commenced in the early 1970's. Since there was initially no proper road access into the property, the first step was the construction of present-day Museum Rd. in order to bring in the heavy equipment needed for work in the park. At the time, present-day Bayshore Rd. ran west from HWY 118 only as far as the former Stothart home, which was situated on Lot 16 in the 9th Concession of Dysart, where 1 Museum Rd. is located today. The work to extend the road involved extensive filling and grading from this point onward, across the west side of the former Stothart farm property to the eastern boundary of the park, to create a proper roadbed. It is speculated that the main thoroughfare running through the park itself (which is essentially a continuation of Museum Rd.) may have been built at this time, as well. This roadway through the park ran from its eastern boundary across the property toward just shy of its western boundary. At this point it turned south and then east toward Head Lake, paralleling the boundary line and ending in a turning circle. It too required much filling & grading for its construction. At the Dysart et al council meeting of February, 9, 1972, the Municipality proposed to have the firm Canadian Mitchell Ltd. "lay out the balance of the roads, parking lot, walking trails, etc. in the Glebe Park" later that same month. This infers that the access road to the park had been completed by that time and possibly some of the Park's main thoroughfare itself.

The Municipality envisioned the Park which would be used by families for picnics and recreation. Initially, two large stone barbecues were built (which bore the date "1973"), along with a few low-to-the-ground stone barbecues. Wooden outhouses, painted dark green, were also constructed. While the Municipality's plans were well intended, due to the Park's isolation, it was more popular as a "lovers' lane" and an easy target for vandalism. Within the first ten years the smaller barbecues had been destroyed, along with the outhouses. Some local truckers used the turning circle as a location to change their oil, with the resultant litter of used oil filters which were thrown into the nearby bush.

The first public use of what was to become Glebe Park was the establishment of snowmobile trails in the mid-to-late 1960's. The snowmobile trails in the park are believed to have slightly pre-dated or been concurrent with the Church proposing the sale of the property. The property contained some logging trails from previous operations—one of these was a draw road along part of the western boundary. It had been established several years earlier by the Walling family next door on Lot 14 as a short cut to their upper property for harvesting firewood (avoiding a steep bluff). The church had no objection to this encroachment. The local snowmobile riders adapted some of the bush trails for their use, including Walling's draw road. These trails became part of the ever-growing network of the Haliburton County Snowmobile Association. The Park trails were a popular and important link between Haliburton Village and outlying areas. In time the HCSA rerouted them to accommodate cross country ski trails in the park. One of the snowmobile routes ran from the Haliburton Industrial Park, going deep into the park, where the trail passed the eventual site of the Haliburton Highlands Museum and, thence onto the park's road, with connections further along to Head Lake or Highway # 118 and then to Haliburton Village. What is now the Head Lake Trail in the Park (for walking, biking and snowshoeing) was originally a snowmobile trail.

In 1976, a newly-formed group, the Haliburton Highlands Nordic Trail Association obtained permission from the Municipality to commence the establishment of cross-country ski

trails in Glebe Park. These were on the North side of the main park road. Over the next several years many trails were blazed, tested, retained or re-routed as conditions and experience dictated. The trails were frequently changed as the club strived for perfection & improvement. Some of their trails ended up crossing the existing snowmobile trail and there was the potential for an accident when snowmobilers or skiers crossed paths. Around 1994, at the request of the HHNTA Association, the HCSA. gave up their trail routes within Glebe Park in order to give the skiers control of the Park's interior; the snowmobile trails were then re-routed. One trail was retained going along the western side of the park onto Head Lake, to lead riders to Haliburton Village; the above trail, which later became part of the Head Lake Trail, was blazed at this time but was abandoned by the club not long after.

In 1978-79, the Haliburton Highlands Pioneer Museum was relocated from downtown Haliburton Village when a new purpose-built facility was constructed in Glebe Park. It was officially opened in 1980. The chosen site was on the north side of the Park's access road, (now Museum Rd.) immediately upon cresting the hill and entering the park. This was the first major land clearing in the park making space for placement of the Museum building and the Reid House. In 1979, during construction of the new Museum, the John Reid House (the Museum's original facility since its inception in 1967-1968), was moved into the park and placed immediately west of the new Museum. In 1984, the Museum embarked on an expansion project further down the road when they commenced construction of the Museum Farmstead. The Roads Department cleared trees and added fill on the north side of the road to allow construction of a pioneer log house. More buildings became available and, in 1985, *the Roads Department carried out* further clearing and filling at that location.

In 1986 the Haliburton Legion (Royal Canadian Legion Branch #129) held their first Bluegrass Music Festival in the Park, a 3-day event which ran until 1995. The Roads Department felled trees and blazed trails across from the Museum Farmstead to clear a site for this event. This became known at the time as the Bluegrass Field. There had been an earlier trail across from the Farmstead which ran perpendicularly from the Main Road down to Head Lake; it pre-dated the Farmstead's site preparations. Part of this roadway was obliterated to create the amphitheatre for the Bluegrass event, leaving 2 unlinked sections of the trail. The upper part is now the pathway entrance to the Sculpture Forest; the lower end is a short-cut from the field down to Head Lake. The Roads Department also ventured into the adjacent bush to blaze several trails and camp sites "for rough camping only" for use during the festival. These were laid out on both sides of the part of the Main Road as it turned south down towards the turning circle. Others were blazed in the bush to the west and north of the Farmstead. The latter culminated in a large clearing on the high ground beyond the present toboggan hill (which itself was created some years later, in 2004) that served as the overflow camping site area. The Legion arranged for Ontario Hydro to erect poles and lines for power into their newly-created spaces within the park. For the first Bluegrass Festival, a rough temporary stage was set up along the south side of the Bluegrass Field; a well was dug in the bush immediately north of the Museum's Farmstead. Steve Giles from the Haliburton Legion played a major role in these developments. With the event being a success, the Roads Department cleared additional land to expand the Bluegrass Field to the east in 1987. The Legion obtained funds to build a permanent stage on the east side of the field and the temporary stage was dismantled. A new well was dug around 1988 slightly to the north west of the Farmstead to improve the volume of

the water supply for the event. Patrons of the Bluegrass Festival were impressed with the setting, noting that while most outdoor music festivals took place in open fields in the hot blazing sun, Haliburton's Bluegrass Festival was appreciably different, being held, more or less, in the woods.

The Haliburton Legion covered most of the costs of these developments in Glebe Park. They paid the Municipality for the Roads Department's work in setting up the Bluegrass Field and campsites and also paid for the work of Ontario Hydro to supply electrical power to the site. Subsequently, the HHNTA took the opportunity to expand their cross-country ski trail system to include the campsite trails which were dormant in the winter. This allowed skiers to ski down to the turning circle & amongst the campsites. By the mid-1990's, these lower trails capitalized on the Legion's hydro installations to allow for night-time skiing.

Around 1988, the Legion built a shower building for the Bluegrass Festival patrons on the north side of the main road to the west of the Museum Farmstead. They left a buffer of trees between the Farmstead and this new facility. The Legion rented portable toilets for the Bluegrass event. They planned to eventually erect a washroom facility next to the shower building but since Festival only ran until 1995, this building never materialized. When the Bluegrass Festival was officially cancelled, the Legion presence in Glebe Park ended. The HHNTA subsequently took over the Legion Stage for use as a clubhouse. The Municipality later sold the shower building and it was trucked off site in the 2010's.

The Haliburton Highland Games committee established a presence in Glebe Park in 1989. There was some overlap in Legion membership among the Bluegrass group and the Highlanders, but it was not officially a Legion event. Due to a mis-communication, this group cut down the buffer zone of trees between the Farmstead and the shower building for part of their event. The main activities, however, took place in the Bluegrass Field. They held their event in Glebe Park until 1992. In 1993 the event was moved to Head Lake Park (where it remained thereafter) because improvements to the Bluegrass Field in the Spring of 1993 (filling & grass seeding) were underway but not ready in time for the event.

In the Winter of 1985-1986 the Municipality arranged to have Glebe Park logged under a winter works programme. The focus was upon removing the lesser grade species and damaged trees in order to create more growing space and sunlight access for the more marketable hardwoods. Around 2001, the Park was logged again, shortly after arrangements were made for Sir Sandford Fleming College build their new campus nearby. This resulted in a lot of damage to the ski trails.

In 2007 the College commissioned a forest management plan (2007-2027 by Forest Design) for the 5.3 hectares (13.1 acres) of woodland on their property. This led to the removal of poor quality and diseased trees to create a healthier forest for the safety of forest users and to improve health and vigour of the residual forest. In 2010 the Glebe Park Committee with the approval of Council commissioned a stewardship plan and forest management plan for the 60 hectares (148.30 acres) of municipally owned parkland. The forest management plan recommended a forest tending approach which involved stand improvement and the felling of diseased or danger trees close to trails.

In 1993 a large 3-bay garage building was erected by the HHNTA on the clearing between the Farmstead and the shower building. This stood until demolition in 2023 when it was replaced with a new building at the east side of the Bluegrass Field (now called Glebe Field) in 2022-23. This was to clear the site for the construction of residence buildings for the College (expected construction 2024). The new garage was built beside the baseball diamond that was installed by the Municipality in 2016.

Around the year 2000, the Municipality severed 23 acres of the southern end of Glebe Park and gave it to Sir Sandford Fleming College for the construction of a new Haliburton campus. A new road (College Drive) was built through the bush between Industrial Park Rd. and the new College site. The College and parking lot were built overtop of some of the former Bluegrass campsite roadways, necessitating a re-routing of some of the ski trails. Construction of the College began in 2001 and the new facility opened in the Fall of 2004. The land was donated to the College with the understanding that that public would still be able to use this land as parkland and that agreements for park uses for the trails of the Haliburton Highlands Nordic Trails Association, the snowmobile trail of the Haliburton County Snowmobile Association and the Haliburton Sculpture Forest would be honoured by the College. Land use agreements were created between these three organizations and the Municipality and College.

After the land was donated to the College, the Municipality created the Glebe Park Committee 2002 which consisted of representatives of the Municipality, the College, the neighbourhood association and all of the stakeholders involved in managing trails and activities in the park. This committee was given the responsibility of planning for and managing of the park

There have been other developments in Glebe Park, not fully recorded. Shortly after the opening of the College it was decided by the Municipality to capitalize on the existing trails in Glebe Park, the creation of the College grounds, and the road network in the adjacent Halbiem subdivision to create the Head Lake Trail. The committee began advertising this route, which connected with Museum Rd., HWY 118, Harmony Road, Pine Avenue, Park Street, trails in Rotary Park and Head Lake Park to create a full walking circuit of Head Lake. A separate committee was formed to manage the trail. The Head Lake Trail has become a popular route for walkers, joggers and bicyclists.

In the 2000's, a snowshoe trail was blazed at the eastern side of the park to the north of the park roadway between the Museum and the ski trail's lower loop. In the 2010's, the Haliburton Mountain Bike Club was formed and single-track mountain bike trails were added to the park. At this time there was also expansion of the snowshoe trails, undertaken by volunteers with the assistance of Museum and municipal recreation staff.

After the bursting of the beaver dam at Moss's Pond in Haliburton in 1990 (which caused the washout of a portion of Pine Ave and Maple Avenue), the main roadway in Glebe Park was opened up as an emergency route for motor vehicles (including school buses) to get to and from Haliburton Village from the Eagle Lake/West Guilford area and beyond. An opening along the Glebe Park/Walling's Field property line (near today's Glebe Rd.) had been previously blocked by the Roads Department with large boulders to prevent vehicle access to Glebe Park at that location and reduce vandalism. The Roads Department removed the boulders to allow

this route to be used during the emergency. After Maple Avenue and Pine Avenue were re-opened in town, the Roads Department put the boulders back in place.

In 1999, during re-construction/widening of Highland Street near the County Rd. 1 cut-off, the above route was re-opened for the convenience of motorists for the duration of the roadwork. Once College Drive was constructed to access the College property the emergency route was changed (when needed) to go through the park and the College parking lot and onto College Drive. The route was used again during the reconstruction of the bridge on CTY Rd 21 and also the washout of Bayshore Road.

What is now known as Museum Rd. was at one time a branch of Bayshore Acres Rd. When street numbers came into effect in the early 2000's the part of Bayshore Acres Road which ran west into Glebe Park was re-named Museum Rd. The road going west from HWY 118 and the other branch which runs north, culminating in a dead end, were renamed Bayshore Rd.

In 2009 the Glebe Park committee commissioned a "Planning Information Report" from Glenside Ecological. This led to the commissioning of a Stewardship Plan in 2010 which included forest management. In 2011, the Glebe Park Committee created a planning document for the park, which includes forest management, trail development, for skiing, snowshoeing, walking, and biking, maintenance, landscaping, entryways, lighting and electricity, signage, buildings, mapping, and communication with the public.

Since 2011, the park has seen significant developments. This includes the building of timber frame entryways and wooden fences and gates at the Museum and College entrances to the park and landscaping between the two entrances. Significant trail work has been done in the upper section of the park; replacing culverts, improving drainage and surfaces. Sections of the main ski trail, that had originally been created on private land to the west of the park, were rerouted so that they are now totally within the park boundaries. This allows for 7 km of walking trails in the northern section of the park. Since 2011, the Sculpture Forest has increased it permanent collection from 21 to 40 sculptures. The trails in the Sculpture Forest have been resurfaced and the main entryway landscaped.

1.6 History of the Cross-Country ski trails and the Haliburton Highlands Nordic Trails Association in Glebe Park

The original ski trails in Glebe Park were built by Haliburton Highlands Nordic Trails Association. Originally, they linked Haliburton with Minden and were groomed about once a week for classic skiing. Now there are 13.5 km of ski trails in Glebe Park and nearby. All trails are groomed regularly for both classic and skate skiing. The skating trails are often groomed daily.

In early years John Beachli built a three-bay garage for HHNTA to store grooming equipment. The unused bandshell, originally built by the Legion in the 1980's for festivals was given to HHNTA. It was modified and used as a clubhouse by the ski club until 2018. Over time squirrels and racoons moved in making it unusable.

In 1997 the Sam Slick, now Roller Coaster, Peter Rabbit and the West Loop trails were built to provide more skiing opportunities at Glebe. The west Loop is mostly on private land but provides access to Township land to the west.

In 1998 the OFSA Nordic ski championships were held at Glebe. During these years many high school and university level races were held at Glebe. Fleming College was built in 2003-2004 leading to the rerouting of lower trails.

The Sculpture Forest opened in 2001 using part of the lower lighted loop. Initially it was only open to skiers in the winter, then snowshoers. In 2021 with Covid and a dramatic increase in visitor the lower loop was also opened to walkers in the winter.

In 2010 HHNTA built the Round the Mountain and Lookout Loops on Township lots west of Glebe Park connected by the West Loop on private land to the Glebe Park trails to create one system. In 2021 a cabin was built on the West Loop to encourage use of the west ski trails.

In 2022 the municipality donated an additional five acres of land to the College so that College residences could be built. The HHNTA garage and the descending trail from the upper trails were located on this parcel. As part of the agreement to transfer this land to the College the municipality agreed to remove the garage and build a new one and cover the cost of rerouting the climb and descent trails and the accompanying lighting.

In the spring of 2023 HHNTA moved to a new garage built by Dysart et al to accommodate the college construction.

For over 30 years the Ski Club/HHNTA has operated the Jack Rabbit ski program to teach children and youth the fundamentals of Nordic skiing. The cost is very reasonable and they have been able to offer rental equipment to participants at a good price.

Membership in HHNTA is made up of local skiers, cottagers, and business members who wish to support the organization. Day passes are available for visitors. This revenue covers operating expenses, based on the extensive use of volunteers.

HHNTA works with the Glebe Park Committee to continually improve the ski trails making them better for skiing and off season use by walkers, runners and bikers. Drainage has been improved, rocks removed and gravel added to make the trails smoother and dryer.

2.0 Stewardship Objectives

2.1 Current Stewardship Objectives

The Glebe Park and Museum Committee is responsible for planning and implementing the best management practices to achieve the stewardship objectives of Glebe Park. The Committee's objectives for the park are to provide opportunities for cultural and self-propelled recreational activities, while maintaining the ecological integrity of the forest and a safe environment for visitors.

Objectives	**Activities**
Recreational and Cultural Use	● Plan trail infrastructure for minimal impact on the environment

	● Plan for placement of sculptures with minimal impact on the environment ● Plan for and manage increased self-propelled recreational and cultural use of the park ● Plan for and manage restoration, conservation and maintenance of buildings and park infrastructure ● Encourage opportunities for learning about natural, recreational and cultural features of the park and local history and heritage ● Maintain updated maps of the trail systems and features in the park that can be used for planning and information.
Ecological Integrity	● Remove diseased trees (when these endanger the integrity of the forest or create a safety hazard) ● Maintain/enhance biodiversity throughout the forest encouraging the establishment of native tree species ● Maintain and/or enhance wildlife habitat ● Maintain diversity of floral community ● Protect habitat for species at risk ● Protect water sources and water courses ● Prevent garbage and dog feces from entering the park environment ● Monitor and control (if possible) invasive species
Safety	● Monitor trails for safety concerns ● Remove dead, diseased and damaged trees that are close to trails, buildings or parking lots

Table 1: Stewardship Objectives and activities for the Glebe Park and Museum Committee.

The documents listed below were previously prepared for Fleming College and the Glebe Park and Museum Committee for the management and stewardship of Glebe Park. These documents listed have been used as a basis for this stewardship plan.

Forest Management Plan (for Fleming College)
Author(s): Forest Design, Peter McElwain
Period: 2007 - 2027

This forest management plan was completed as required by Haliburton County Tree Cutting By-law by Forest Design, Forestry and Fibre Management Consultant. The purpose of this management plan is to monitor the quality of trees, removing dead or diseased trees, promote growth of a younger stand and to encourage a safer environment for the many users of the forest on the Fleming College property.

Glebe Park Stewardship Plan
Author(s): Forest Design

Period: 2011 - 2021

The 2011-2021 Glebe Park Stewardship Plan was produced by Forest Design in association with Glenside Ecological Services Limited. This stewardship plan was created to assist the Glebe Park and Museum Committee with planning and implementing their values and management practices to achieve the objectives of Glebe Park.

Haliburton Campus Forest Inventory Report
Author(s): Makenna Flynn, Samantha Jarvis, Meagan Morey, Paula Torti
Period: 2019

The 2019 Haliburton Campus Forest Inventory Report was completed by a Credit for Product Group of the Ecosystem Management Technology Program of Fleming College in the fall semester of the 2019-2020 school year. This report was completed for the Fleming College Haliburton Campus. Fleming College is striving to meet its sustainability objective and this plan was completed to make advancements towards meeting the UN's goals for good health and well-being, quality education, climate action, and life on land.

2.2 Completed Stewardship Activities (2011-2021)

A forest management plan was created by Peter McElwain of Forest Design in 2006 for the 10.87-hectare parcel of land (the Fleming College campus) along the north westerly shoreline of Head Lake within the settlement boundaries of the village of Haliburton.

The parcel of forest under this plan (which houses the Haliburton Sculpture Forest) could be described as a mature tolerant hardwood forest bordering the shoreline of a warm water fishery, Head Lake. This forested area is incorporated into a larger multi-use park. The assessment showed that the high multi-use activity within and surrounding this relatively small forest had created a significant environmental impact on the health and vigour of the forest. Forest management objectives included removing the poor quality and diseased trees to improve the health and vigour of the residual stand.

The approach proposed to manage the property's biodiversity was to maintain the composition and structure of the forest within the bounds of natural variation. Harvest and silviculture intensities and techniques should mimic natural processes. and identified values will be protected using a precautionary approach. For example, all known nesting sites and cavity trees should be protected. if deemed not to pose a safety threat to the participants using the site.

The following forest management prescription activities were proposed:

1. Single tree selection harvesting system which would consist of:

   a) Marking trees for removal to improve the spacing of the trees. The intent of the marking would be to remove the poor quality or declining trees first. in order to improve the overall quality of the forest. The harvest would create 30°0 openings in the forest canopy.

   b) Marking to concentrate on poor quality trees in the small to medium size classes.

   c) Leave as many den or cavil trees as possible for wildlife and songbirds.

d) Release regeneration by thinning small and pole wood size trees where competition is severe from three sides.

e) Encourage the growth of oak, cherry, birch, and ash. by allowing more light into the stand.

f) Removal of the poor quality small to medium stems should encourage the growth of the residual trees and promote the maple regeneration on the forest floor. Few extra-large trees would be removed to maintain stand structure.

g) Remove any diseased trees that currently pose a threat to the safety of the trail S) stem and the Sculpture Forest Exhibits.

2. There will be very little harvesting of softwood trees to maintain wildlife habitat around the riparian zones and Head Lake.

3. Group selection in areas appropriate for creating small openings in the canopy to maintain species diversification of shade intolerant and or mid-tolerant species such as red oak. black cherry, white ash. Yellow birch. and white pine.

This plan was implemented in 2007, with the focus on removing diseased maple trees which presented a hazard to people using the trails and visiting the Sculpture Forest. Approximately 30% of the maple trees were removed in this parcel of the forest. This opened up the canopy and allowed for the growth of cherry, birch, and ash. Most of the trees cut down were removed from the forest.

In the area to the southwest of this forest area, a wide swath of trees was removed (prior to this study) as part the construction of the College building to allow for the installation of the sewage line and connecting it to the line in the adjacent neighbourhood. Much of this area (south of the snowmobile trail) was replanted with white pines, which over the past 15 years have grown into a stand of dense branched trees. Many of these trees have had terminal leader damage caused by the white pine weevil, *Pissodes strobi*, which is common in open grown white pine and results in dense branched short trees.

A significant amount of trail work has been done in the Sculpture Forest area in subsequent years to improve the surface and support good drainage. Areas around sculptures, where earth has been compacted by a large amount of foot traffic, have been covered by mulch or wood chips to lessen the impact. This requires ongoing maintenance.

The slopes leading up (or down) to a number of sculptures were degraded through foot traffic of visitors. Granite stairs and metal railing have been put in place to replace square hemlock beams, railings have been installed to provide greater accessibility, and landscaping has been done to repair degraded slops and to prevent further foot traffic.

One short trail was constructed by hand in 2006 from the Head Trail to the shoreline with minimal disturbance of the coniferous forest. A wooden deck and floating dock were installed at the base of the trail to allow for viewing and water access to the park. Square hemlock beams were installed on the sloped trail to make for a safer and easier descent (subsequently replaced with granite stairs and railings) Otherwise the shoreline area has remained undisturbed.

3.0 Stewardship Activities

The stewardship activities stated in the sections below follow the Glebe Park and Museum Committee's stewardship objectives to promote recreational and cultural use, to steward ecological integrity and to ensure health and safety.

3.1 Recreational and Cultural Use

3.1.1 Sculpture Forest

The Haliburton Sculpture Forest was started in Glebe Park in 2001 as a project of the Arts Committee of the Haliburton County Development Corporation. This project was put into place to focus on local economic development in the Haliburton area through the arts providing residents and visitors with a visual arts experience. In 2005 a not-for-profit organization, Haliburton Sculpture Forest et al, was formed to undertake the planning, development, management and promotion of the Sculpture Forest. Sculptures from Canadian and international artists are nestled along the trails of Glebe Park in the area surrounding the Haliburton School of Art + Design. At present time, the collection includes forty sculptures and six one-of-a-kind benches completed by various artists. Along with being available during all seasons and people to enjoy, the Sculpture Forest is often used as a teaching site for multiple programs at Fleming College. The Sculpture Forest attracts thousands of visitors each year.

Recommendations

Because of the amount of foot traffic through the Sculpture Forest, the ground around many of the sculptures has been compacted. Compacting of the soil around trees can have a negative impact on root systems resulting in suffocation, resulting in the death of tree roots. To counter the effects of soil compaction it is important, where possible to move high traffic areas away from larger trees as their root systems are less adaptable than smaller trees (Froehlich, H.A. 1979). In addition, wood chips and mulch should be placed around the sculptures and renewed on a regular basis to minimize the compacting of the ground.

The construction and maintenance of pathways that lead guests through the forest is an ideal method to help limit soil compaction throughout the forest. Sites for new sculptures should be selected in areas within younger groupings of trees to mitigate the effects of compaction.

3.1.2 Wayfinding and Interpretive Signage

At the time of the writing this plan, wayfinding and interpretive signage in Glebe Park was being updated to provide easy to follow signs throughout the park to help to ensure the enjoyment and safety of users. This includes wayfinding signs, trail signs, trail markers (for hiking trails), colour coded, painted rectangles on snowshoe trails and colour coded painted squares on walking trails trails, exit signs, "you are here" location maps for ski trails and snowshoe trails, and private property signs.

Recommendations

- Wayfinding signage should be reviewed on an annual basis.
- Include more interpretive and educational signage

Interpretive signage is an easy way to provide education on heritage, history and natural history to the public. This signage should include significant historical and cultural information related to park features, historical buildings and the region, identification of native flora and fauna species, information about pollinators, and information about invasive species in the area, The current tree identification signs should be replaced with new signs providing more details such as what role a tree plays in a forest ecosystem, Indigenous names, and traditional uses. There is currently no interpretive signage to accompany the museum farmstead buildings or the Reid House.

Since interpretive plaques are limited in space and should have QR code links that allow park users to access more information if they wish.

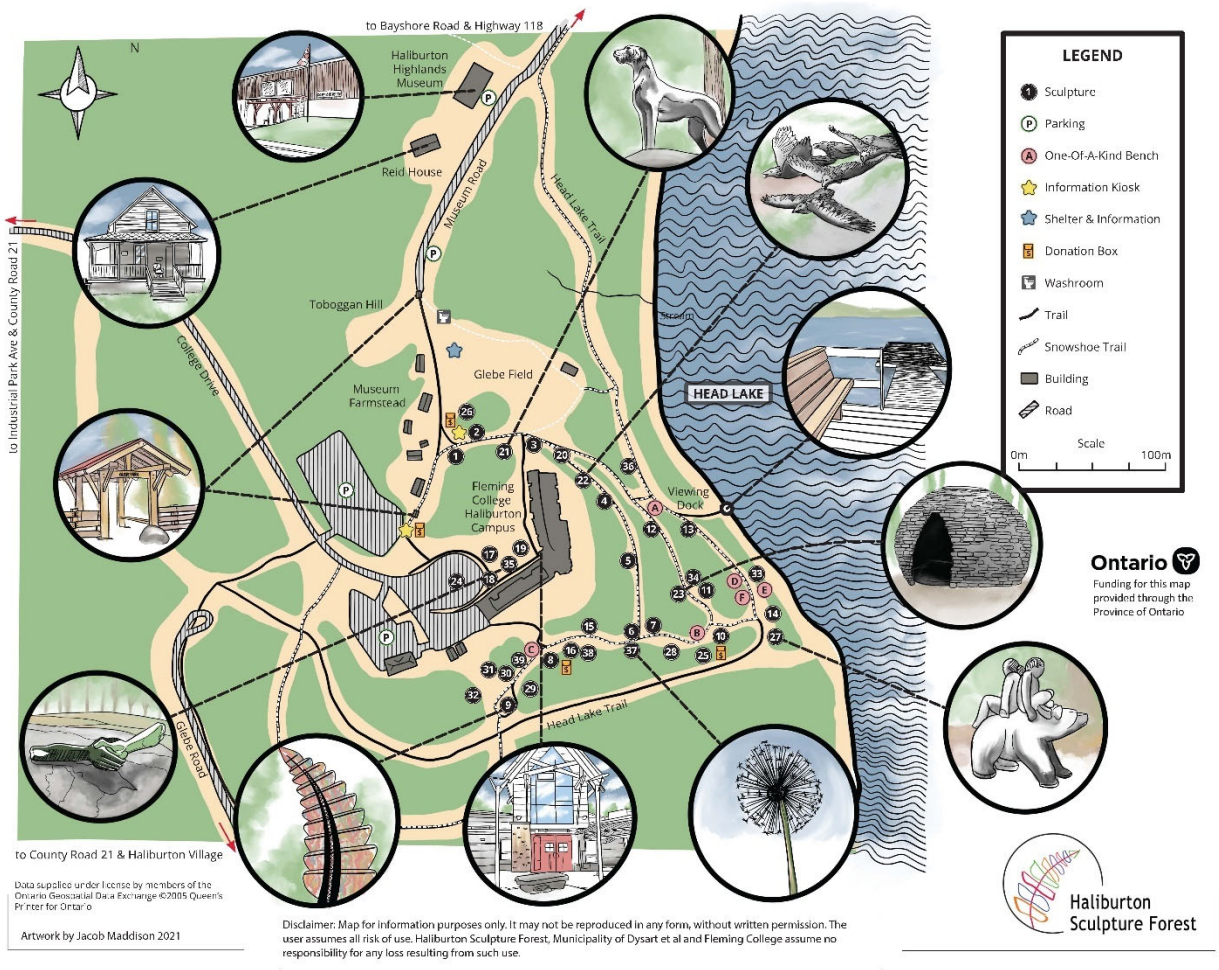

Figure 4: Haliburton Sculpture Forest Map (2022)

3.1.3 Haliburton Highlands Museum

The Haliburton Highlands Museum was originally housed in the old Reid House which was located in the village of Haliburton and was built in 1882. This property was chosen at the time, because this was one of the oldest homes in the village and happened to be for sale. As the museum outgrew the Reid House, it was moved to a new building in Glebe Park in 1980. During the construction of the new museum in 1979, the Reid home was moved and placed

adjacent to the new building (baytek, D). It was refurbished and used to showcase village life in 1900.

In subsequent years a log barn, house and small building housing a forge were added to the museum grounds in order to depict early settlers' life in a rural setting.

The main gallery in the museum has numerous thematic exhibits relating to the first inhabitants of the region, Indigenous peoples, who were followed by the first influx of lumbermen and settlers. The museum is and will continue to be used for educational purposes, inspiration and aesthetic enrichment for the people of Haliburton county. The goal is to fulfill the obligations of collecting, preserving, researching, housing and interpreting all cultural and historic objects of value.

The Museum Farmstead buildings are in varying states of disrepair and significant work needs to be undertaken to ensure their structural integrity and sustainability. Although a significant amount of work has been done repair the Reid House a number of issues remain. This building also needs ongoing maintenance.

The main museum building is currently inadequate in its size and facilities – requiring space for a workshop and proper facilities to store the archives and the museum collection in proper conditions. The grounds surrounding the museum, Reid House and Farmstead require a review and a plan for upgrading and maintenance.

Recommendations

- That a restoration, conservation and ongoing maintenance plan be put in place for the Reid House and Museum Farmstead.
- Undertake a needs assessment for the Museum to identify the space required for a workshop and proper facilities to store the archives and the museum collection in proper conditions.
- Create and implement a plan for upgrading and maintaining Museum grounds.

3.1.4 Cross Country Skiing and Snowshoeing

The Haliburton Highlands Nordic Trails Association grooms and maintains 13.5 km of cross-country skiing trails in the Glebe Park area. 5,25 km of these trails are outside of the park crossing over private land and onto other municipally owned land to the west. Here you will find some hilly tracks going through the forest. There are some 10 – 20 metre climbs and descents with quick turns and steep fast sections if the snow is fast. Ongoing summer trail work to flatten and improve drainage on the ski trails is improving their usability for skiers, as well as walkers, runners and bikers in the off-season. View Figure 3 for a map of the Cross-Country Ski trails.

Snowshoeing can take place on 7.66 km of trails that are dedicated for snowshoeing. The Museum provides free sets of snowshoes for visitors to use. View Figure 4 for a map of the Snowshoe trails. Snowshoeing is also allowed on the Nordic ski trail that loops through the Sculpture Forest.

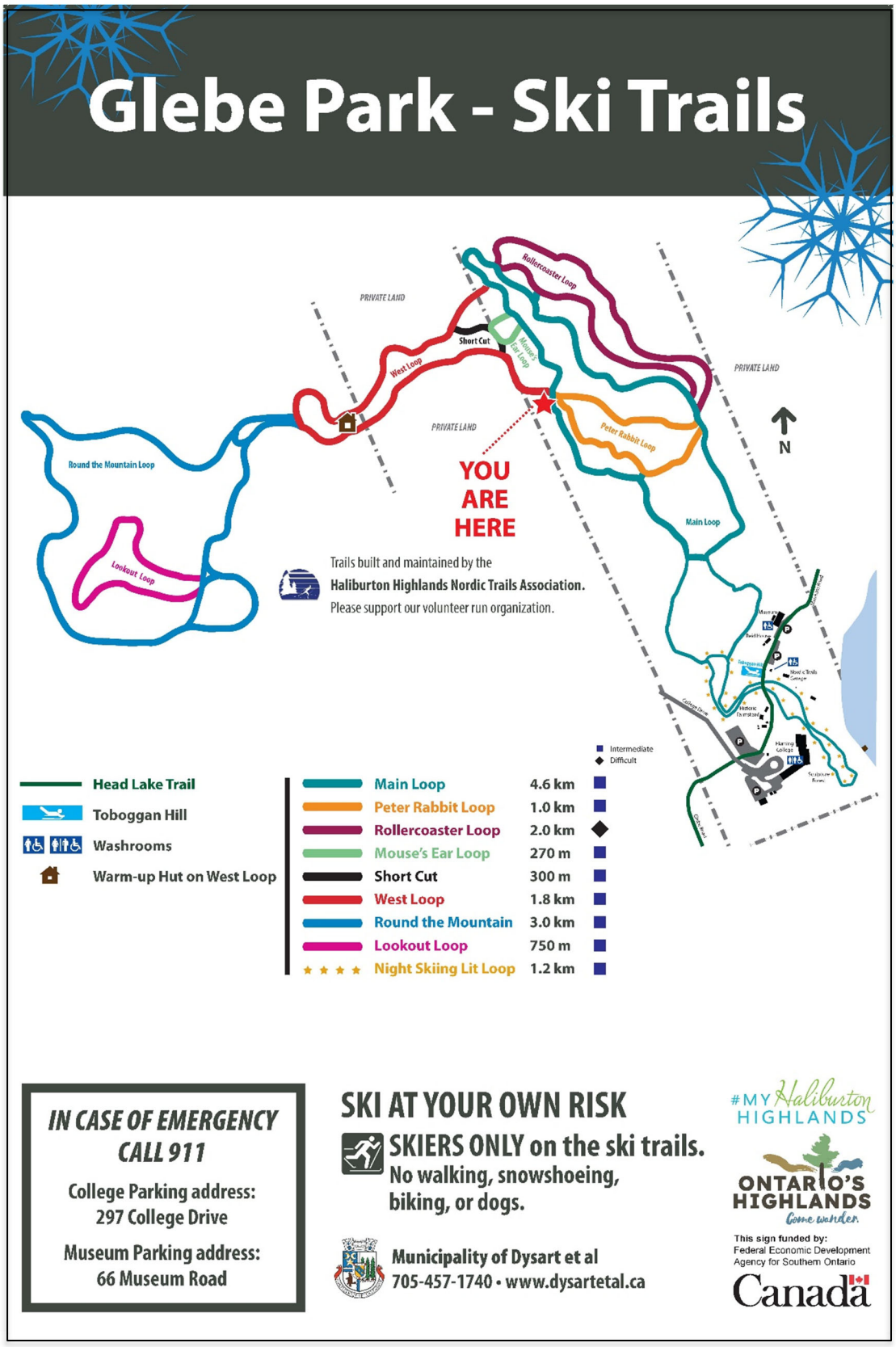

Figure 4: Map of Nordic Ski Trails in Glebe Park and adjacent land.

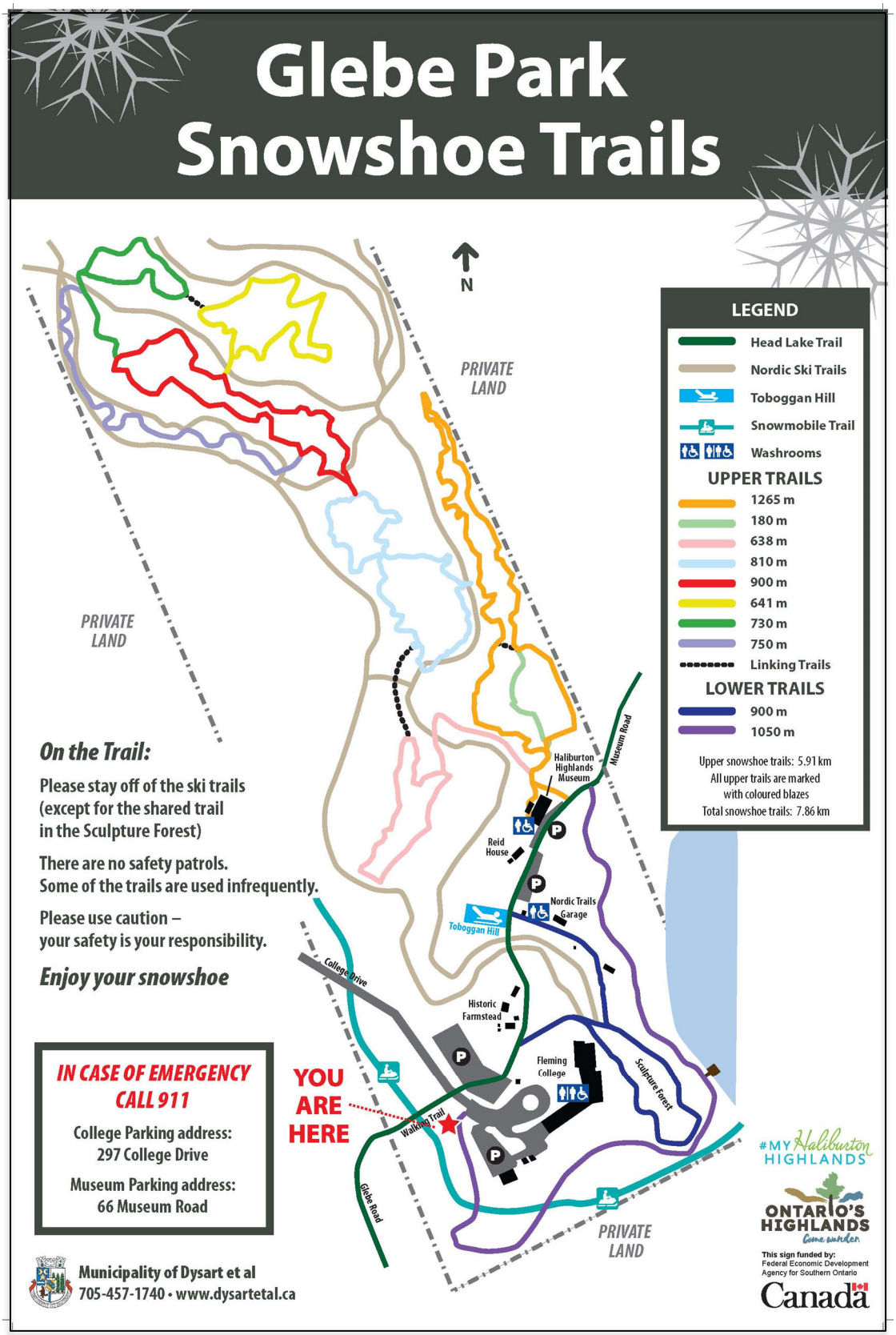

Figure 5: Glebe Park snowshoe trails.

3.1.5 Hiking and Biking

In addition to its popular winter activities, Glebe Park is known for its summer cultural and recreation activities such as the Sculpture Forest, Museum programming, hiking and mountain biking. A rack card is available for visitors at the municipal visitor's welcome centre promoting these activities. Hiking and mountain biking are great alternative uses for the ski trails in Glebe Park as they have a minor impact on the surrounding area and the overall integrity of the trails themselves. There is an extensive system of well-marked single track bike trails in Glebe Park. These are also used by hikers and runners. In spring, summer and fall the wide smooth ski trails are popular with walkers and bikers. Although the overall impacts may not be of concern, the existing single-track bike trails should be monitored for cases of erosion and care taken in planning any additional trails.

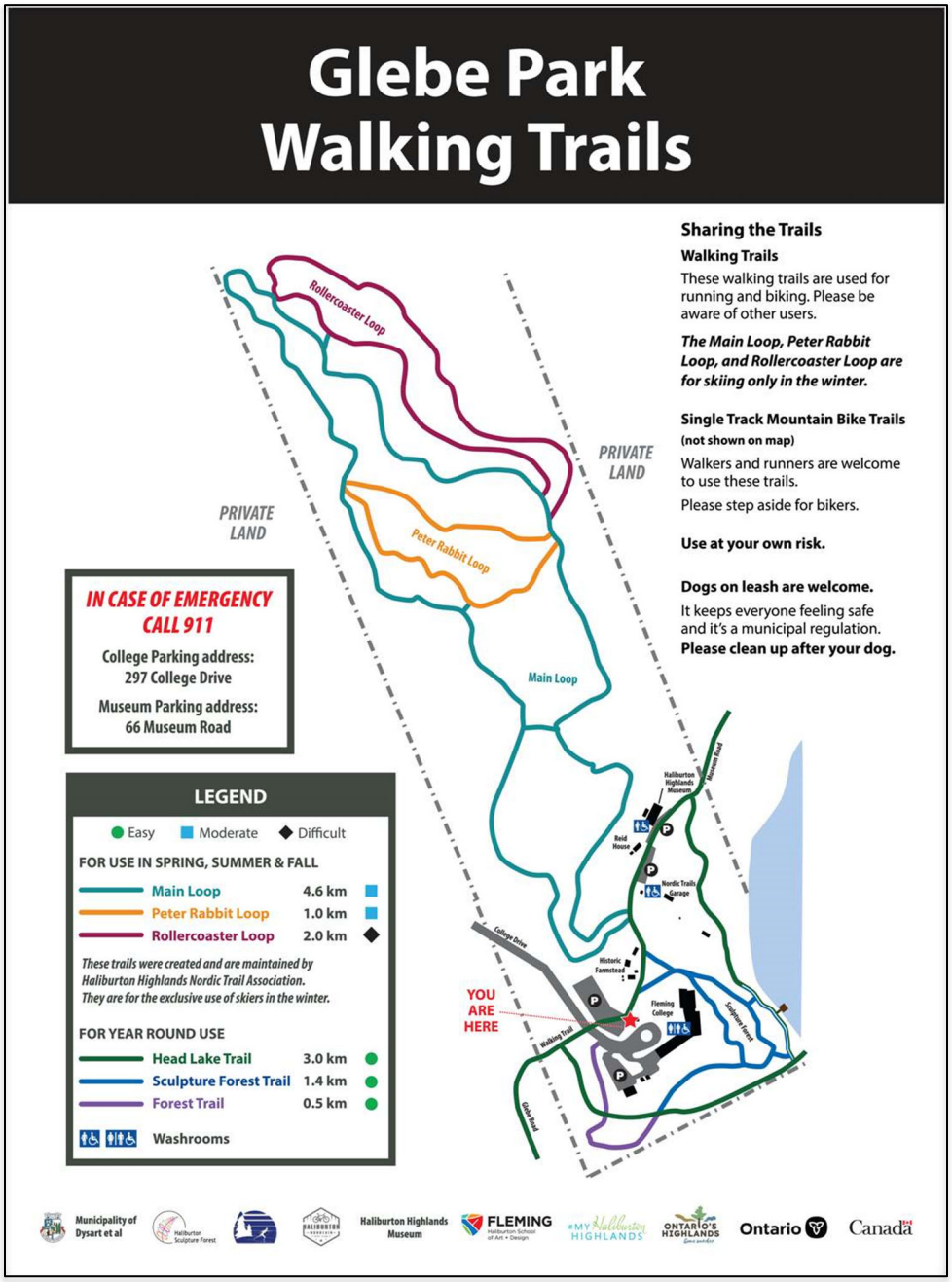

Figure 6: Glebe Park walking trails.

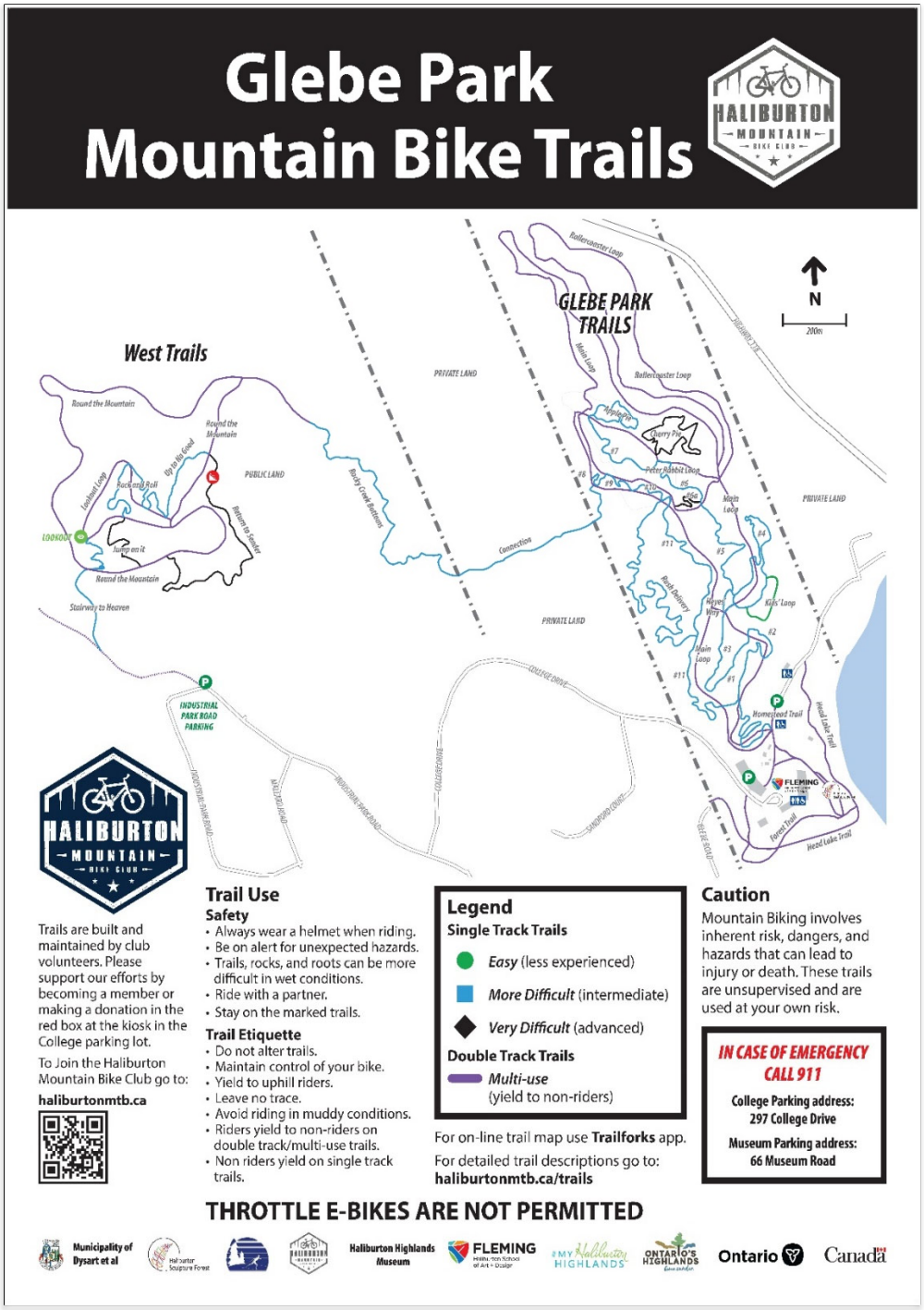

Figure 7: Glebe Park mountain bike trails.

3.1.6 Pavilion/Picnic Tables

The introduction of structures will create an appealing and relaxing environment and activities within natural areas, these structures could help introduce more guests to the Glebe Park. They should be placed in the park where the existing open area is located so no tree

cutting has to be done. It is recommended to implement 2-3 picnic areas to ensure there is space for as many visitors as possible during the busy season. There is also infrastructure on the property that was once used as a stage and the Nordic Trails club house. The abandoned infrastructure being left on the property leaves possibility for injury as well as affecting the park aesthetically. If this structure is not going to be renovated for another purpose it is recommended that infrastructure be removed and replaced with a pavilion that can be utilized by park users.

3.1.7 Mapping

The Planning and Land Information Department of the Municipality has over the years undertaken GIS mapping of the trails, buildings, features and infrastructure of the park. Over the past few years, a number of changes and additions have been made to trails, buildings and other features. Fleming College is currently building new student residences, adding a parking lot and reconfiguring the existing parking lot and entrance to the park. Mapping of the park needs to be updated to provide the municipality and committee current information for planning and communication.

3.1.8 Recreational and Cultural Use: Stewardship Activities and Recommendations Summary Table

Stewardship Value	**Objective**	**Recommendations/ Considerations**
Recreational and Cultural Use	● Plan for and manage increased self-propelled recreational and cultural use of the park	● Consider the addition of 2-3 picnic areas to ensure there is space for as many visitors as possible during the busy season. ● Consider the addition of a pavilion/picnic shelter in existing open area to provide shade.
	● Plan trail infrastructure for minimal impact on the environment	● Cap the creation of double-tracked wide trails and limit the development of all new trails.
	● Plan for lessening impact of visitors to the Sculpture Forest on the forest environment ● Placement of sculptures with minimal impact on the environment	● To counter the effects of soil compaction around sculptures in the Sculpture Forest renew wood chips and mulch on a regular basis. ● Consideration should be given to selecting areas for new sculptures within groupings of younger trees (the younger trees have more resilient roots

		systems that can adapt to the soil compaction.
	● Plan for and manage restoration, conservation and maintenance of buildings and park infrastructure	● Create a restoration, conservation and ongoing maintenance plan for the Reid House and Museum Farmstead. ● Undertake a needs assessment for the Museum to identify the space required for a workshop and proper facilities to store the archives and the museum collection in proper conditions. ● Create and implement a plan for upgrading and maintaining Museum grounds. Complete restoration of interior former stage/club house building for use as storage space for municipality and park stakeholders.
	● Encourage opportunities for learning about natural, recreational and cultural features of the park and local history and heritage	● Install interpretive signs in the park to share cultural and historic information.
	● Maintain updated maps of the trail systems and features in the park that can be used for planning and information.	● Create updated GPS map of the park to show the changes and additions to trails, changes and additions to buildings and other park features and infrastructure.

Table 2: Stewardship Recommendations: Recreational and Cultural Use.

3.2 Safety

3.2.1 Hazard Tree Assessment

Because Glebe Park trails are used on a regular basis by the public it is necessary to have a hazard tree risk assessment protocol which defines a regular schedule and process for assessment. Tree risk assessment should be done on a consistent annual schedule that will be able to cover liability issues in regard to public relations as well as ensure the safety of the park users. Due to the nature of forest systems, snags and hang ups will be produced regularly by growing trees, these can pose risk to high traffic areas such as recreational trails. Other such hazard trees would be leaning trees which can be cleared with a singular assessment. These issues can be spotted with ground identification.

Dead trees or dying trees and trees with dead branches which are close to trails should be assessed and identified on a regular basis (see *Operational Procedures for Managing Hazard Trees)* and procedures undertaken to remove the hazard.

Where a hazard exists, signage needs to be put in place to alert the public of the danger and trails closed to public use if required. Signage needs to be posted when work is underway in the forest to remove hazard trees and branches.

The *Operational Procedures for Managing Hazard Trees,* was created for Glebe Park in July 2023 and is attached as an addendum to the Stewardship Plan.

Recommendation

Follow the procedures outlined in the *Operational Procedures for Managing Hazard Trees*

3.2.2 Trail Monitoring and Maintenance

All active trails within Glebe Park should be monitored on a regular basis. Practices in the summer, spring and fall should include things such as trail checks (including hiking and biking trails) that look for flood areas (culverts, erosion), raised roots/rocks, hazard trees with hanging branches, and potential wildlife hazards etc. In the winter months when skiing, snowshoeing and tobogganing are active, all ski trails should be groomed regularly (as is the current practise) to provide easy access and use for the public. Regular trail checks should be made, this includes looking for hazard trees and potential ice hazards. These monitoring practices are important because of the risk of injury in remote areas on the trail that are not easily accessible.

Recommendations

Monitor all trails on a regular basis. In the summer, spring and fall trail checks should include looking for flood areas (culverts, erosion), raised roots/rocks, hazard trees with hanging branches, and potential wildlife hazards etc. In the winter months all ski trails should be groomed regularly and regular trail checks to look for hazard trees and potential ice hazards.

3.2.3 Signage for Emergencies

Emergency vehicles can access the park via two entrances, located on the south west side of the park leading through the College parking lot and the other east side of the park via

Bayshore Road and Museum Rd. There is an additional emergency access trail on the north end of the park from HWY 118. Directional signage is located at all entrances/exits to Glebe Park and the trails within. Location maps are situated at trail junctions throughout the park informing trail users about the available access points and the protocol for notifying 911 in case of an emergency.

Recommendations

Display signage at each entrance of the park that shows proper routes for emergency vehicles and all access points that can easily be described over the phone.

3.2.4 Safety: Stewardship Activities and Recommendations Summary Table

Stewardship Value	Objective	Recommendations/ Considerations
Safety	● Ensure safety along the trail corridors	● Conduct full hazard tree assessment annually, following the Glebe Park and Museum Committee, *Operational Procedures for Managing Hazard Trees*, July 2023, document. ● Budget for hazard tree removal in the annual park budget. ● Monitor park trails on a regular basis to identify issues including hazard trees, flooding, ice hazards, etc. ● Groom park trails regularly in the winter to provide safe and easy access.
	● Ensure safety throughout the park for all users	● Install signs at all entrances/exits to Glebe Park and at trail intersections with 911 information. ● Ensure that there are signs at each entrance that indicate routes and location information for emergency vehicles. ● Consider the addition of a life ring buoy at the dock to be used in case of emergency.

Table 3: Stewardship Recommendations: Health and Safety

3.3 Ecological Integrity

3.3.1 Forest Management

Background:

Based on the Ecologic Land Classification (ELC) of Ontario, Glebe Park is located in Ecozone 5E and Ecoregion 5E-11 of Ontario. (https://www.ontario.ca/page/ecological-land-classification)

It is further classified as falling within the Bancroft Eco-district within the 'Georgian Bay Ecoregion" and is situated on the southern portion of the Precambrian Shield, in south-central

Ontario, extending from southeastern Lake Superior in the west to the central portion of the Ottawa River valley and the Quebec border in the east. (https://www.ontario.ca/page/ecosystems-ontario-part-1-ecozones-and-ecoregions)

The southern boundary of this ecoregion is defined by the interface between the bedrocks of the Precambrian shield ("bare rock ridges and shallow till to the south" and "shallow till and bare rock ridges") and the Ordovician limestones and dolostones. (https://www.ontario.ca/page/ecological-land-classification)

In the 5E-11 Ecodistrict, on mesic to dry mesic sites, typical of Glebe Park, sugar maple is a dominant species, and other hardwoods such as American beech, wild black cherry, American basswood, and white ash may be common as well, especially in the southern part of the ecoregion. This ecoregion forest cover description is a perfect match for the Glebe Forest, which is comprised of a tolerant hardwood working group, of various age classes, dominated by sugar maple. It should be noted that eastern hemlock is also a component of the forest on moister, cooler northern slopes and low-lying areas and within the 5E-11 Ecodistrict on drier, warmer sites you will find eastern white pine, red pine, trembling aspen, paper birch, northern red oak, and bur oak. It is also worth while to note that although the predominant underlying geology of Ecodistrict 5E-11 is carbonate based, is low-lying not true for the Glebe Forest which borders Ecodistrict 5E-8 and 9 and is dominated by older acidic bedrock. The importance of this fact and classification discrepancy, will come into play later when looking at factors

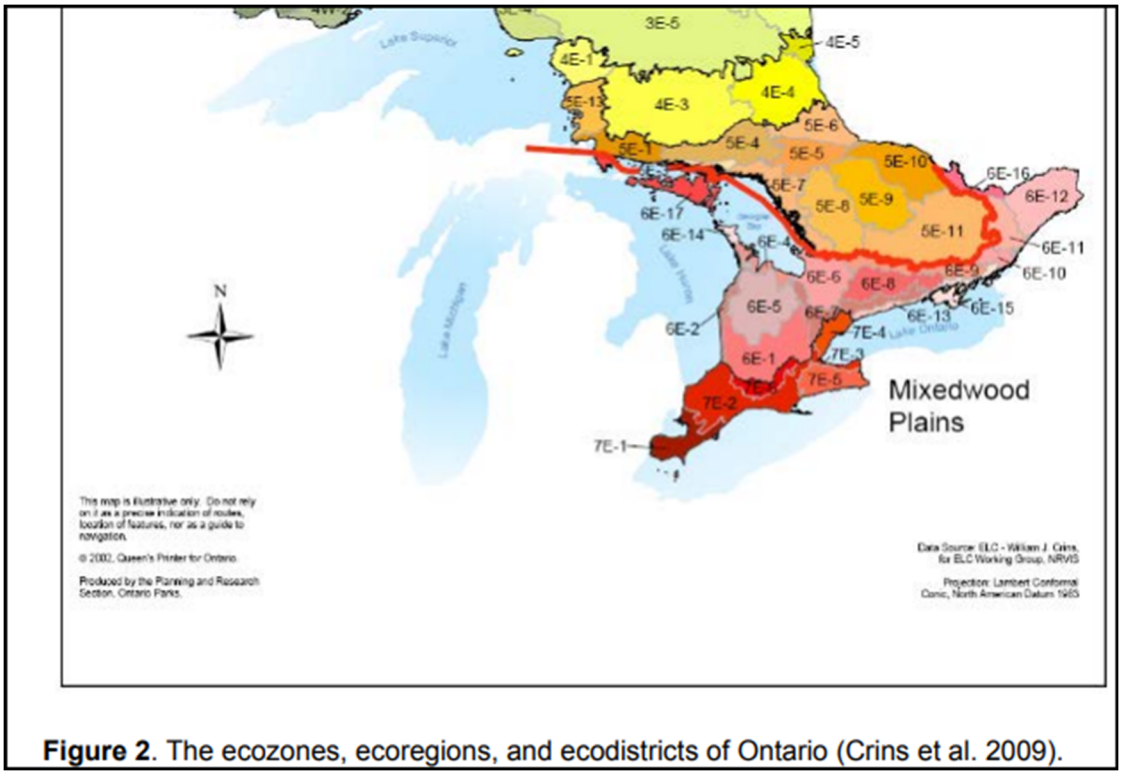

Figure 2. The ecozones, ecoregions, and ecodistricts of Ontario (Crins et al. 2009).

Figure 8: Ecozones, ecoregions, and ecodistricts of Ontario

impacting the Glebe Forest. This identification and classification of the Glebe Forest within the ELC provides a starting point and foundation for planning and management.

Forest Management Objectives:

The history of the Glebe Forest is one similar to all forests within the area and Eastern North America in general, logging (https://cfs.nrcan.gc.ca/selective-cuttings/68). Past forest management plans have focused on the value of the forest primarily as a commodity. These past practices altered the forest composition and function. At one point the forest composition would have been similar to today but would also have included a superstory (an additional forest canopy layer extending above the tolerant hardwood layer) of white pine dotted across the landscape.

> ***Presettlement forest in southern Ontario: Ecosystems measured through a cultural prism.*** Roger Suffling, Michael Evans, Ajith Perera, The Forestry Chronicle, 2003. https://pubs.cif-ifc.org/doi/pdf/10.5558/tfc79485-3

In 2011 Forest Design Consulting prepared a forest management plan for Glebe Park which was incorporated into the Glebe Park Stewardship Plan 2011-2021. Recent practices prescribed by that plan, removed all dead standing trees from the forest under the guise of safety and forest health. This practice had merit where adjacent to recreational trails and has been addressed with modified and up to date practices with the creation of the Glebe Park and Museum Committee, *Operational Procedures for Managing Hazard Trees*, July 2023, document. But when the prescription was applied, it was applied to the entire park area, even in remote corners of the park with no trails for 100s of metres. The practice resulted in the complete removal of all standing dead wood and its critical roll in the forest ecosystem

> ***Ecology of Dead Wood in the Northeast.*** Aleander M. Evans and Matthew J. Kelty, Forest Guild, 2010. https://foreststewardsguild.org/wp-content/uploads/2019/06/ecology_of_dead_wood.pdf

> ***Developing research approaches to understand biodiversity response to biomass removal.*** L.A. Venier, I. Aubin, K. Webster, A. Rive, D.M. Morris, J.A. Rice, and P. Hazlett, Natural Resources Canada, 2014. https://publications.gc.ca/collections/collection_2015/rncan-nrcan/Fo123-2-12-2014-eng.pdf

The recommendation for the Glebe Forest going forward is to follow an “unmanaged forest” approach to forest management with limited tree extraction. This means the forest will not be managed for its commercial value and the practice of logging will be excluded from the park. Some foresters might argue that modern forest management is essential to a healthy productive forest ecosystem. This is only true in some cases to meet the needs and wants of humans and economic pressures which are part of our economy and culture today. But few forests benefit from logging, and forests did quite fine post glaciation until the cut and run era of forest management began and humans started “managing” the forest.

An unmanaged forest approach is a misnomer to some degree since it simply excludes current OMNRF Forest Management Practices which prioritize wood commodity production. It does not mean that you do absolutely nothing to the forest, but rather employs modern science and the natural process of forest succession to facilitate ecosystem/forest health, diversity, recovery and sustainability.

What is unmanaged forest and how does it sustain biodiversity in landscapes with a long history of intensive forestry? Hans Henrik Bruun, Jacob Heilmann-Clausen, Journal of Applied Ecology. First published: 31 August 2021. https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2664.13754

Reconstructing Historical Logging in the Great Lakes - St. Lawrence Forests of Algonquin Provincial Park and Haliburton Forest, Ontario: An Analysis of Tree Core data. Emily Lock, A Capstone submitted in conformity with the requirements for the degree of Masters of Forest Conservation John H. Daniels Faculty of Architecture, Landscape, and Design University of Toronto. https://tspace.library.utoronto.ca/bitstream/1807/104168/1/Lock%20-%20Capstone%20-%20F.pdf

Non-Timber Forest Management and Sustainable Use by Major Forest Zones in BC https://continuingstudies.uvic.ca/science-and-the-environment/courses/non-timber-forest-management-and-sustainable-use-by-major-forest-zones-in-b-c/

Forest Status, Impacts and Recommendations:

Status:

The Glebe Forest is a sugar maple dominated, tolerant hardwood working group, with common associated species such as, white ash, black cherry, ironwood, American beech, yellow birch, white birch, red maple, basswood balsam fir and eastern hemlock. There are rare, scattered seedling/sapling white pine trees with a concentration in the upper clearing/gravel storage area. These white pines are suppressed by a high canopy closure percentage (lack of light) and have been browsed on by WT deer. In general, there is no sugar maple regeneration in the Glebe Forest. This is an anecdotal observation based on 7 years of walking the forest and looking for maple regeneration.

Variables impacting the Forest composition/Forest Disturbance/ Forest Function

a. Past Logging.

The main species that was extirpated from the park, probably by the late 19th century, was the white pine. Although there is no evidence of white pine being part of this forest ecosystem, history would suggest that it was. This is supported by the presence of white pine in adjacent forests and in the county. There is also a mosaic of "Pit and Mound or Hummock" micro topography, that points to huge, tall wind thrown trees such as white pine.

Nature Conservancy of Canada
https://www.natureconservancy.ca/en/where-we-work/ontario/featured-projects/backus-woods/interpretive-features/tip-up.html

Long-term influence of disturbance-generated microsites on forest structural and compositional development. Emma M. Sass, Anthony W. D'Amato, David R. Foster, Audrey Barker Plotkin, Shawn Fraver, Peter K. Schoonmaker, and David A. Orwig, NCR Research Press, 2018. https://site.uvm.edu/tdamato/files/2021/05/Sass-et-al.-2018-CJFR.pdf

The white pine that are currently in the park are mainly found in the upper clearing/ gravel storage area and almost all have white pine weevil leader damage due to their height being less than 8m and the lack of partial shading to alter temperate that would not favour the weevil. The multiple logging events on this site will also affect future species composition, especially sugar maple owing to nutrient balance disruption.

Long-term decline of sugar maple following forest harvest, Hubbard Brook Experimental Forest, New Hampshire. Natalie L. Cleavitt, John J. Battles, Chris E. Johnson, and Timothy J. Fahey. NCR Research Press, 2017.

https://cdnsciencepub.com/doi/pdf/10.1139/cjfr-2017-0233

Recommendation:

Reintroduce white pine transplanted seedlings or larger caliper stock into the Glebe Forest, to "Bring back the pine"! These seedlings would be planted in specific areas of the forest that have suitable soil depth and moisture regime under natural gaps in the overstory canopy to provide light for growth and some shade and temperature control to limit white pine weevil attacks.

White pine weevils. Health Canada. https://www.canada.ca/en/health-canada/services/pest-control-tips/white-pine-weevils.html

The newly planted seedlings would also require deer browse protection until they were above the browse height of 2m. Deer browsing is discussed below.

b. Forest Disease:

The main forest disease in Glebe Park is the Beech Bark Disease (BBD).

Beech Bark Disease. Government of Ontario https://www.ontario.ca/page/beech-bark-disease#:~:text=Beech%20bark%20disease%20is%20an,in%20combination%20with%20other%20stresses

It was introduced from Europe to Nova Scotia in the 1890's and slowly progressed west until it hit Glebe Park around 2010. It has no practical controls.

Beech Bark Disease. Esther Kibbe and Enrico Bonello, Department of Plant Pathology, OHIOLINE, Ohio State University Extension. https://ohioline.osu.edu/factsheet/plpath-tree-09

Mature, large American beech trees, in the park, are dead or showing signs of infection and decline. But the younger to mid aged specimens are still symptom free which parallels the literature. Dead American beech trees make up the second highest percentage of hazard trees in Glebe Park.

Beech Bark Disease: Beautiful But Deadly. Haliburton Forest and Wild Life Reserve. https://www.haliburtonforest.com/beech-bark-disease/

Multiple resources:

https://scholar.google.ca/scholar?q=Beech+bark+disease+treatment&hl=en&as_sdt=0&as_vis=1&oi=scholart

Recommendations:

i. Remove only dead or dying trees that qualify as hazard trees and are adjacent to trails following the Glebe Park and Museum Committee, *Operational Procedures for Managing Hazard Trees*, July 2023, document.
ii. All American beech hazard trees, that are felled, should be left where they fall and not cut up or moved for use as firewood. This will reduce the spread of BBD within and outside the Glebe Forest.
iii. Maintain all healthy American beech trees with hopes that there is genetic variation within the species and they may be potentially disease resistant. Avoid stressing any remaining American beech trees by avoiding the placement of any trail routes within the rooting zone (crown diameter X 1.5). This will also prevent the unintended spread of spores and invertebrates along the trail vector.
iv. Local foresters (Haliburton Forest and Wildlife Reserve) are looking at replacing American beech with red oak. Red oak have different soil texture and moisture light requirements than American beech. The other potential problem with this species replacement proposal is the recent discovery of Oak Wilt Disease in Canada.

Oak Wilt. Invasive Species Centre, 2023
https://www.invasivespeciescentre.ca/invasive-species/meet-the-species/invasive-pathogens/oak-wilt/.

When BBD first appeared foresters would tell you to go hug a beech since there would not be any left soon. BBD seems to now be following a similar path as Dutch Elm Disease (first discovered in Ontario in 1946) where there was a dramatic decline in the white elm in North America. White elm, however, still persists today, https://www.ontario.ca/page/dutch-elm-disease, but rarely reaches any abundance or age as prior to the introduction. This could be the future for American beech.

v. Implementation of permanent forest sample plots throughout the Glebe Forest which are monitored and inventoried on a regular basis to track changes and trends in the forest structure and composition. There are a number of permanent sample plot protocols accepted and in place that would meet the needs of this recommendation.

Research Tool Kit, Harvard Forest
https://harvardforest.fas.harvard.edu/research-tool-kit#:~:text=The%20permanent%2020x20%20meter%20plots,debris%20on%20the%20forest%20floor

c. White Tailed Deer Browsing:

Haliburton is known for its deer population. The deer in town and in Glebe Park are a popular sight for visitors and tourists. The deer do present a problem to many residents, eating their flower and vegetable gardens. The municipal council has passed a no deer feeding bylaw for a limited area within the village and for a limited time period each year (May 1st to September 30th).

By-Law No. 2023-44. Being a By-Law to regulate and control Feeding of Deer under the Jurisdiction of the Corporation of the United Townships of Dysart, Dudley, Harcourt, Guilford, Harburn, Bruton, Havelock, Eyre and Clyde. https://www.dysartetal.ca/en/municipal-government/By-Law%20Enforcement/By-Law%202023-44%20Deer%20Feeding.pdf

Deer are a natural component of the forest ecosystem surrounding the village but are not only being a nuisance to local residents but are also having major impacts to the Glebe Forest ecosystem. The fact that many does have twin and even some with triplet fawns is indicative of the false habitat productivity in the Glebe Park area. Deer are being fed all winter by some residents allowing for limited natural mortality among the adult population and high fawn birth and survival rates. This combined with the lack of natural predators in the area and the fact that deer utilize the many winter trails in Glebe to reduce critical winter energy expenditures also contributes to the high winter survival and over abundance of deer in the Glebe Forest.

Issue: Deer Abundance. Department of Ecosystem Science and management, Penn State https://ecosystems.psu.edu/outreach/youth/sftrc/deer/issue-deer

Plant species browsing, mutilation and extirpation

Deer are now browsing plant and tree species that they would normally not eat in a balanced ecosystem. Balsam fir seedlings are not preferred but are all browsed in the park and preferred species such sugar maple and red maple are virtually absent from the seedling layer in the entire forest. Only 2 tiny 1m^2 areas in the park have any sugar maple seedlings. It is worth while to note that more than deer browsing may be responsible for the decline of maple regeneration in the Glebe Forest. Decades of acid precipitation falling on hardwood forests growing on low carbonate, low buffering acidic bedrock combined with many successive logging events may have decreased/depleted/unbalanced the calcium in the forest soils, resulting in poorer forest growth and difficult stand regeneration for sugar maple.

Long-term decline of sugar maple following forest harvest, Hubbard Brook Experimental Forest, New Hampshire. Natalie L. Cleavitt, John J. Battles, Chris E. Johnson, and Timothy J. Fahey, NCR Research Press, 2017. https://cdnsciencepub.com/doi/pdf/10.1139/cjfr-2017-0233

Calcium and aluminum impacts on sugar maple physiology in a northern hardwood forest. Joshua M. Harlman, Paul G. Schaberg, Gary J. Hawley, Linda H. Pardo, Timothy J. Fahey, Tree Physiology, 2013 https://academic.oup.com/treephys/article/33/11/1242/1708746

Calcium Deficiency Implicated in Sugar Maple Decline, Testing for Biological Calcium Depletion at the Forest and Landscape Levels***.*** Donald DeHayes, Paul Schaberg, Scott Bailey, Northeastern States Research Cooperative, 2001 https://nsrcforest.org/project/calcium-deficiency-implicated-sugar-maple-decline

The seedling layer for tree species is dominated by white ash and black cherry. Even these are browsed to some degree but not mutilated. Eastern hemlock regeneration is also

being severely browsed but still present in the seedling layer. Canadian Yew or ground hemlock (Taxus canadensis) has virtually been extirpated from the park.

Forest Management Guidelines for the Provision of White-tailed Deer Habitat. Dennis R. Voigt, Jim D. Broadfoot, James A. Baker, Ontario Ministry of Natural Resources, 2017 https://dr6j45jk9xcmk.cloudfront.net/documents/2811/guide-whitetail-deer.pdf

The only place that it exists at this time is at the NE corner of the Fleming College building where tall rising branches allow them to avoid being browsed. All other once thriving ground hemlock areas are now just bare, stripped, dead branches. Thus, the forest species composition is being altered drastically and will affect the natural succession process and the current and future forest. The browse is attributed to white tailed deer since they leave a torn rough ripped browed twig break and rabbits and hares leave a sharp angled twig cut.

Recommendations:

Implementation of permanent forest sample plots throughout the Glebe Forest which are monitored and inventoried on a regular basis to track changes and trends in the forest structure and composition. There are a number of permanent sample plot protocols accepted and in place that would meet the needs of this recommendation. The Haliburton Highlands Land Trust and the U-Links Centre for Community-Based Research have already established protocols for sample plots on HLT properties.

Research Tool Kit, Harvard Forest https://harvardforest.fas.harvard.edu/research-tool-kit#:~:text=The%20permanent%2020x20%20meter%20plots,debris%20on%20the%20forest%20floor.

Forest Health Assessment for Barnum Creek Nature Reserve. Alyson Bimm, Cailyn Carscadden, Julia Hérault, Natalie Holley, Olivia Gaetz, Jade Gorman, Kevin Leblond, Emily Lemon, Megan MacPherson, Emilia Violin, & Taylor Howe, Trent University, 2022 https://database.ulinks.ca/items/show/4948

These plots would also be utilized to determine the % browse and deer carrying capacity. To determine the long-term impact, it is recommended to have some plots that utilized deer exclusion fencing, to yield data that shows the impact of deer on the forest. Fenced vs unfenced sample plot data will provide a comparison that may give a more definitive picture of the impact of white -tailed deer on the Glebe Forest.

Evaluating the impacts of white-tailed deer (Odocoileus virginianus) browsing on vegetation in fenced and unfenced timber harvests. Halie A. Parker et al, Forest Ecology and Management, 2020. https://www.sciencedirect.com/science/article/abs/pii/S0378112720310951

d. Trails:

There are tens of kilometres of trails in Glebe Park. The trails have various seasonality, ranging from only winter snowshoe trails, that virtually disappear in the spring, to single track mountain bike trails, that have a concentrated acute impact on soil erosion and

potential chronic impacts on the rooting habitats and function of adjacent trees, to wider Nordic ski trails, that are also used for walking and biking in the non-winter months.

Effects of mountain biking versus hiking on trails under different environmental conditions. Marianne Evju, Dagmar Hagen, Mari Jokerud, Siri Lie Olsen, Odd Inge Vistad, Journal of Environmental Management, 2017. https://www.sciencedirect.com/science/article/pii/S0301479720314791.

Larger Nordic ski trails are double tracked width and create stand instability from wind damage, providing ingress avenues for invasive species and reducing core areas and add to forest fragmentation.

It's not trails that disturb forest birds, but the people on them. Frontiers, 2018. https://www.sciencedaily.com/releases/2018/11/181112082417.htm

The forest is also following a natural succession process and approaching a late sere/successional stage. Standing dead wood, dead trees, snags are once again appearing as they die from competition and a variety of natural causes. They have not been present in the forest since the 2011 prescription for their removal. These dead and dying trees can fall without warning and pose a safety hazard to forest trail users.

Recommendations.

i. Although one of the main uses of Glebe Park is human powered recreation, it is recommended to cap the creation of double tracked wide trails and limit the development of all new trails. All new approved trails should only be single track in width. The Glebe Park Committee should consult with local trail user/stakeholder organizations that are involved with Glebe Park to come to an agreement on a plan and a maximum cap on all trails.

   Comparing Relative Impacts of Various Trail User Groups - A summary of research and studies on factors that affect trails management strategy and determining uses for each trail. Woody Keen, American Trails, 2008. https://www.americantrails.org/resources/comparing-relative-impacts-of-various-trail-user-groups

ii. The removal of dead "hazard trees" should only be carried out following the Glebe Park and Museum Committee, *Operational Procedures for Managing Hazard Trees*, July 2023, document. This basically classifies hazard trees with a rating system to trigger the need to remove the tree. Only trees within one tree length of a trail are considered. Dead trees within one tree length of a trail but leaning away from the trail are not considered hazard trees. There is no question that trees endangering the safe use of the park's trails should be dealt with, but minimized to allow for the vertical standing dead wood component of the forest to be restored to the pre 2011 cutting prescription level. The document/procedure also outlines protocols for ongoing monitoring and reporting of hazard trees in Glebe Park.

e. Climatic Change:

Research predicts that sugar maple will decline as temperatures increase. In general, over hundreds of years, plant species may migrate northward. In one scenario, tolerant

hardwood forests of central Ontario may migrate as far north as Kapuskasing. Species, such as those of the oak-hickory forests of the central U.S., may eventually migrate into what is currently the Great Lakes-St. Lawrence Forest and Ecozone 5E.

The Impact of Climate Change on Ontario's Forests. Forest Research Information Paper – No. 143, Ontario Ministry of Natural Resources and Ontario Forest Research Institute. https://fgca.net/wp-content/uploads/OFRI-impact-of-climate-change-on-ontarios-forests-1.pdf

Climate change isn't the only thing threatening maple trees. Thomas Hall, Canadian Geographic, 2018. https://canadiangeographic.ca/articles/climate-change-isnt-the-only-thing-threatening-maple-trees/

Forest adaptation to climate change—is non-management an option? Robert Jandl, Peter Spathelf, Andreas Bolte, Cindy E. Prescott, Annals of Forest Science, 2019 https://annforsci.biomedcentral.com/articles/10.1007/s13595-019-0827-x

Regional growth decline of sugar maple (Acer saccharum) and its potential causes. Daniel A. Bishop, Colin M. Beier, Neil Pederson, Gregory B. Lawrence, John C. Stella, Timothy J. Sullivan, Ecosphere, 2015. https://esajournals.onlinelibrary.wiley.com/doi/full/10.1890/ES15-00260.1

3.3.2 Invasive Species Monitoring and Management

Undisturbed wild areas have a natural defense against invasive species. Human disturbances such as the double track trails located in Glebe Park offer corridors for the spread of invasive species allowing them to take routes within the ecosystem. Invasive species travel to these destinations via human traffic, whether it is on equipment (such as ski's, snowshoes and bicycles) or clothes (shoes, and outerwear). Both of these have the potential to introduce invasive species from other locations that may not have previously been in the park. There is currently no protocol for the removal or prevention of invasive species in the park. However, to maintain the park's environmental integrity it is in the best interest to prevent the movement of these species that pose risk to Ontario's forests and natural areas. Invasive species pose a threat to native Ontario plants and animals due to competition, biodiversity loss, parasites, hybridizers and disease (Government of Canada, 2020).

Invasive species that have been recorded in Haliburton County are Purple Loosestrife Giant Hogweed and Japanese Knotweed (COHPOA, 2020). The Glebe Park and Museum Committee might consider undertaking an invasive species inventory such as a bio blitz to have a better understanding of the ecological integrity of the park. After identifying which alien species are located in the park, monitoring and management plans need to be put into place.

Recommendations.

To reduce the chance of introducing invasive species visitors should be educated via interpretive signage and encouraged to use shoes brushes at all entrances and exits to the park. All equipment should be cleaned off before use and after the use of Glebe Park as this will greatly reduce the chances of invasive species introduction.

Consider undertaking an invasive species inventory such as a bio blitz to have a better understanding of the ecological integrity of the park.

Create and implement monitoring and management plans to deal with invasive species.

3.3.3 Sensitive Areas

It is important that these smaller, more sensitive compartments such as Compartment 3: Hemlock Lowland be left untouched as it is the smallest compartment of the Forest and is the most unique stand (see Figure 2). As the park is subjected to human interaction and machinery this can have negative impacts on the natural environment. It is important to understand that some areas can be greatly affected by the small gradual changes in the environment surrounding them. In the Glebe Stewardship Plan 2011-2021 the forest is compartmentalized into different sections that make up different regions of flora types within the park (see Figure 2). Sections are subjected to different levels of traffic and will be affected differently by natural processes such as forest succession. Secondary succession (fires, blowdown, floods, harvesting, insect and pathogen infestations), events may return the forest to a previous state such as shrub land or an open vegetation area or, on a small scale, simply create gaps within the forest canopy. Sensitivity to change is a key concept when disturbance is a regular process in terms of human recreation, domestic dog disturbances, and machinery.

Stick nests have been found in the eastern portion of Compartment C5: Maple Forest (northeast corner of the park) and C4: Maple Polewood Forest. These should remain protected habitats as other hawks will commonly redecorate these nests in future years.

Recommendations.

Leave smaller, more sensitive compartments such as Compartment 3: Hemlock Lowland untouched. Maintain the eastern portion of Compartment C5: Maple Forest (northeast corner of the park) where stick nests have been found as a protected habitat (as other hawks will may use these nests in future years).

3.3.4 Climate Change

Impacts of climate change may involve more extreme weather events that result in inconsistent water quantities during spring run-off and summer rain. From the perspective of infrastructure weather events involving unusually large volumes of rain will have an impact on trails causing washouts and potential flooding. Ongoing improvement of trails and drainage system and replacement of culverts will mitigate some of the impact of these events.

Too much or too little water and an overall increase in temperature can affect the composition of the forest hydrologic cycle causing an imbalance in an ecosystem creating stress on some species and opportunities for invasive species. One major issue that is affecting Ontario in regard to climate change is that watersheds are experiencing what were called “100-year floods” more often. Such events are caused by a rapid increase in spring run off when frost is still retained within the ground. These events could result in delayed recharging of groundwater systems that will impact the moisture content of the forest. This could lead to a change in succession types responding to drier ground conditions. These turnover effects can lead to an increase in dieback in certain species that require more water and lead to an increase of hazard trees.

For more detailed information on the impact of climate change on forests refer to:

The Impact of Climate Change on Ontario's Forests. Forest Research Information Paper – No. 143, Ontario Ministry of Natural Resources and Ontario Forest Research Institute. https://fgca.net/wp-content/uploads/OFRI-impact-of-climate-change-on-ontarios-forests-1.pdf

Recommendation.

Continue the upgrading of trails and drainage systems and the replacement of older culverts to mitigate some of the impact of these extreme weather events.

3.3.5 Dog Waste

Dog walking is a very popular activity in the park in the Glebe field area and the walking trails throughout the park. This activity has the potential to add significant amounts of fecal matter that is not naturally occurring in the park forest. Leaving dog feces in the forest can increase the risk of bringing in bacteria to the environment, therefore causing a pollutant and human health hazard. The fecal matter will eventually make its way into streams, ponds, lakes and other waterways that humans use (EPA, 2020).

A specific, signed bin that for the disposal of dog waste bags (and also a dispenser of dog waste bags) was recently installed on the main trail of the park, as well as an additional, bear proof, waste bin and these have been effective in decreasing the amount of dog feces being deposited in the park and also the number of dog waste bags (containing dog feces) abandoned along the trail.

Recommendation.

Consideration should be given to adding another dog waste bin at another key location in the park.

3.3.6 Ecological Integrity: Stewardship Activities and Recommendations Summary Table

Many objectives and recommendations listed in Table 2 can be applied to Recreational and Cultural Use but are also relevant to Ecological Integrity and Safety. To prevent redundancy, each recommendation has only been listed once in this table.

Stewardship Value	Objective	Recommendations
Ecological Integrity	● Maintain forest health	● Cap the creation of double tracked wide trails and limit the development of all new trails. All new approved trails should only be single track in width. The Glebe Park Committee should consult with local trail user/stakeholder organizations that are involved with Glebe Park to come to an agreement on a plan and a maximum cap on all trails.

	● Monitor and manage invasive species	● Educate visitors via interpretive signage the impact of introducing invasive species to the park and encourage actions such as to using shoes brushes at all entrances and exits to the park and the cleaning of all equipment before and after use. ● Consider undertaking an invasive species inventory such as a bio blitz to have a better understanding of the ecological integrity of the park. ● Create and implement monitoring and management plans to deal with invasive species.
	● Maintain and enhance biodiversity throughout the forest	● Keep trails away from Compartment 3: Hemlock Lowland. It is the smallest compartment of the Forest and a unique stand of trees. ● Cap the creation of double-tracked wide trails and limit the development of all new trails. Any new approved trails should only be single track in width. ● The Glebe Park and Museum Committee should consult with local trail users/stakeholder organizations that are involved with Glebe Park and come to an agreement on a plan and a maximum cap on all trails. ● The removal of dead “hazard trees” should only be carried out following the Glebe Park and Museum Committee’s, *Operational Procedures for Managing Hazard Trees*, July 2023, document. ● Implementation of permanent forest sample plots throughout the Glebe Forest which are monitored and inventoried on a regular basis to track changes and trends in the forest structure and composition ● Maintain all healthy American beech trees with hopes that there is genetic variation within the species and they may be potentially disease resistant. ● Avoid stressing any remaining American beech trees by avoiding the placement of any trail routes within the rooting zone

		(crown diameter X 1.5). This will also prevent the unintended spread of spores and invertebrates along the trail vector. ● Reintroduce white pine transplanted seedlings or larger caliper stock into the Glebe Forest, to "Bring back the pine"! These seedlings would be planted in specific areas of the forest that have suitable soil depth and moisture regime under natural gaps in the overstory canopy to provide light for growth and some shade and temperature control to limit white pine weevil attacks. ● Protecting the integrity of habitat in compartment C3: Hemlock Lowland. This is crucial to maintaining the biodiversity of Glebe Park. It is recommended that this compartment remain protected from any future development within the park to retain this high valued ecological ecosystem. ● The stream channel entering into Head Lake should be monitored during wet seasons for erosion of the fine silty clay soil. Water quality entering Head Lake could be jeopardized in this area, possibly requiring mitigation in the future. ● Stick nests have been found in the eastern portion of Compartment C5: Maple Forest (northeast corner of the park). This should remain a protected habitat as other hawks will commonly redecorate these nests in future years. ● Develop plan for the northern open area • Staking out preferred trail locations to cross this opening; • Maintain the 3 metre trails that are permanently located across the opening; • Select a suitable area to transplant native trees that are not currently in the arboretum and redirect the trail to this location; and • Allow natural regeneration to encroach from the forest edge to become established in the underutilized areas.

		● Allow for wide borders in main field to allow growth on native plants and habitat/feeding area for pollinators
	● Mitigate impacts of extreme weather events	● Continue the upgrading of trails and drainage systems and the replacement of older culverts to mitigate some of the impact of these extreme weather events.
	● Prevent dog feces from entering the park environment	● Introduce a second dog waste bag station and signage.

Table 4: Stewardship Activities and Recommendations: Ecological Integrity

5.0 Summary

The 2023-2033 Glebe Park Stewardship Plan identifies the need for implementing long-term stewardship goals. Both stewardship goals and forest management practices have been recommended in this plan. All recommendations are in accordance to the stewardship values of The Glebe Park and Museum Committee.

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APPENDIX 1: WILDLIFE INVENTORY

Ministry of Natural Resources (MNR) Status: NAR - Not at Risk; SC - Special Concern; THR - Threatened; END - Endangered

Committee on the Status of Endangered Wildlife in Canada (COSEWIC) Status: NAR - Not at Risk; SC - Special Concern; THR - Threatened; END - Endangered

S_Rank (Provincial Ranking): S1 - Extremely rare; S5 - Common. S3 and below are tracked by the OMNR

Class/Order		Scientific Name	Common Name	MNR Status	COSEWIC Status	S_RANK
Aves						
	Cuculiformes	Coccyzus erythropthalmus	Black-billed Cuckoo			S5B
	Falconiformes	Buteo platypterus	Broad-winged Hawk			S5B
	Falconiformes	Cathartes aura	Turkey Vulture			S5B
	Galliformes	Bonasa umbellus	Ruffed Grouse			S5
	Passeriformes	Agelaius phoeniceus	Red-winged Blackbird			S5
	Passeriformes	Carduelis tristis	American Goldfinch			S5B
	Passeriformes	Catharus fuscescens	Veery			S4B
	Passeriformes	Catharus guttatus	Hermit Thrush			S5B
	Passeriformes	Catharus ustulatus	Swainson's Thrush			S4B
	Passeriformes	Certhia americana	Brown Creeper			S5B
	Passeriformes	Contopus virens	Eastern Wood-pewee			S4B
	Passeriformes	Corvus brachyrhynchos	American Crow			S5B
	Passeriformes	Corvus corax	Common Raven			S5
	Passeriformes	Cyanocitta cristata	Blue Jay			S5
	Passeriformes	Dendroica caerulescens	Black-throated Blue Warbler			S5B
	Passeriformes	Dendroica fusca	Blackburnian Warbler			S5B
	Passeriformes	Dendroica magnolia	Magnolia Warbler			S5B
	Passeriformes	Dendroica pensylvanica	Chestnut-sided Warbler			S5B
	Passeriformes	Dendroica virens	Black-throated Green Warbler			S5B
	Passeriformes	Geothlypis trichas	Common Yellowthroat			S5B
	Passeriformes	Melospiza melodia	Song Sparrow			S5B
	Passeriformes	Oporornis philadelphia	Mourning Warbler			S4B
	Passeriformes	Piranga olivacea	Scarlet Tanager			S4B
	Passeriformes	Poecile atricapillus	Black-capped Chickadee			S5
	Passeriformes	Quiscalus quiscula	Common Grackle			S5B
	Passeriformes	Sayornis phoebe	Eastern Phoebe			S5B

Class/Order		Scientific Name	Common Name	MNR Status	COSEWIC Status	S_RANK
	Passeriformes	Seiurus aurocapilla	Ovenbird			S4B
	Passeriformes	Setophaga ruticilla	American Redstart			S5B
	Passeriformes	Sialia sialis	Eastern Bluebird	NAR	NAR	S5B
	Passeriformes	Sitta carolinensis	White-breasted Nuthatch			S5
	Passeriformes	Sturnus vulgaris	European Starling			SNA
	Passeriformes	Troglodytes troglodytes	Winter Wren			S5B
	Passeriformes	Turdus migratorius	American Robin			S5B
	Passeriformes	Vermivora ruficapilla	Nashville Warbler			S5B
	Passeriformes	Vireo olivaceus	Red-eyed Vireo			S5B
	Passeriformes	Zonotrichia albicollis	White-throated Sparrow			S5B
	Piciformes	Colaptes auratus	Northern Flicker			S4B
	Piciformes	Dryocopus pileatus	Pileated Woodpecker			S5
	Piciformes	Picoides pubescens	Downy Woodpecker			S5
	Piciformes	Picoides villosus	Hairy Woodpecker			S5
	Piciformes	Sphyrapicus varius	Yellow-bellied Sapsucker			S5B
Mammalia						
	Artiodactyla	Odocoileus virginianus	White-tailed Deer			S5
	Carnivora	Ursus americanus	American Black Bear	NAR	NAR	S5
	Carnivora	Vulpes vulpes	Red Fox			S5
	Lagomorpha	Lepus americanus	Snowshoe Hare			S5
	Rodentia	Tamiasciurus hudsonicus	Red Squirrel			S5
Insecta						
	Lepidoptera	Carterocephalus palaemon	Arctic Skipper			S5
	Lepidoptera	Chlosyne harrisii	Harris's Checkerspot			S4
	Lepidoptera	Erynnis juvenalis	Juvenal's Duskywing			S5
	Lepidoptera	Glaucopsyche lygdamus	Silvery Blue			S5
	Lepidoptera	Hesperia sassacus	Indian Skipper			S4
	Lepidoptera	Megisto cymela	Little Wood-Satyr			S5
	Lepidoptera	Papilio canadensis	Canadian Tiger Swallowtail			S5
	Lepidoptera	Phyciodes cocyta	Northern Crescent			S5
	Lepidoptera	Pieris oleracea	Mustard White			S4
	Lepidoptera	Poanes hobomok	Hobomok Skipper			S5
	Lepidoptera	Polites themistocles	Tawny-edged Skipper			S5
	Lepidoptera	Thorybes pylades	Northern Cloudywing			S5
	Odonata	Basiaeschna janata	Springtime Darner			S5
	Odonata	Calopteryx aequabilis	River Jewelwing			S5
	Odonata	Calopteryx maculata	Ebony Jewelwing			S5
	Odonata	Cordulia shurtleffii	American Emerald			S5
	Odonata	Dorocordulia libera	Racket-tailed			S5

Class/Order		Scientific Name	Common Name	MNR Status	COSEWIC Status	S_RANK
			Emerald			
	Odonata	Enallagma hageni	Hagen's Bluet			S5
	Odonata	Epitheca cynosura	Common Baskettail			S5
	Odonata	Gomphus exilis	Lancet Clubtail			S5
	Odonata	Gomphus spicatus	Dusky Clubtail			S5
	Odonata	Ischnura verticalis	Eastern Forktail			S5
	Odonata	Ladona julia	Chalk-fronted Corporal			S5
	Odonata	Leucorrhinia hudsonica	Hudsonian Whiteface			S5
	Odonata	Libellula quadrimaculata	Four-spotted Skimmer			S5
	Odonata	Nehalennia irene	Sedge Sprite			S5
	Odonata	Plathemis lydia	Common Whitetail			S5
Dicotyledoneae						
	Apiales	Aralia nudicaulis	Wild Sarsaparilla			S5
	Asterales	Eurybia macrophylla	Large-leaf Wood-aster			S5
	Capparales	Cardamine diphylla	Two-leaf Toothwort			S5
	Caryophyllales	Stellaria borealis	Northern Stitchwort			S5
	Cornales	Cornus alternifolia	Alternate-leaf Dogwood			S5
	Dipsacales	Lonicera canadensis	American Fly-honeysuckle			S5
	Dipsacales	Sambucus racemosa	European Red Elder			S5
	Dipsacales	Viburnum lantanoides	Alderleaf Viburnum			S5
	Dipsacales	Viburnum nudum var. cassinoides	Northern Wild-raisin			S5
	Ericales	Gaultheria procumbens	Teaberry			S5
	Fagales	Betula alleghaniensis	Yellow Birch			S5
	Fagales	Betula papyrifera	Paper Birch			S5
	Fagales	Corylus cornuta	Beaked Hazelnut			S5
	Fagales	Fagus grandifolia	American Beech			S4
	Fagales	Ostrya virginiana	Eastern Hop-hornbeam			S5
	Geraniales	Impatiens capensis	Spotted Jewel-weed			S5
	Lamiales	Lycopus uniflorus	Northern Bugleweed			S5
	Malvales	Tilia americana	American Basswood			S5
	Polygonales	Polygonum cilinode	Fringed Black Bindweed			S5
	Primulales	Trientalis borealis	Northern Starflower			S5
	Ranunculales	Actaea rubra	Red Baneberry			S5
	Ranunculales	Caulophyllum thalictroides				S5
	Ranunculales	Coptis trifolia	Goldthread			S5
	Rosales	Fragaria virginiana	Virginia Strawberry			S5

Class/Order		Scientific Name	Common Name	MNR Status	COSEWIC Status	S_RANK
	Rosales	Mitella nuda	Naked Bishop's-cap			S5
	Rosales	Prunus serotina	Wild Black Cherry			S5
	Rosales	Ribes glandulosum	Skunk Currant			S5
	Rosales	Rubus allegheniensis	Allegheny Blackberry			S5
	Rosales	Rubus flagellaris	Northern Dewberry			S4
	Rosales	Rubus idaeus ssp. idaeus	Common Red Raspberry			SNA
	Rosales	Rubus pubescens	Catherinettes Berry			S5
	Rosales	Sorbus decora	Northern Mountain-ash			S5
	Rosales	Tiarella cordifolia	Heart-leaved Foam-flower			S5
	Rubiales	Galium asprellum	Rough Bedstraw			S5
	Rubiales	Galium triflorum	Sweet-scent Bedstraw			S5
	Rubiales	Mitchella repens	Partridge-berry			S5
	Salicales	Populus tremuloides	Trembling Aspen			S5
	Sapindales	Acer pensylvanicum	Striped Maple			S5
	Sapindales	Acer saccharum var. saccharum	Sugar Maple			S5
	Scrophulariales	Epifagus virginiana	Beechdrops			S5
	Scrophulariales	Fraxinus americana	White Ash			S5
	Scrophulariales	Fraxinus nigra	Black Ash			S5
	Urticales	Ulmus americana	American Elm			S5
	Violales	Viola cucullata	Marsh Blue Violet			S5
	Violales	Viola pubescens var. pubescens				S5
Filicopsida						
	Filicales	Adiantum pedatum	Northern Maidenhair-fern			S5
	Filicales	Dryopteris carthusiana	Spinulose Shield Fern			S5
	Filicales	Dryopteris cristata	Crested Shield-fern			S5
	Filicales	Dryopteris marginalis	Marginal Wood-fern			S5
	Filicales	Gymnocarpium dryopteris	Oak Fern			S5
	Filicales	Onoclea sensibilis	Sensitive Fern			S5
	Filicales	Osmunda claytoniana	Interrupted Fern			S5
	Filicales	Osmunda regalis	Royal Fern			S5
	Filicales	Phegopteris connectilis	Northern Beech Fern			S5
	Filicales	Polypodium virginianum	Rock Polypody			S5
	Filicales	Polystichum acrostichoides	Christmas Fern			S5
	Filicales	Thelypteris noveboracensis	New York Fern			S4S5
	Filicales	Thelypteris palustris	Marsh Fern			S5

Class/Order	Scientific Name	Common Name	MNR Status	COSEWIC Status	S_RANK
Lycopodiopsida					
Lycopodiales	Huperzia lucidula	Shining Clubmoss			S5
Lycopodiales	Lycopodium annotinum	Stiff Clubmoss			S5
Lycopodiales	Lycopodium dendroideum	Treelike Clubmoss			S5
Monocotyledoneae					
Arales	Arisaema triphyllum	Jack-in-the-pulpit			S5
Cyperales	Brachyelytrum erectum var. erectum	Bearded Shorthusk			S4?
Cyperales	Carex arctata	Black Sedge			S5
Cyperales	Carex communis	Fibrous-root Sedge			S5
Cyperales	Carex crinita	Fringed Sedge			S5
Cyperales	Carex gracillima	Graceful Sedge			S5
Cyperales	Carex intumescens	Bladder Sedge			S5
Cyperales	Carex lacustris	Lake-bank Sedge			S5
Cyperales	Milium effusum	Tall Millet-grass			S4S5
Liliales	Allium tricoccum	Small White Leek			S5
Liliales	Erythronium americanum	Yellow Trout-lily			S5
Liliales	Maianthemum canadense	Wild-lily-of-the-valley			S5
Liliales	Maianthemum racemosum				S5
Liliales	Medeola virginiana	Indian Cucumber-root			S5
Liliales	Polygonatum pubescens	Downy Solomon's-seal			S5
Liliales	Sisyrinchium montanum	Strict Blue-eyed-grass			S5
Liliales	Streptopus lanceolatus	Rose Twisted-stalk			S5
Liliales	Trillium erectum	Red Trillium			S5
Liliales	Trillium grandiflorum	White Trillium			S5
Liliales	Trillium undulatum	Painted Trillium			S5?
Orchidales	Cypripedium acaule	Pink Lady's-slipper			S5
Pinopsida					
Pinales	Abies balsamea	Balsam Fir			S5
Pinales	Thuja occidentalis	Eastern White Cedar			S5
Pinales	Tsuga canadensis	Eastern Hemlock			S5
Taxales	Taxus canadensis	Canadian Yew			S4

Apprendix II

Glebe Park and Museum Committee

OPERATIONAL PROCEDURES FOR MANAGING HAZARD TREES

July 2023

These procedures adopt and follow the Toronto Region Conservation, OPERATIONAL PROCEDURES FOR MANAGING HAZARD TREES, January, 2006. https://treecanada.ca/wp-content/uploads/2017/11/OPERATIONAL-PROCEDURES-FOR-MANAGING-HAZARD-TREES.pdf

They have been modified to meet the facilities found in Glebe Park.

PART 1 - HAZARD TREE INSPECTION AND POLICY IMPLEMENTATION STRATEGY

Introduction: The basis of managing hazard trees as routine inspection in Glebe Park is defined in these operational procedures. This allows hazard trees to be identified, trees at risk to be assessed for increased hazard potential and non-hazardous trees to be inspected for future risk potential. Each time a Glebe Park is inspected, the inspection shall be documented on a standard "Glebe Park Hazard Tree Inspection Form," with information including the date, time, assessor's name and any other relevant information. Also, as each area/ trail in Glebe Park is assessed it is documented on the "Glebe Park Hazard Tree Trail Inventory Check List." See forms below. Tree location and tree codes are also entered in the Avenza mapping app and all data is entered and saved as an Excel file.

INSPECTION AREAS

Passive-Use Areas

Passive-use areas are non-gated recreation areas designed for year-round, passive, public use. There is no charge for using these areas (some may have voluntary registration and/or donations), and there is rarely a defined service provided for the user. These areas provide the public with quality open space for recreation. They usually include a mix of open space, nature trails and passive recreational uses. Liability related to tree failure is less likely in passive-use conservation areas than in an active-use conservation area. While many of these areas see year-round usage, the potential for tree-related mishap is reduced because the patrons have no permanence on the site. Also, public presence during periods of inclement weather is reduced, during which time tree failure frequently occurs. However, the fact that these areas openly offer the public recreation space means that vigilance in removing tree hazards must be exercised. Due to the casual usage of these areas and lack of designated services associated with the complete property, inspection of the entire area may not be required. Hiking, mountain biking, trail running and snowshoeing are often the intended uses and trails see transient use, meaning that the user passes quickly through the area and the likelihood of a tree-related mishap is substantially reduced.

If the area has a signed trail system, they will be inspected every two years and documented on a “Glebe Park Hazard Tree Inspection Form”” provided for the area. These paper field forms are 2 sided, with all the codes and explanations for each element of tree inspection on the back side. These forms are supported by an excel spread sheet of completed” Glebe Park Hazard Tree Inspection Form” logs showing all hazard trees and their status.

This will be submitted to the Glebe Park and Museum Committee Chair and accompanied by a summary report. where they will be filed until year end. At year-end

It is important when inspecting trails to identify gathering points or stopping points such as benches, vistas or parking areas. In Glebe Park gathering points such as the various sculpture locations, in the Sculpture Forst, baseball diamond benches, information kiosks and trail intersections, would qualify as potential gathering/stopping locations where the hazard tree interface is maximized. These areas possess a greater potential for tree-related mishap. Any unsigned trails will be inspected as required.

Emergency (911) numbers will be posted at designated access points/ trail heads to these areas.

INSPECTION PROTOCOL

While the areas of assessment may differ, the protocol for the assessment of each individual tree remains the same. Each tree that has a target must receive a thorough inspection for hazard potential. There are six ‘zones of inspection’ for assessing each tree for failure potential. They are:

1. Zone 1 – this area is the stem and root zone 1.23m up the stem, and 1.23m out from the stem. This crucial area absorbs most of the tree weight under compression, and structural compromise in this area compromises the structure and safety of the entire tree.
2. Zone 2 – is the main stem, from the point 1.23m up the stem, up to the main branch union. Failure points are often found in this zone, but can often be corrected.
3. Zone 3 – is the primary root system extending to about half way out to the drip line.
4. Zone 4 – is the primary branches out to one third their length.
5. Zone 5 – is the is the remainder of the structural roots.
6. Zone 6 – is the remainder of the crown. This area is often crucial in determining the tree condition.

Each of these areas must receive a thorough inspection. When failure potential is identified in any of these areas, the tree should be rated according to the hazard tree rating system (see below) to determine its exact hazard potential. Careful inspection of the site is also important when inspecting a tree. Construction, or other damage to the root system of the tree, can result in tree decline and thus cause the tree to become hazardous over time.

Part 2 HAZARD TREE RATING SYSTEM

The primary objectives of the hazard tree rating system are:

• To determine whether trees which show some evidence of failure potential are actually hazardous.

• To prioritize which hazardous trees should receive attention.

• To maintain a detailed record to justify tree pruning or removal.

The hazard tree rating system has been designed to accommodate the large number of trees present in Glebe Park. A "Hazard Tree Evaluation Form" has been designed to document the assessment of trees in Glebe Park and to aid an assessor in determining the potential hazard of a tree. This form will also help to standardize assessments amongst different assessors.

The hazard tree rating system has five sections. Each tree is rated according to the five sections then the scores are totaled. The total determines whether the tree is hazardous or

not. However, if the assessor at any time feels that one factor makes the tree immediately hazardous, this factor can override the system and the tree is marked for removal. Dead trees hanging over trails or are located within one treelength of and leaning towards trails are awarded an 18-point value immediately with no need for the five individual assessment values. Dead trees within one tree length and not hanging over the trail and are leaning away from the trail are not considered hazard trees and are retained as part of the natural forest structure.

The five sections are discussed in detail below.

Section 1 – Species Rating

The species rating assesses the known hazard potential of a tree species. Each species of tree has a different set of attributes that make it more or less likely to fail. Growth patterns, habitat, hardness of wood, rate of growth and root type all contribute to the failure potential of a tree species.

The hazard tree rating system rates tree species in one of three categories:

1. Low Failure Rate – this species is rarely known to fail under normal, acceptable growing conditions. The structure, hardness of wood and branch scaffold of this species is traditionally good.
2. Medium Failure Rate – this species has attributes that make it prone to failure under certain conditions, but under normal conditions failure is rare. The structure, hardness of wood and branch scaffold of this tree is average. The tree may be prone to pathogens that reduce its structural integrity.
3. High Failure Rate – this species is known to fail frequently under normal conditions. The structure, hardness of wood and branch scaffold of this species is poor, and it is usually prone to one or more pathogens that reduce its structural integrity.

The following trees are regularly found in Glebe Park; the failure potential of each is indicated.

High Failure Rate
- Poplar Family
- Willow Family
- American Beech

Medium Failure Rate
- Ash Family
- Basswood
- Birch Family
- Elm
- Fir Family
- Hemlock
- Pine Family
- Red Maple
- Tamarack
- Spruce Family

Low Failure Rate
- Cherry Family
- Sugar Maple
- White Cedar
- Ironwood

Section 2 – Size Rating

The size of the hazard plays an important role in prioritizing which hazards must be abated first. Size rating can be assessed in one of two ways; the size of the defective part (i.e.: dead branch, weak branch union) can be rated, or the entire tree can be rated. The size of the part plays a significant role in how much potential damage tree failure can cause. It must be noted that smaller-sized hazards have the ability to cause extensive damage or injury. Thus, smaller hazards should not be overlooked. Common sense dictates that the larger hazards must be given priority.

The hazard tree rating system rates size hazard in one of four categories:

1. Small Hazard – the tree or hazardous part is of a small size, 15cm or less in diameter.
2. Medium Hazard – the tree or hazardous part is of a large size, 15-40cm in diameter.
3. Large Hazard – the tree or hazardous part is of a very large size, over 40cm or more in diameter.
4. Whole Tree.

For the purposes of the TRCA hazard tree program, trees greater than 15cm in diameter at a height of 1.23m up the stem will be the focus for assessment.

Section 3 – Target Rating

In order for a tree to be hazardous it must have a target. A tree in an out-of-the-way place, far from any public activity, is not hazardous despite the fact that it might have failure potential. Targets are judged according to usage. Some areas receive high usage, while others see only occasional use. The hazard tree rating system rates hazard tree targets according to one of the four following criteria:

1. Occasional Use – areas which are infrequently used. These areas include open fields, trails and wooded areas.

2. Moderate Use – areas which receive active but not constant/regular use. These areas include walkways, picnic areas, passive-use recreation areas, and infrequently used driveways. (e.g., Sculpture Forest)

3. Frequent Use – areas which receive regular use. These areas include driveways, park roads, sheds, outhouses, picnic shelters, parking areas, tent or seasonal campsites and concessions. They also include phone lines, cable lines or secondary utility lines.

4. Constant Use – areas which are extensively used. These areas include residential structures (houses, garages), municipal roads, community structures, permanent campsites, etc. They also include primary utility conductors and distribution conductors.

Identifying the target is important in identifying a hazard tree. The target often dictates the urgency with which a hazard tree is dealt. Careful inspection of a site is necessary to determine the exact target potential of a hazard tree. For example, if a tree has a structural defect and is close to a trail (target) but has an extensive lean away from the trail, then its target potential is low and it is not necessarily a hazard. Trees like this can be assessed to be beneficial as a habitat tree or for interpretive value.

Section 4 – Tree Condition Rating

Tree condition is an important consideration when assessing a tree for hazard potential. A tree in decline may not be immediately hazardous but it will become hazardous in the future if it continues to decline. Rating the condition of the tree is especially important in flagging future hazards. This also assists in predicting future tree work needs.

The hazard tree rating system rates condition in one of three categories:

1. Good Condition – the tree shows good, healthy growth and little or no evidence of stress or decline.
2. Average Condition – the tree is in average condition; it may show some evidence of stress or decline, but not in a manner which threatens its survival.
3. Poor Condition – the tree is in decline; it shows small leaf size, reduced vigor, crown dieback and/or other features indicating stress or decline.

The condition of the tree should be carefully noted when rating a hazard tree. This permits the inspector to compare the tree condition from year to year and thus map decline.

Section 5 – Tree Structure Rating

Structure is perhaps the most important aspect of assessing the potential of a tree to fail. Trees are massive, complex organisms, and any compromise in the structural integrity of the tree can result in catastrophic failure. The list of possible structural defects that a tree can possess is large but some of the more common defects have been listed below.

Weak Branch Unions - These are places where branches are not strongly attached to the tree. Trees with a tendency to produce upright branches, such as Elm and Silver Maple, often have weak branch unions.

Wood Decay Wood - decay, usually the result of some parasitic pathogen, creates cavities which make the tree inherently unstable by weakening its support structure.

Cankers - A canker is a localized area on the stem or branch of the tree, where the bark is sunken or missing. Cankers are caused by some external pathogen, and there is always a likelihood of branch failure at or near the canker.

Growth Pattern - Poor tree growth, such as a lean, branches which are larger than the trunk, and crown deformity, can result in trees which are unsafe.

In many cases one structural defect will not make the tree a hazard, but combinations of these and other defects will give the tree the potential to fail. In some cases, one defect may make the tree hazardous. For example, a perfectly healthy Red Oak with a major basal cavity (cavity near the base of the trunk) is a hazard, despite its many other positive characteristics.

The hazard tree rating system rates tree structure in the following four categories:

1. Good Structure – the tree is structurally sound according to the accepted standards of its species. There are no evident structural compromises.
2. Average Structure – the tree has acceptable structure. While there may be some minor structural problems, they are do not warrant immediate concern.
3. Poor Structure – the tree has one or more structural defects that warrant concern. Failure at one of these defects is possible.
4. Severe Structure – the tree has at least one major structural defect. This defect has immediate failure potential. This one point may override all other factors and result in immediate removal of the hazard.

Assessing the tree for structural defect is often the most difficult part of the inspection protocol. To properly inspect a tree, a careful ground level inspection should be done. In some cases, the assessor may request to have the crown inspected by a qualified tree-climber. Also, some limited root excavation may be required to thoroughly assess root condition and defects. The

ground level inspection is sufficient in most cases, but further inspection may be required if the ground level inspection raises additional concerns.

Rating Summary

The preceding 5 rating categories are designed to provide a standardized system for assessing trees for hazard potential. In review, they are as follows:

Species Rating	1-Low Failure Rate; 2-Medium Failure Rate; 3-High Failure Rate.
Size Rating	1-Small Hazard; 2-Medium Hazard; 3-Large Hazard.
Target Rating	1-Occasional Use; 2-Moderate Use; 3-Frequent Use; 4-Constant Use.
Condition Rating	1-Good Condition; 2-Moderate Condition; 3-Poor Condition.
Structure Rating	1-Good Structure; 2-Average Structure; 3-Poor Structure; 4-Severe Structure.

After rating each category, the categories are totaled and the total is the Hazard Tree Rating. The rating is as follows:

16-17	Tree is an extreme hazard and requires urgent abatement;
14-15	Tree is hazardous and should be abated in a timely manner;
10-13	A tree at risk; it should be monitored regularly for change;
<9	Tree is not hazardous.

As mentioned, if the assessor feels that one factor overrides all others, he/she can give the tree a hazard rating of 'OV' (override), indicating it must be removed at the earliest possible opportunity. Also, a dead tree should be given a rating of 'DEAD', and should be prioritized accordingly.

PART 3 – ABATEMENT STRATEGY

A large part of this document has dealt with inspection and assessment, however, eliminating the actual hazards is perhaps the most crucial part of hazard tree management. The hazard tree rating system is designed to help prioritize work, so that tree hazards are removed in the most efficient manner possible. Hazards are prioritized according to the rating they receive under the hazard tree rating system.

Abatement Methods

During the inspection procedure, the assessor must make a decision on the best way to abate the hazard. There are three primary methods of abating a tree hazard:

1. Tree Removal – removal of the entire tree is a drastic step, but is often necessary when a tree has serious structural defects. Dead trees also must be removed if associated with a target.
2. Pruning / Selective Branch Removal – Branch removal is often all that is required to abate a hazardous tree part.
3. Correction – there are several techniques which can be used to correct defects in trees. Steel braces and/or cables are commonly installed to strengthen weak branch unions.

However, correction does not remove the hazard. Correction activities can be undertaken to extend the safe life of a tree, but should be used only when the tree has significant historic or landscape value. Installation of correction devices should be followed by routine inspections to ensure that the devices are functioning correctly.

Preventative Hazard Management

An important part of a successful tree hazard abatement strategy is preventative hazard management. In this case, small trees that show hazardous potential are removed before they become large. This allows for easier, cost-effective hazard management. One of the problems with this strategy is the negative public perception of removing small, healthy trees. It is difficult to justify removing a young, vigorously growing tree for the sake of future cost savings.

Preventative hazard tree management is a more feasible strategy for such areas as active and passive-use conservation areas, where public concern is less likely. The long-term cost savings of this strategy are considerable.

Displaying signs at trail heads or access points to Glebe Park outlining the risks associated with being in areas that contain trees is a way to prepare visitors for the event of a potential tree failure under any circumstance. As well, signs may offer an opportunity for a contact number for visitors to call if they see a potential hazard. Staff will then be able to respond to a situation before there is injury or damage to property.

Planting native trees in the appropriate site-classification will help limit future hazards.

Marking Trees

When a tree has been assessed as a hazard, it must be marked for future abatement procedures in accordance to policy standards. Because of the high-use nature of Glebe Park lands, permanently marking a tree in a highly distinguishable manner can often cause contention with the public. It is advisable that the tree not be marked until immediately before it is scheduled for removal. In some cases, using non-permanent methods such as flagging tape is preferable to permanent methods such as paint. This allows the mark to be removed if other measures such as moving the target can be implemented. The trees are ribboned with yellow “Caution Tape” with the tree labelled and coded based on the data on the Glebe Park Hazard Tree Assessment Form (see below). The tree is also pinned/entered on the Avenza mapping app and coded as per the Glebe Park Hazard Tree Assessment Form.

Documentation and Forms:

1.0 Glebe Park Hazard Tree Assessment Form (2 sided):

Front: This form has 17 columns each can be recorded on the form in the field manually and entered on excel later (as seen here) or entered into the Avenza app. This documentation will be explained later in more detail but, in short, the Hazard Tree marker (Flagging tape code) will contain most of this form data and additional data can be entered under the description section

for each tree on Avenza. This form is an individual sheet in the Excel Glebe Park Hazard Tree file. And example of the file can be seen below.

Glebe Park Hazard Tree Assessment Form Surveyor Name: ____D.McGee_____

Trail Names:_____

Trail Codes(TC):_____

**** Dead trees score an automatic 18 TR ****

1 Survey Date dd/mm/yy	2 GPS Location Lat,Long, degrees, minutes or degrees decimal NAD83:	3 Pin added to Avenza map Y/N	4 Tree Flagged & labeled Y/N	5 Tree ID Code written on the tree marker ribbon on site TC/TNC/TS/Tr #	6 Dead/Alive D/A	7 Treatment cut,c. no cut, nc. prune,p.	8 Tree Species (TS)	9 Species Rating (SR)	10 Size Rating (SIR)	11 Target Rating (TAR)	12 Tree Condition rating (TCR)	13 Tree structure rating (TSR)	14 Total Rating (TR)	15 Treatment complete Y/N, N	16 Date Treatment complete	17 Person Responsible
170623	45,3.215,-78,31.355	Y	Y	MB,HS,Bf,1	D	C	Bf						18	N		
170623	45,3.193,-78,31.410	Y	Y	XCS,ML,Mh,1	A	p	Mh	1	2	3	2	3	11	N		
170623	45,3.210,-78,31.407	Y	Y	mb,hs,Mh,2	d	c	Mh						18	N		
170623	45,3.215,-78,31.400	Y	Y	mb,hs,Mh,3	d	c	Mh						18	N		
170623	45,3.283,-78,31.417	Y	Y	mb,#1,Mh,1	d	c	Mh						18	N		
170623	45,3.317,-78,31.410	Y	Y	mb,#1,Mh,2	d	c/nc	Mh						18	N		
170623	45,3.335,-78,31.378	Y	Y	mb,#1,Be,3	a	c/nc	Be	4	2	3	3	3	15	N		
170623	45,3.335,-78,31.375	Y	Y	mb,#1,Be,4	d	c	Be						18	N		
170623	45,3.328,-78,31.367	y	Y	mb,#1,Be,5	a	c/nc	Be	4	2	3	3	3	15	N		
170623	45,3.352,-78,31.443	y	Y	mb,#3,Be,1	d	c	Be						18	N		
170623	45,3.365,-78,31.440	y	Y	mb,#3,Bf,2	d	c	Bf						18	N		
170623	45,3.365,-78,31.440	y	Y	mb,#3,Bf,3	d	c	Bf						18	N		
170623	45,3.365,-78,31.440	y	Y	mb,#3,Bf,4	d	c	Bf						18	N		
170623	45,3.380,-78,31.395	y	Y	mb,kl,Be,1	a	nc	Be	4	2	3	3	3	15	N		

All codes and code explanations are found on the back side of this form (as seen below) so there is no need to memorize codes. The following is an explanation/example of the form with data entered.

**** Dead trees score an automatic 18 TR ****

1 Survey Date dd/mm/yy	2 GPS Location Lat,Long, degrees, minutes or degrees decimal NAD83:	3 Pin added to Avenza map Y/N	4 Tree Flagged & labeled Y/N	5 Tree ID Code written on the tree marker ribbon on site TC/TNC/TS/Tr #	6 Dead/Alive D/A	7 Treatment cut,c. no cut, nc. prune,p.	8 Tree Species (TS)	9 Species Rating (SR)	10 Size Rating (SIR)	11 Target Rating (TAR)	12 Tree Condition rating (TCR)	13 Tree structure rating (TSR)	14 Total Rating (TR)	15 Treatment complete Y/N, N	16 Date Treatment complete	17 Person Responsible
170623	45,3.215,-78,31.355	Y	Y	MB,HS,Bf,1	D	C	Bf						18	N		

Explanations will be presented by column numbers.

1. Date, self explanatory since the format is expressed in the column header.
2. *GPS location, self explanatory since the format is expressed in the column header. The data is obtained* from the Avenza mapping app and degrees, decimal format is preferred and easiest.
3. Tells you whether or not the hazard tree is located on the Avenza map app.
4. Tells you if the tree has been flagged and has a coded label in the field.
5. Tells you , the Trail Code(TC) which is a mtn bike trail(mb) the trail name (TNC) is Homestead(HS), the tree species is Balsam fir, (Bf) and the tree number is #1 on that trail. Tree numbers are specific to a specific trail.

6. Is the tree dead(D) or alive(A)
7. Treatment code outlines the prescribed abatement procedure
8. Tree species code, Balsam fir (Bf) in this case.
9-13. Tree evaluation codes seen on the back of the form. No entries for this particular tree since it was dead it gets an 18 rating automatically which is an extremely hazard rating that should be dealt with quickly.
14. total tree rating score, see the form back for explanations. This number dictates how serious the tree hazard is and should be the basis for prioritizing hazard abatement.
15-17. Self explanatory since the format is expressed in the column header.

Note: information in columns 5 and 7 are also entered on the Hazard Tree marker (Flagging tape code) tree ribbon label in the field.

Back side of the form:

This is a summary of all the codes and value descriptions required for the completion of the Glebe Park Hazard Tree Assessment Form (front side). It is a handy reference when in the field.

Hazard Tree Form Column Explanations

Tree ID Code: Trail Code,TC/Trail name code/Tree Species,TS/Tree# eg. mbcpBe2= Mtn bike trail, Cherry pie, American beech, tree #2

Trail name codes: Sculpture forest, **SF**; Mountain bike,**MB**,followed by trail name abbreviation or number: Snowshoe,**SS,** followed by colour: XC Ski, **XCS**, followed by name

Mtn bike trail names/codes: Head lake Trail ,**HL**. Green Raquette,**GR**. Homestead, **HS**. Kids Loop,**KL**.Cherry Pie,**CP**. Apple Pie,**AP**. Rush Delivery,**RD**. Trail numbers **1-11**

West Side, Ex connection, **EC**; Deep connection,**DC**;Lust in Translation,**LIT**;Up to no good,**UNG**;Love on Top,**LOT**;Return to sender etal,**RTS**;Back door to heaven,**BDH**

Snow shoe trail names/codes: Pink,**PI**;Red,**RE**;Green,**GR**;Orange,**OR**;Blue,**BL**; Connectors,**CO**;(some SS trails follow Mtn bike trails also)

XCSki Trail names/codes: Main loop,**ML**; Peter Rabbit,**PR**; Roller Coaster,**RC**; West Loop,**WL**; Round the mtn,**RTM**; Lookout, **LO**; Down &up,**DU**.

Tree Species codes: Sugar maple, M**h**; Beech,**Be**, Ironwood,**Iw**; Poplar,**Po**; Hemlock,**He**, Red Maple,**Ms**; Balsam fir,**Bf**; White spruce,**Sw**; White pine,**Pw**;BL Cherry,**Bc**.

Species rating(SR):

High Failure Rate = 3
Black Locust
Manitoba Maple
Norway Maple
Silver Maple
Poplar Family
Willow Family

Medium Failure Rate = 2
Ash Family, Basswood,
Birch Family, Walnut Family,
Elm, Fir Family, Hemlock, Honey Locust, Horsechestnut, Larch, Pine Family, Red Maple, Tamarack, Tuliptree, Spruce Family

Low Failure Rate = 1
Cherry Family
Crabapple & Apple
Hawthorne
Oak Family
Sugar Maple
Sycamore
White Cedar

Size Rating(SIR): (trees/parts 15cm dbh or less, are not usually assessed)

2. Medium Hazard-the tree or hazardous part is of a large size, 15-40cm in diameter.
3. Large Hazard- the tree or hazardous part is of a very large size, over 40cm in diameter.

Tree Structure Rating(TSR):

1. Good Structure – the tree is structurally sound according to the accepted standards of its species. There are no evident structural compromises.
2. Average Structure – the tree has acceptable structure. While there may be some minor structural problems, they are do not warrant immediate concern.
3. Poor Structure – the tree has one or more structural defects that warrant concern. Failure at one of these defects is possible.
4. Severe Structure – the tree has at least one major structural defect. This defect has immediate failure potential. This one point may override all other factors and result in immediate removal of the hazard.

Tree Condition rating (TCR):

1. Good Condition - the tree shows good healthy growth & little to no evidence of stress or decline.
2. Average Condition - the tree is in average condition & may show some evidence of stress or decline, but not in a manner that threatens its survival.
3. Poor Condition - the tree is in decline & shows small leaf size, reduced vigour, crown dieback and/or other signs indicating stress or decline.
4. Dead Tree

Total Rating Interpretation (from TR)

16-17	Tree is an extreme hazard and requires urgent abatement;
14-15	Tree is hazardous and should be abated in a timely manner;
10-13	A tree at risk; it should be monitored regularly for change;
<9	Tree is not hazardous.

As mentioned, if the assessor feels that one factor overrides all others, he/she can give the tree a hazard rating of 'OV' (override), indicating it must be removed at the earliest possible opportunity. Also, a dead tree should be given a rating of 'DEAD', and should be prioritized accordingly.

Target Rating(TAR):

1. Occasional Use - areas that are infrequently used. Includes open fields, trails & wooded areas.
2. Moderate Use - areas that receive active but not constant use. Includes walkways, picnic areas, passive use recreation areas & infrequently used driveways.
3. Frequent Use - areas that receive regular use. Includes driveways, park roads, sheds, outhouses, picnic shelters, parking areas, tent or seasonal campsites and concessions. Phone, utility & cable lines.
4. Constant Use - areas that are extensively used. Includes structures (houses, garages), municipal roads, community structures, permanent campsites, primary

Abatement/Treatment(cut,c.no cut, nc.prune,p.)

1. Tree Removal – removal of the entire tree is a drastic step, but is often necessary when a tree has serious structural defects. Dead trees also must be removed if associated with a target.
2. Pruning / Selective Branch Removal – Branch removal is often all that is required to abate a hazardous tree part.

This form is an individual sheet in the Excel Glebe Park Hazard Tree file. And example of the file can be seen below.

2.0 Glebe Park Hazard Tree Trail Inventory Check List

This is a list, is recorded on the Excel spreadsheet and includes the following information:

i. Trail type: Mtn. bike, Snowshoe, XC ski, Sculpture Forest, Walking
ii. Trail name: e.g. Peter Rabbit
iii. Date surveyed
iv. Surveyor Name

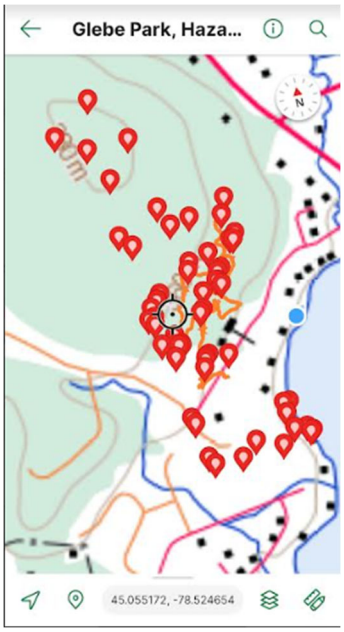
This form is to ensure all applicable trails have been surveyed for hazard trees and it is documented. The form is set up to be used for continuous and successive inventories over the 2-year return cycle. This form is an individual sheet in the Excel Glebe Park Hazard Tree file. And example of the file can be seen below. In some cases, the trails have multiple use based on location and season and thus may not have any hazard trees recorded under that trail type since it is covered under another. An example of this would be the Sculpture Forest Trail, which has been surveyed but hazards trees were entered under the Mtn. bike trails since they over lap. This form is an individual sheet in the Excel Glebe Park Hazard Tree file. And example of a small portion of the file can be seen below.

Glebe Park Hazard Tree Trail Inventory Check List					
(All trail names are as posted on Glebe Park Trail maps)					
Trail Type	Trail Name	Date Surveyed dd/mm/yy	Surveyor Name	Date Surveyed dd/mm/yy	Surveyor Name
Mtn Bike	Homestead	17 06 23	D. McGee		
	#1	17 06 23	D. McGee		
	#2	17 06 23	D. McGee		
	#3	17 06 23	D. McGee		
	#4	17 06 23	D. McGee		
	#4,5 Connector	17 06 23	D. McGee		
	#5	17 06 23	D. McGee		
	#6a	17 06 23	D. McGee		
	#6b	05 07 23	D. McGee		
	Cherry Pie (CP)	08 07 23	D. McGee		

3.0 Avenza Mapping app:

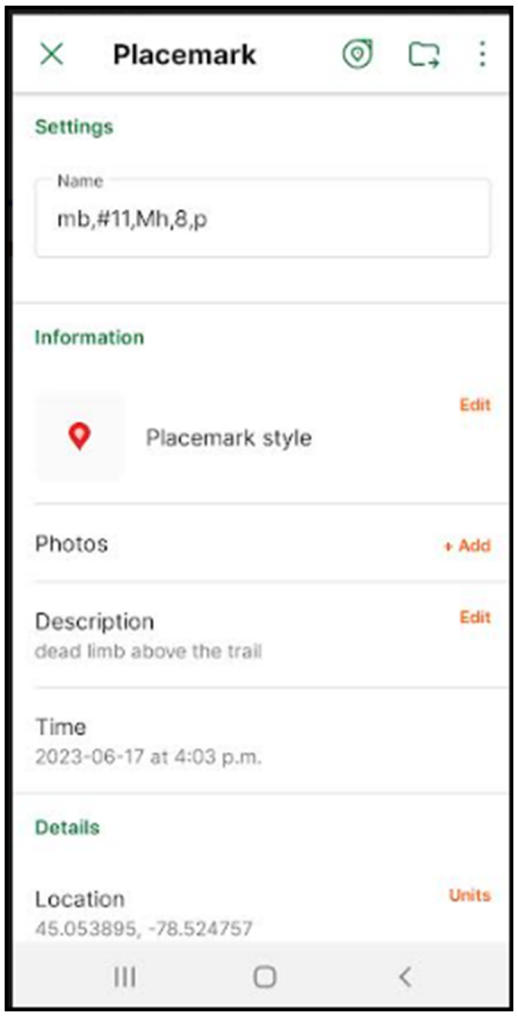
This app is free and available for download at the Google app store for both i-phone and Android phones.

The file used has a topographic map of Haliburton County including Glebe Park. The purpose of this app is to mark the locations (GPS) of the hazard trees and label them following the codes on the Glebe Park Hazard Tree Assessment Form. This will allow the tree to have a permanent record of its location so it can be found again for abatement. Below is an example of what the map and what the tree locations looks like on your phone.



Each Tree has a specific code on its ribbon/label.

You can navigate to any point/tree and call up the file info to see what the hazard tree is. There is an example below explaining the data contained in the individual hazard tree file.



This tree is on Mtn bike trail, #11, it is a hard maple, is the 8th hazard tree on that trail and the abatement prescription is to prune it.

Shows the pin style on the map.

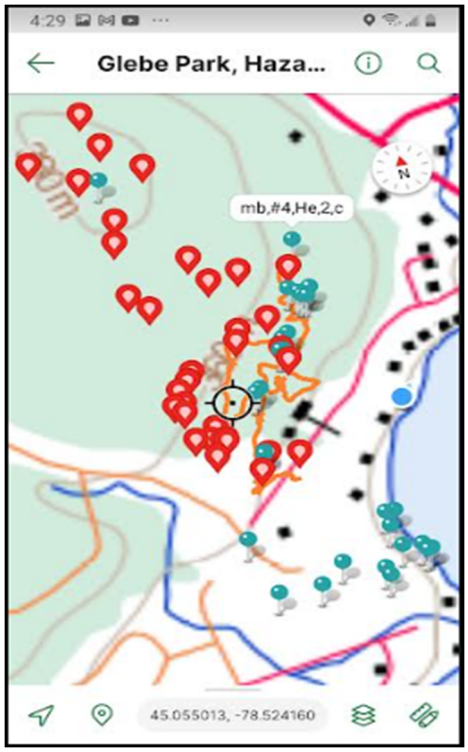
There is a dead limb hanging above the trail.

The data entry is time stamped to show it is a real data entry.

This is the GPS Lat, Long location in degrees.

Avenza hazard tree locations/pins and tree status will be changed when abatement is complete.

Avenza hazard tree locations will remain on the map and the pin colour changed to “green” as seen in the Avenza map below.



The excel spreadsheet will show hazards trees that have had abatement procedures completed, highlighted in green and showing the date and individual/company that did the tree work. The following shows an example of the spreadsheet with white background portion of the spreadsheet showing active hazard trees and the green background showing trees that are no longer a hazard .

1 Survey Date dd/mm/yy	2 GPS Location Lat,Long, degrees, minutes or degrees decimal NAD83:	3 Pin added to Avenza map Y/N	4 Tree Flagged & labeled Y/N	5 Tree ID Code written on the tree marker ribbon on site TC/TNC/TS/Tr#	6 Dead/Alive D/A	7 Treatment cut,c. no cut, nc. prune,p.	8 Tree Species (TS)	9 Species Rating (SR)	10 Size Rating (SIR)	11 Target Rating (TAR)	12 Tree Condition rating (TCR)	13 Tree structure rating (TSR)	14 Total Rating (TR)	15 Treatment complete Y/N,N	16 Date Treatment complete	17 Person Responsible
23-10-23	45.059910	y	y	ss,red,Ew	d	c	Ew						18	N		
23-10-23	45.059910	y	y	ss,red,Ew	d	c	Ew						18	N		
23-10-23	45.059910	y	y	ss,red,Ew	d	c	Ew						18	N	4	
170623	45,3.215,-	Y	Y	mb,hs,Mh	d	nc	Mh						18	Y	Aug 15,23	D.McGee
170623	45,3.335,-	Y	Y	mb,#1,Be,	d	c	Be						18	Y	Oct.25,23	Nature
10-07-23	45.051543	y	y	mb,gr,By,	a	c	By	1	2	3	1	2	9	Y	Oct.25,23	FC arboris
10-07-23	45.051230	y	y	mb,gr,Ew,	d	c	Ew						18	Y	Oct.25,23	FC arboris
170623	45,3.210,-	Y	Y	mb,hs,Mh	d	c	Mh						18	Y	Aug 15,23	D.McGee
170623	45.054805	Y	Y	mb,#1,Mh	d	c	Mh						18	Y	Aug 15,23	D.McGee

All inventory data and updated files and a summary report will be sent to the Glebe Park and Museum Committee Chair.