Hanlon Creek
Heritage Maple Grove
Forest Survey Report

Report to Kortwright Hills Community Association
Guelph, Ontario
April, 2006

Report No. 1 Prepared by
Bruce Kershner
Terrestrial Ecologist

Native Tree Society Special Publication #16
March 2012

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http://www.nativetreesociety.org
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The Native Tree Society (NTS) is a cyberspace interest groups devoted to the documentation and celebration of trees and forests of the eastern North America and around the world, through art, poetry, music, mythology, science, medicine, wood crafts, and collecting research data for a variety of purposes. Our discussion forum is for people who view trees and forests not just as a crop to be harvested, but also as something of value in their own right. Membership in the Native Tree Society and its regional chapters is free and open to anyone with an interest in trees living anywhere in the world.
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Forward/Introduction

This report is one of a series written by Bruce Kershner that the Native Tree Society (NTS) are publishing or republishing as part of its Special Report series. They were given to fellow NTS member Dale Luthringer prior to Bruce's untimely death in 2007 with the goal of them eventually being published and made available to other tree researchers.

This report: "Hanlon Creek Heritage Maple Grove Forest Survey Report" was prepared in April 2006, by Bruce Kershner, for Kortwright Hills Community Association, Guelph, Ontario. The text included herein is complete and as written by Bruce Kershner aside from corrections of minor typographical errors. This is perhaps the most contentious of the reports written by Bruce Kershner that we are republishing. The introduction to the report reads in part:

"The woodland site referred to in this report as the Hanlon Creek Heritage Maple Grove in Guelph, Ontario, is one of the sites documented as part of the ecological field work conducted during winter 2006 for the Kortwright Hills Community Association. The Association arranged for the author of this study, a terrestrial and forest ecologist and old-growth forest authority, to survey and analyze the woodlands of a 670-acre area which the City of Guelph plans to develop into the Hanlon Creek Business Park."

Not only were representatives of the City of Guelph involved, so were proponents of the business park, and potential occupants of the park. In addition Bruce Kershner raised the ire of Dr. Douglas Larsen, a dendrochronologists with the University of Guelph, with regards to some of his age estimates of trees within the proposed business park (see the disclaimer at the end of this introductory section).

The City of Guelph was primary owner of most of the business park land and was the authority in charge of approval of the development plan. The Hanlon Creek Business Park was approved and some construction has taken place as of this writing in March 2012. An overview of the development is presented on the city's webpage: The Hanlon Creek Business Park and Guelph's future - Myths and facts http://guelph.ca/business.cfm?itemid=77841&smocid=2726

"The Hanlon Creek Business Park strikes a balance between meeting Guelph's economic needs and its need to protect the city's natural heritage. Its development comes after almost a decade of public consultation, scientific assessments and thorough environmental analysis.

Environmental protection, enhancement and monitoring for the Hanlon Creek Business Park exceed that of any other development in Guelph's history. The measures in place to ensure the preservation of natural heritage features are exhaustive.

The Hanlon Creek Business Park will play an important role in Guelph's future. It is intended to be the home of 10,000 new jobs, and is a vital part of the City's growth management plan. Guelph is preparing to accommodate 31,000 new jobs by 2031 as prescribed by the Province's *Places to Grow* legislation, without sprawling beyond the city's boundaries."

hanlon creek business park

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The Hanlon Creek Business Park and Guelph's future

Myths and facts

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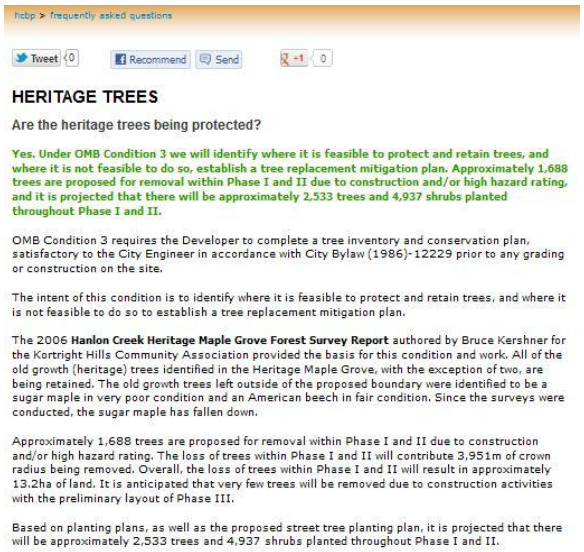
The document addresses some of the questions regarding the Heritage Maple Grove described in the report:

"The heritage maple grove of trees (old growth) is excluded from development and is being protected. ..The Grand River Conservation Authority and the City of Guelph's Environmental Advisory Committee have endorsed and approved the buffers around wetlands and wooded areas, which were established through the environmental impact study."

A second document on the city website specifically mentions this 2006 report by Bruce Kershner.

HERITAGE TREES Are the heritage trees being protected? http://guelph.ca/business.cfm?itemid=77417&smocid=2732



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HERITAGE TREES

Are the heritage trees being protected?

Yes. Under OMB Condition 3 we will identify where it is feasible to protect and retain trees, and where it is not feasible to do so, establish a tree replacement mitigation plan. Approximately 1,688 trees are proposed for removal within Phase I and II due to construction and/or high hazard rating, and it is projected that there will be approximately 2,533 trees and 4,937 shrubs planted throughout Phase I and II.

OMB Condition 3 requires the Developer to complete a tree inventory and conservation plan, satisfactory to the City Engineer in accordance with City Bylaw (1986)-12229 prior to any grading or construction on the site.

The intent of this condition is to identify where it is feasible to protect and retain trees, and where it is not feasible to do so to establish a tree replacement mitigation plan.

The 2006 **Hanlon Creek Heritage Maple Grove Forest Survey Report** authored by Bruce Kershner for the Kortright Hills Community Association provided the basis for this condition and work. All of the old growth (heritage) trees identified in the Heritage Maple Grove, with the exception of two, are being retained. The old growth trees left outside of the proposed boundary were identified to be a sugar maple in very poor condition and an American beech in fair condition. Since the surveys were conducted, the sugar maple has fallen down.

Approximately 1,688 trees are proposed for removal within Phase I and II due to construction and/or high hazard rating. The loss of trees within Phase I and II will contribute 3,951m of crown radius being removed. Overall, the loss of trees within Phase I and II will result in approximately 13.2ha of land. It is anticipated that very few trees will be removed due to construction activities with the preliminary layout of Phase III.

Based on planting plans, as well as the proposed street tree planting plan, it is projected that there will be approximately 2,533 trees and 4,937 shrubs planted throughout Phase I and II.

"The 2006 Hanlon Creek Heritage Maple Grove Forest Survey Report authored by Bruce Kershner for the Kortright Hills Community Association provided the basis for this condition and work. All of the old growth (heritage) trees identified in the Heritage Maple Grove, with the exception of two, are being retained. The old growth trees left outside of the proposed boundary were identified to be a sugar maple in very poor condition and an American beech in fair condition. Since the surveys were conducted, the sugar maple has fallen down."

There also was an interesting document from January 11, 2006 by the Guelph Civic League. The document was accessed on September 02, 2011, but no longer appears to be available online. The document begins:

"*In December, a tree specialist hired by a citizens' group in Guelph discovered something truly incredible: an ironwood tree that could be over 500 years old. His discovery is even more significant because the ironwood is surrounded by a grove of very old maples, including one that's more than 230 years old. Alas, all are slated for removal as part of the Hanlon Creek Business Park development.*

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- Election Candidates Answer Guelph Civic League's Questions on Hot Election Issues
- 2009 Voting Records now online!
- City Budget
- City of Guelph Communications Review 2009
- Hanlon Creek Business Park
- TaxChat
- Heritage Conservation
- Leadership
- Wards and Neighbourhoods

SEARCH:

Ancient Trees Found - A 500-Year-Old Clings To Life

January 11, 2006

In December, a tree specialist hired by a citizens' group in Guelph discovered something truly incredible: an ironwood tree that could be over 500 years old. His discovery is even more significant because the ironwood is surrounded by a grove of very old maples, including one that's more than 230 years old. Alas, all are slated for removal as part of the Hanlon Creek Business Park development.

In 1994, the Hanlon Creek Watershed Study was incorporated into the City of Guelph Official Plan. The adoption of the plan in its entirety was a commitment to the citizens of the community that the City would protect, restore and enhance the Hanlon Creek Natural Heritage system, which contains cold water fisheries, streams, major provincially significant wetlands, large wooded areas and a wide variety of species of wildlife and plants. Together, these elements form a significant and diverse ecological jewel that is rare and unique in southern Ontario.

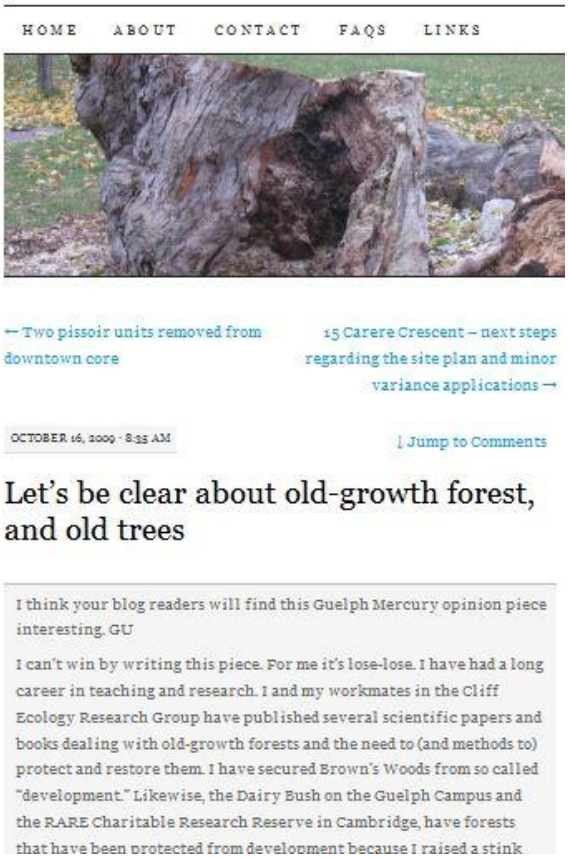
Since 1999, the intended uses for the proposed Hanlon Creek Business Park have changed from the original proposed prestigious Corporate Business Park in a natural setting that respected the sensitivity of these environmental features, to a far more generic industrial/manufacturing complex with what appears to be a

In 1994, the Hanlon Creek Watershed Study was incorporated into the City of Guelph Official Plan. The adoption of the plan in its entirety was a commitment to the citizens of the community that the City would protect, restore and enhance the Hanlon Creek Natural Heritage system, which contains cold water fisheries, streams, major provincially significant wetlands, large wooded areas and a wide variety of species of wildlife and plants. Together, these elements form a significant and diverse ecological jewel that is rare and unique in southern Ontario."

The final article that deserves mention in this introduction is a blog written by dendrochronologist Dr. Douglas Larsen, of the University of Guelph, ONT. Dr. Larsen is famous for his discovery of ancient cedars over 1650 years old along the Niagara Escarpment on Flowerpot Island in Lake Huron.

Let's be clear about old-growth forest, and old trees, by Douglas Larsen, October 16, 2009

http://ward2guelph.wordpress.com/2009/10/16/let%E2%80%99s-be-clear-about-old-growth-forest-and-old-trees/



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Let's be clear about old-growth forest, and old trees

I think your blog readers will find this Guelph Mercury opinion piece interesting. GU

I can't win by writing this piece. For me it's lose-lose. I have had a long career in teaching and research. I and my workmates in the Cliff Ecology Research Group have published several scientific papers and books dealing with old-growth forests and the need to (and methods to) protect and restore them. I have secured Brown's Woods from so called "development." Likewise, the Dairy Bush on the Guelph Campus and the RARE Charitable Research Reserve in Cambridge, have forests that have been protected from development because I raised a stink

Dr. Larsen fairly characterizes his comments as a lose-lose situation for himself. In the article he takes Bruce Kershner to task for overstating the ability to assign tree ages based upon physical characteristics, without the use of ring counts obtained through core samples. The disclaimer found at the end of each of these article republished as part of the Native Tree Society's Special Publication Series is in response to these criticisms.

Edward Frank, editor

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HANLON CREEK HERITAGE MAPLE GROVE - FOREST SURVEY REPORT -

The woodland site referred to in this report as the Hanlon Creek Heritage Maple Grove in Guelph, Ontario, is one of the sites documented as part of the ecological field work conducted during winter 2006 for the Kortwright Hills Community Association. The Association arranged for the author of this study, a terrestrial and forest ecologist and old-growth forest authority, to survey and analyze the woodlands of a 670-acre area which the City of Guelph plans to develop into the Hanlon Creek Business Park (hereafter called "the project" or "the project site"). See following map (Fig. 1) of proposed development plans for Hanlon Creek Business Park.

Aim of the Survey

The Association's aim was to obtain an independent analysis of the impacts that the development would have on the project's woodland communities. Although the City's environmental consultants studied the project site over a multi-year period, there was evidence that their Environmental Impact Statements and other reports overlooked certain aspects of the project site or insufficiently analyzed the impacts of the project's proposed actions.

Specific examples of this oversight by the City's consultants are that:

a) they did not even recognize the existence of the woodland, now identified as the Heritage Maple Grove, in that it did not appear on the maps or text descriptions of several earlier Environmental Impact Statements (EIS);

b) it is the only woodland on the project site that is proposed to be entirely destroyed for the development of the business park;

c) the woodland is also threatened by two separate proposed actions that are responses to mitigate impacts of the project: construction of a large berm (noise barrier) and widening of Forestell Road (which borders the grove) to handle the expected increase in traffic.

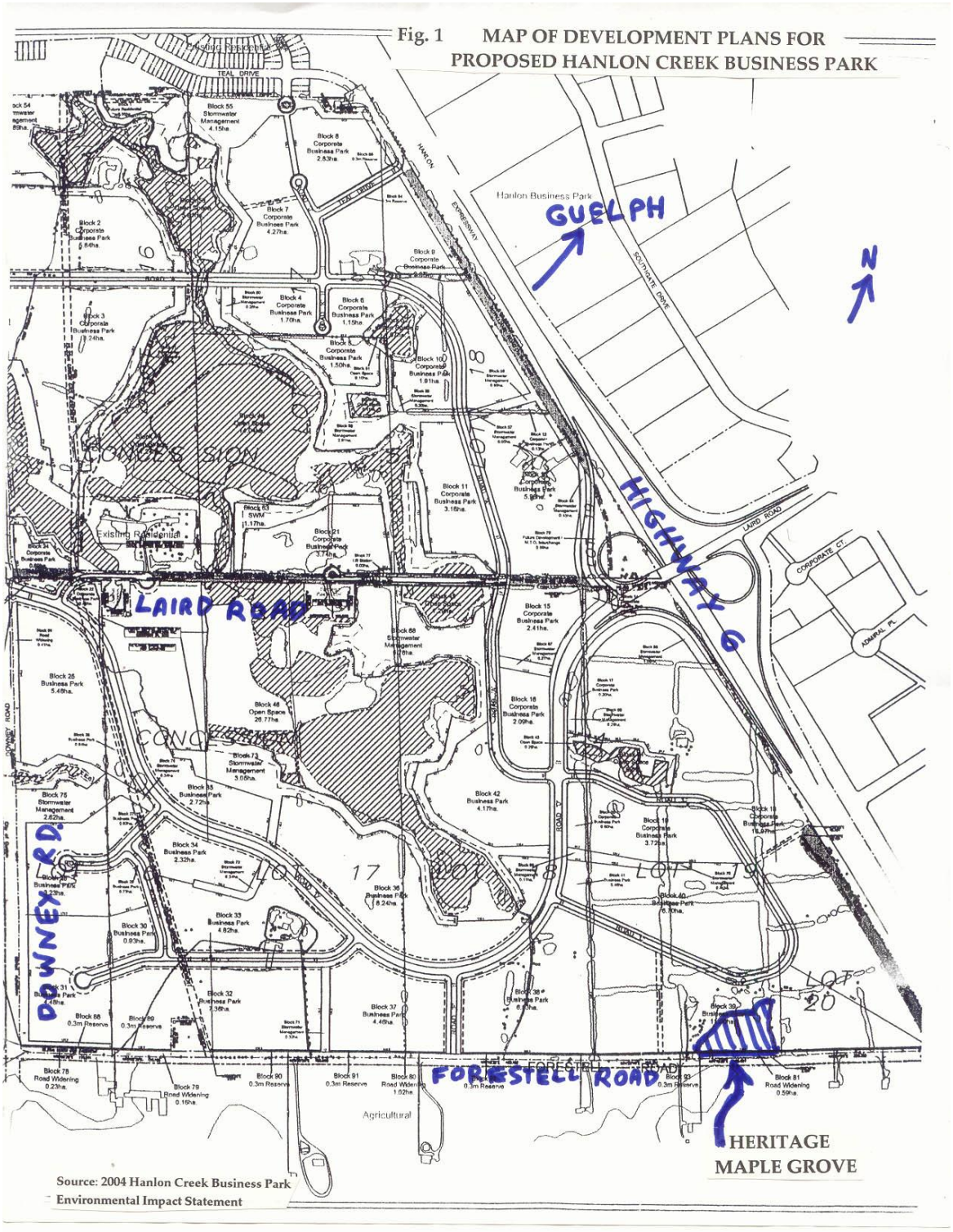
d) in the 2004 EIS which does show it on the vegetation map, no description in the text is devoted specifically to this grove. Furthermore, the notable old-growth aspect of the grove was not recognized. If the City's terrestrial ecologists were not trained to recognized old growth trees, the unique visual appearance of the trees (which is easily visible from the adjacent road) should have been very obvious. At the very least, it should have been identified as a "very mature" woodland, and recognized as the oldest one on the project site. In addition, the Hop-hornbeam (also known as Ironwood, Ostrya virginiana), only 42 feet (13 m) from the road, is near record size for this species, another indicator of exceptional age.

e) the City's consultants also did not recognize the major old growth component of the Central Cedar Woodland, located just north of Laird Road. This component is represented by nearly 100 old growth trees, many of them very impressive in size. This woodland will be addressed in a separate forthcoming report.

Location of the Site

The proposed Hanlon Creek Business Park is located approximately 4.7 miles (7.5 km) southwest of the center of the City of Guelph, and 43 miles (69 km) west of Toronto. Highway 6 forms its boundary on the east, Downey Road is its western boundary, a housing development at the downstream end of Hanlon Creek runs along its northern boundary, and Forestell Road forms its southern boundary. See Fig. 1 map and Fig. 2 aerial photo of the project.
The Heritage Maple Grove is close to the southeast corner of the project site, adjacent to the north side of Forestell Road, only 1,345 feet/410 m west of Highway 6.

Fig. 1 MAP OF DEVELOPMENT PLANS FOR PROPOSED HANLON CREEK BUSINESS PARK



Source: 2004 Hanlon Creek Business Park Environmental Impact Statement

Physical Features of the Heritage Maple Grove

(see Fig. 3 map of Heritage Maple Grove) The Heritage Maple Grove (also referred to as "the Grove") covers two short knolls composed of gravel moraine deposits left by the glaciers 12,000 to 15,000 years ago.

The west knoll and east knoll are both at an elevation 1,129 feet/344 m above sea level. The east knoll rises 13 - 21 feet/4 - 6 m above different parts of Forestell Road; and 29.5 feet/9 m above the lowland to the northeast. The west knoll rises 6.5-13 feet/2-4 m above the road, and 29.5 feet/9 m above the lowland to the northwest. A small ravine lies between the two knolls at an elevation of 1,102 feet/336 m. Its bottom is mostly occupied by a narrow, shallow 141 feet/43 meter-long kettlehole seasonal pond. An abandoned dirt farmer's access road runs northward from Forestell Road along the west boundary of the Grove for a short distance. About 115 feet/35 m west of this old road is another small seasonal glacial kettlehole pond, which borders Forestell Road.

The Grove's southern border where it actually lines Forestell Road is approximately 492 feet/150 m long; its maximum east-west width (which occurs inland from the road) is 590 feet/180 meters. It extends northward from the road a maximum distance of 427 feet/130 m. It covers approximately 1.4 hectares/3.4 acres. A protective buffer area, proposed by this report, that would surround it would add up to a combined total of about 2.9 ha/7 acres.

The two wooded knolls play a valuable role, as part of the region's larger system of glacial hills, in natural water retention and regulation of water flows. This includes prevention of downstream flooding and also maintaining of stream flows during drought periods. The Grove and associated wetlands are all located at the extreme southeast margin of the Hanlon Creek Watershed. Forestell Road is the watershed boundary (and southern boundary of the City of Guelph). South of it begins the Township of Puslinch and another watershed.

Description of Previously Mapped Vegetation of the Heritage Maple Grove

The only mention of the Grove by the consultants hired by the City of Guelph was by a map symbol that describes it as "FOD5" which means "Deciduous Forest" (so general as to be meaningless). There is no description of it the text of any report. See the following Aerial Photo of Proposed Hanlon Creek Business Park, which shows the official vegetation mapping for the 2004 Environmental Impact Statement.

Description of the Old Growth Trees of the Heritage Maple Grove (see Fig. 3 map of Heritage Maple Grove and Fig. aerial photo close-up of the Grove)

A total of 19 individual old growth trees dominate the Heritage Maple Grove. Old growth Sugar Maples (Acer saccharum) (ranging in estimated age from 150 to 275 years) make up 15 of these 19 trees. The remainder are two American Beech (Fagus grandifolia) (roughly estimated with ages of at least 250 and 275 years old), one Hop-hornbeam (Ironwood) estimated at 400 to 500 years old, and one Eastern Cottonwood (Populus deltoides) (about 100 years old). More data on these trees are displayed in the following chart.

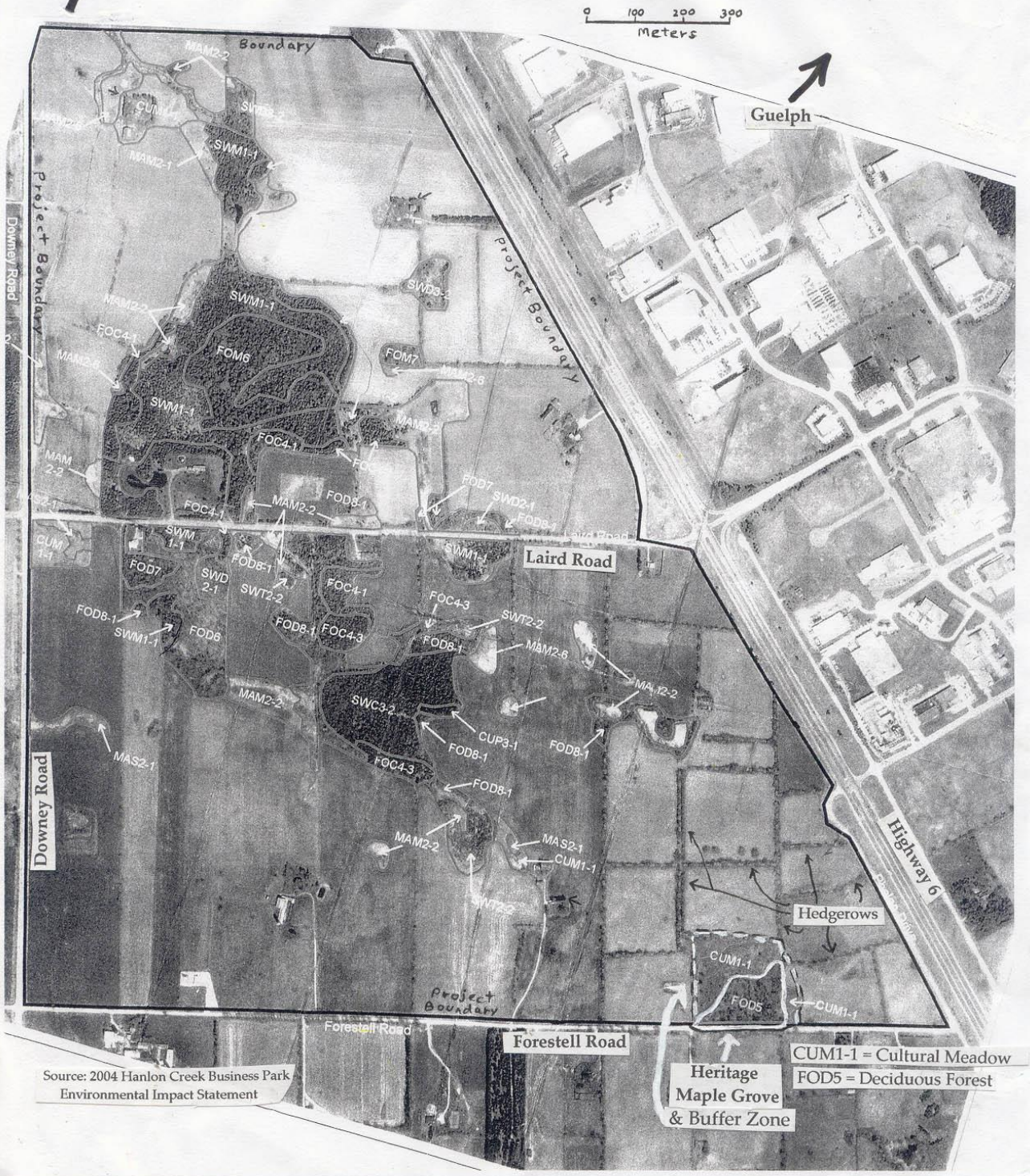
The map specifically highlights the old growth trees of the Grove since they are the rare and notable natural feature. Between and below them, however, is a lower layer of shorter trees of a younger age class, intermixed with large shrubs.

The Grove's western two-thirds is where the old growth trees are most densely concentrated, with 14 of the 19 old growth trees located there. This creates a more shaded woodland habitat with a nearly continuous upper forest canopy. The remaining third in the north and eastern part is an open savannah-like woodland with more thicket, earlier successional vegetation forming the underlayer.

Fig. 2

AERIAL PHOTO OF PROPOSED HANLON CREEK BUSINESS PARK
With Heritage Maple Grove Shown in Lower Right

(adapted from Map of Vegetation Types)



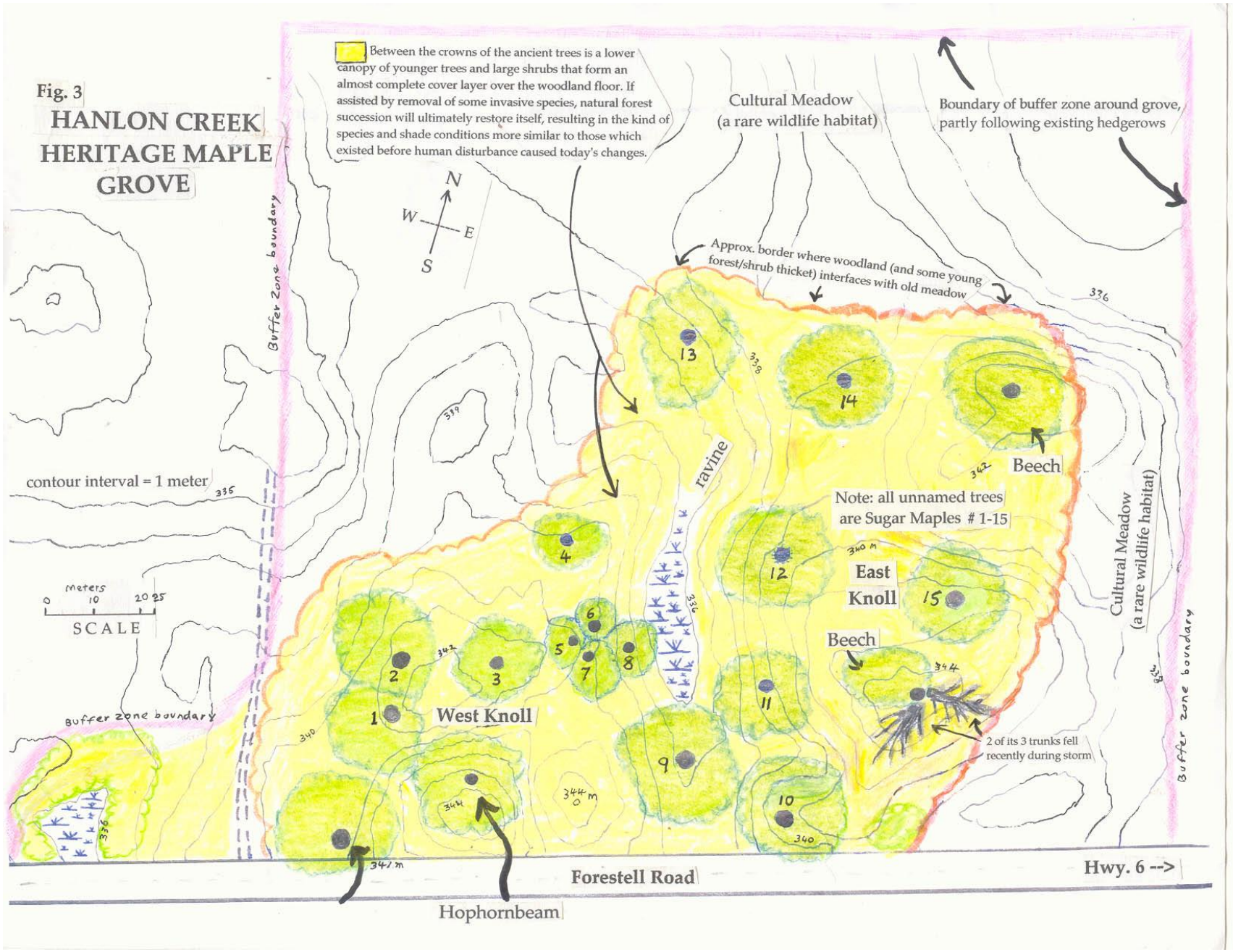


Fig. 3
HANLON CREEK HERITAGE MAPLE GROVE
Between the crowns of the ancient trees is a lower canopy of younger trees and large shrubs that form an almost complete cover layer over the woodland floor. If assisted by removal of some invasive species, natural forest succession will ultimately restore itself, resulting in the kind of species and shade conditions more similar to those which existed before human disturbance caused today's changes.
Cultural Meadow (a rare wildlife habitat)
Boundary of buffer zone around grove, partly following existing hedgerows
N
W
E
S
Buffer zone boundary
Approx. border where woodland (and some young forest/shrub thicket) interfaces with old meadow
336
339
13
14
Beech
ravine
contour interval = 1 meter
335
Note: all unnamed trees are Sugar Maples # 1-15
342
340 m
East Knoll
12
15
4
Cultural Meadow (a rare wildlife habitat)
meters
0 10 20 25
SCALE
6
5
7
8
Beech
344
2
342
3
11
Buffer zone boundary
1
West Knoll
340
2 of its 3 trunks fell recently during storm
9
344 m
10
340
344
336
341 m
Forestell Road
Hwy. 6 -->
Hophornbeam

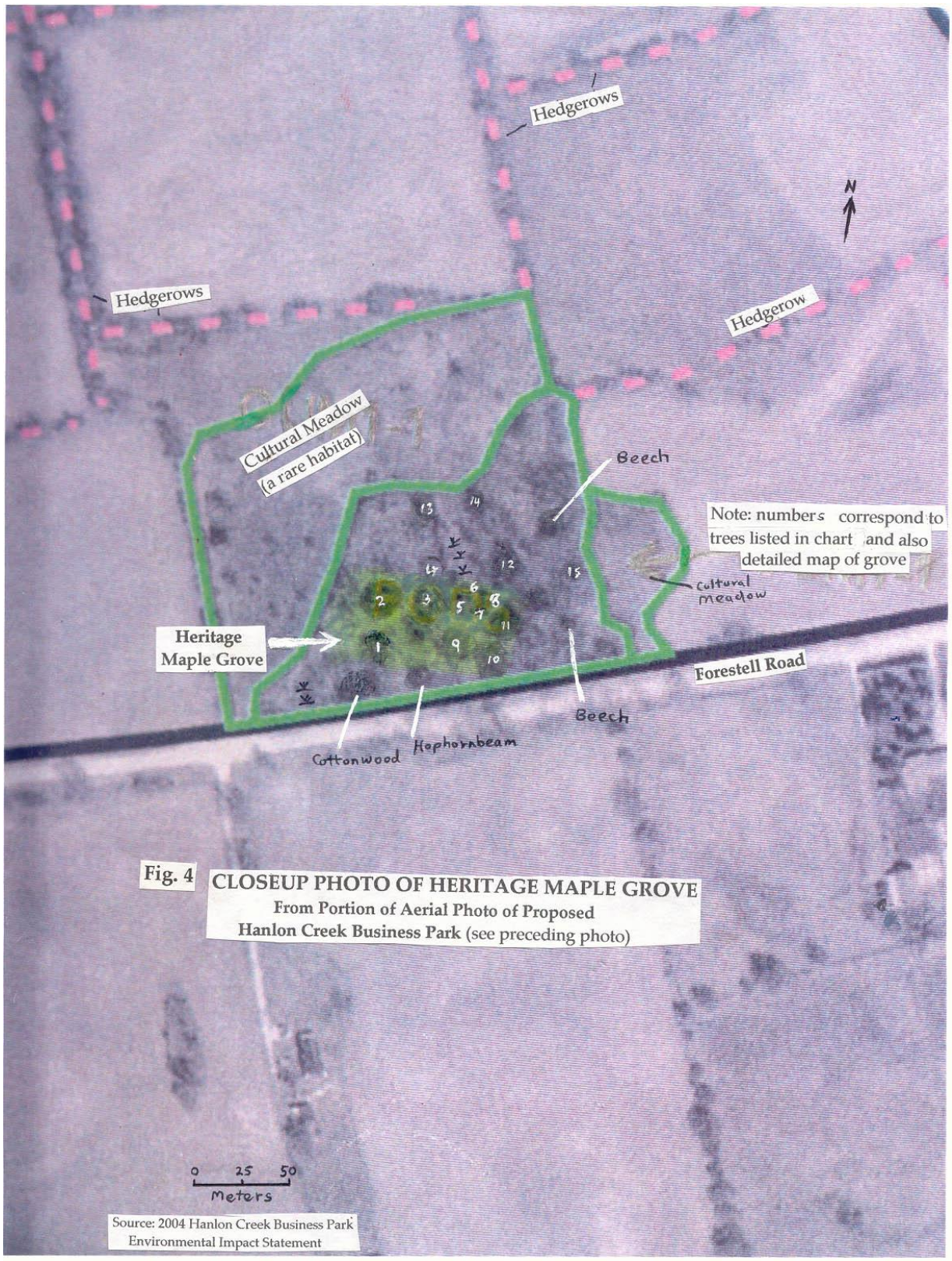


Fig. 4 **CLOSEUP PHOTO OF HERITAGE MAPLE GROVE**
From Portion of Aerial Photo of Proposed
Hanlon Creek Business Park (see preceding photo)

Source: 2004 Hanlon Creek Business Park Environmental Impact Statement

OLD GROWTH TREES OF HERITAGE MAPLE GROVE				
IN PROPOSED HANLON CREEK BUSINESS PARK				
		Age (years)	**Diameter**	**Comments**
Tree Species (common name)	scientific name & descriptive name	(estimate)	inch (cm) at breast height	
Hop-hornbeam (Ironwood)	*Ostrya virginiana*			
	Heritage Hop-hornbeam	400-500 (probably closer to 500 yrs)	20.8 (52.8)	Height approximately 57 ft (17.4 meters). Has larger diameter & taller than official champions of 25 of 35 U.S. states, and Haldimand-Norfolk champion (only nearby regional Ontario record). Age estimate based on ages of 14 old growth Hop-hornbeams previously measured by author in the region. Classic old growth features: gnarled & staghorn-shaped crown branches, shaggy bark + slight balding, flared trunk base, hollow trunk. Planned road widening will destroy part of root system. (Note: the Ontario champion is 35.8 in. (93 cm) diam.)
Amer. Beech	*Fagus grandifolia*			
	Savannah-like Beech	275	27.1 (68.8)	Open-grown form appears to result from earlier savannah habitat
	Storm-ravaged Beech	240	24 (61)	Storm recently toppled 2 of its 3 trunks; south broken trunk yielded estimated count of 160 rings for outer 35% of trunk (inner part hollow), with est. range of 225-275 yr. total age.
Sugar Maple	*Acer saccharum*			
1	Horizontal Bough Maple	180	30.4 (77.2)	Has massive horizontal lower bough; on western steep slope of knoll
2	West Slope Maple	180	30.3 (77)	Grows on western steep slope of knoll
3	Hill Top Maple	160	22.2 (56.4)	Grows on center of western knoll
4	North Slope Maple	150	20.9 (53.1)	Grows on north slope of western knoll
5	Ravine Cluster Maple #1	160	20.6 (52.3	This & next 3 grow in close group on west slope of ravine
6	Ravine Cluster Maple # 2	150	15.5 (39.4)	
7	Ravine Cluster Maple # 3	180	20 (50.8)	Displays conspicuous balding bark
8	Ravine Cluster Maple # 4	180	21 (53.3)	Displays conspicuous balding bark
9	Broken Top Maple	200	31.2 (79.3)	Prominent staghorn-shaped crown branches; original trunk in crown broken off in long-ago storm
10	Staghorn Top Maple	230	32.8 (83.3)	Prominent staghorn-shaped crown branches
11	Bicentennial Maple	200	25.4 (64.5)	Displays some balding bark
12	Shagbark Maple	230	25.6 (65)	Outstanding and bizarre shaggy bark; grows on east knoll's slope overlooking kettlehole wetland
13	Head-of-Ravine Maple #1	170	27.2 (69.1)	Both trees opposite each other, at north opening of ravine, north of main concentration of rest of trees.
14	Head-of-Ravine Maple #2	170	26.7 (67.8)	Both trees opposite each other, at north opening of ravine, north of main concentration of rest of trees.
15	Patriarch Maple	300	35 (88.9)	Largest of the maples; on east knoll with open-grown form from possible former savannah habitat; most of upper crown dead but lower boughs still living.
E. Cottonwood	*Populus deltoides*			
	Roadside cottonwood	100	37.8 (96)	Will be destroyed if proposed road widening is allowed. 100 years is considered to be "old growth for this species
Total Old Growth Trees		19		
Combined Age Total		3,955 yrs		

Chart listing trees of Heritage Maple Grove

Heritage Hop-hornbeam overview.

Heritage Hop-hornbeam showing crown of tree.

Heritage hop-hornbeam: View of base of trunk with person for scale. Estimated age 400-500 years. Height approximately 57 ft (17.4 meters). Has larger diameter & taller than official champions of 25 of 35 U.S. states, and Haldimand-Norfolk champion (only nearby regional Ontario record). Age estimate based on ages of 14 old growth Hop-hornbeams previously measured by author in the region. Classic old growth features: gnarled & staghorn-shaped crown branches, shaggy bark + slight balding, flared trunk base, hollow trunk. Planned road widening will destroy part of root system. (Note: the Ontario champion is 35.8 in. (93 cm) diam.

Heritage Hop-hornbeam showing bark detail.

Heritage Hop-hornbeam showing some branch detail.

Heritage Hop-hornbeam showing trunk and crown.

Heritage Hop-hornbeam showing flair at base of trunk.

Northern-most Beech overview. Age estimated at 275 years, diameter 27.1 inches (68.8 cm.). Open-grown form appears to result from earlier savannah habitat.

Detail of gnarled branches on northern-most beech.

Southern-most of two old-growth beeches marked as storm-ravaged Beech on table. Estimated age 240 years, diameter 24 inches (61 cm.). Storm recently toppled 2 of its 3 trunks; south broken trunk yielded estimated count of 160 rings for outer 35% of trunk (inner part hollow), with est. range of 225-275 yr. total age.

Sugar Maple #1: Horizontal Bough Maple. Age estimated at 180 years, diameter 30.4 inches (77.2 cm.) It has massive horizontal lower bough; on western steep slope of knoll

Sugar Maple #7: Ravine Cluster Maple # 3, estimated age 180 years, diameter 20 inches (50.8 cm.). Displays conspicuous balding bark.

Sugar Mpale #8: Detail of balding bark pattern.

Sugar Maple #8: Ravine Cluster Maple # 4, estimated age 180 years 21 inches (53.3 cm). Displays conspicuous balding bark.

Sugar Maple #9: Broken Top Maple, estimated age 200 years, diameter 31.2 inches (79.3 cm,). Prominent staghorn-shaped crown branches; original trunk in crown broken off in long-ago storm.

Sugar Maple #9: Broken Top Maple showing lower trunk.

Sugar Maple #10: Staghorn Top Maple, estimated age 230 years, diameter 32.8 inches (83.3 cm.). Prominent staghorn-shaped crown branches.

Sugar maple #10: base of trunk of Staghorn Top Maple

Sugar Maple #12: Shagbark Maple, estimated age 230 years, diameter 25.6 inches (65 cm). Outstanding and bizarre shaggy bark; grows on east knoll's slope overlooking kettlehole wetland.

Sugar maple #12: photo of shaggy bark.

Sugar Maple #12: base of trunk showing shaggy bark.

Sugar Maple #12: detail of shaggy bark on lower trunk of the maple tree.

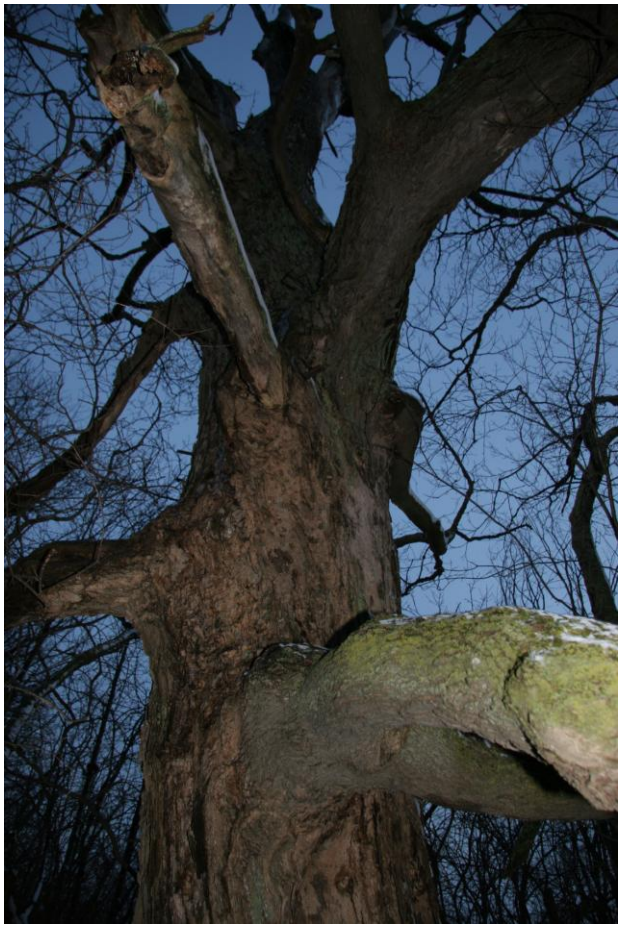
Another photo of this tree is presented as the title photo for this report.

Sugar Maples #13 and #14. Both trees opposite each other, at north opening of ravine, north of main concentration of rest of trees. Sugar Maple #13: Head-of-Ravine Maple #1, estimated age 170 years, diameter 27.2 inches (69.1 cm.). Sugar maple #14: Head-of-Ravine Maple #2, estimated age 170 years, diameter 26.7 inches (67.8 cm.).

Sugar Maple #13: Close-up of gnarled branching on the tree.

Sugar Maple #15: Patriarch Maple, estimated age 300 years, diameter 35 inches (88.9 cm.). Largest of the maples; on east knoll with open-grown form from possible former savannah habitat; most of upper crown dead but lower boughs still living.

Sugar Maple #15: View of the crown of the tree.



Sugar Maple #15: View of heavy lower branches on the tree.

Roadside Cottonwood: Estimated age 100 years, diameter 37.8 inches (96 cm.) Will be destroyed if proposed road widening is allowed. 100 years is considered to be "old growth for this species. Oriole nest is present in the cottonwood.

Sugar maple measurement

Ecological Quality Versus Old Growth Status of the Grove

By identifying the Heritage Maple Grove as "old growth' does not mean it is "pristine." This investigator recognizes it would not be rated high quality as an ecologically functioning natural area. What it does mean is that the mature trees that comprise the Grove are old growth, with one tree (the Hop-hornbeam) attaining a notably exceptional age. Old growth forest sites are extremely rare in southern Ontario, and deserve protection for the variety of values and benefits they provide to society and the environment (separately described ahead).

It is clear that the ground layer and understory layer vegetation that have grown up under the old growth trees are not made up of the species that would form in this type of forest under natural conditions. This is because cattle were allowed to graze in this grove in the past. When this practice ceased many decades ago, the shrubs and young trees (some of which are non-native) grew up on the grazed area under the old growth trees. But if this grove is protected, rehabilitation techniques can easily restore the vegetation under the old growth trees to a composition much more similar to that which previously grew naturally there under pre-settlement conditions. A study of the site may include restoration of the savannah community that appears likely to have existed originally, at least on the east portion.
However, some in the Guelph community have taken a narrow view that since the Grove does not currently have a natural lower layer of vegetation, and that the Grove has a relatively small acreage, it should be dismissed as having "no ecological value" and therefore "not worth saving." Supporters of this view arrive at their conclusion only because they base it on a single value, the ecological value.

However, there are many other values that old growth groves provide (see general list of values in Appendix). When one examines these other values and benefits that the Grove provides (listed ahead), their dismissive view becomes unsupportable. The Grove has great value, making it highly worthy for protection based on the following facts:

1) if the Grove is protected, the non-natural ground vegetation is easily restorable to a natural condition. This would return its ecological value, and this value would increase over time as natural, ecological conditions further establish themselves.

2) old-growth sites -- of any size -- in southern Ontario are extremely rare, especially in urban areas (as this grove is), and deserve protection for that reason alone.

3) the "ecological value" is only one of 10 values and benefits that old growth forest sites provide to society. As detailed ahead, this grove provides unique heritage, educational, scientific research, tourism, aesthetic/scenic, and quality of life enhancement benefits.

4) destruction of any old growth forest site is an irreplaceable and irretrievable loss. One cannot "bring back" an old growth grove, since it takes multiple centuries under natural conditions for them to develop. When decision-makers are faced with a decision whether to destroy a site that is both rare and irreplaceable, the burden of proof should weigh overwhelmingly toward protecting, NOT destroying the site.

5) this particular grove possesses one of the largest and oldest known Hop-hornbeams in the region and in Ontario, with an age that likely reaches back as far as 500 years old. This should be compelling enough, on its own merit, to warrant protection.

The wisest course of action therefore is to protect the Grove so that its unique and irreplaceable values can benefit the Guelph community and surrounding region for generations to come. With restoration of its lower vegetation layer, especially any appropriate prairie/savannah wildflower species, its natural/ecological values can also be added.

Values and Benefits of the Heritage Maple Grove

1. UNIQUE FEATURE FOR A BUSINESS PARK TO PROMOTE
   Instead of just planting scattered saplings, the new business park could also publicize the preservation of its own "Heritage Maple Grove," including the 400 – 500 year old Hop-hornbeam. If a nature trail was designed, it would provide a beautiful amenity for the Business Park's employees that would add to the project's attractiveness as a place to work.

2. HERITAGE VALUE
   Old growth forests are places of great antiquity, containing the oldest (and tallest and largest) living things, attributes worthy in their own right. They are "living historic monuments" since they preserve the original landscape. They are the only place where you can see -- and walk through -- the last surviving landscapes of the pre-European era when only Native Peoples (First Nations) lived here. Similarly, they are the only place to see the land as it existed when the first European settlers struggled in the earliest years of the new colony and nation-to-come. They are a highly valuable part of our irreplaceable legacy, as valuable as discovering an archeological Native village, as important to preserve as an 18th century Colonial homestead.

3. EDUCATION AND RESEARCH BENEFITS
   Since old growth forest sites are rare and widely dispersed in Southern Ontario, the presence of this grove so close to the University of Guelph and area public schools provides a unique educational opportunity for the region's students to observe and compare the dramatic difference in appearance between old growth and younger trees. By protecting this site, it provides schools with the opportunity to adopt it as a study site for various projects such as
   - Restoration of the natural ground vegetation and wild flowers that previously grew there, with the goal of returning it to its natural integrity. This may include rare savannah species.
   - Design a nature trail that would loop through the Grove, with labeled trees and brochure.
   - History classes could relate the trees' ages to a notable periods in Canadian history or the birth year of famous or historical Canadian or First Nations leaders.
   - Art classes could use the trees with notably charismatic shapes as models for art and photography (e.g., shaggy Sugar Maple, gnarly Hop-hornbeam, staghorn-crowned maples).

4. SCENIC AND TOURISM ASSET
   The unique and charismatic appearance of the trees, combined with the knowledge of the great antiquity of the grove, would be appreciated by members of the general community. If a brochure and roadside plaque were created to describe its heritage value, it would ensure this would be appreciated as a site for public visitation. It could also be promoted in the City's tourism literature, with a sign along nearby Highway 6 pointing the way to it.

5. PROVIDE NATURAL NOISE BUFFER, AND SAVE CONSTRUCTION EXPENSES
   By preserving the Grove, the plans to build a berm as a noise and visual buffer along this section of Forestell Road would no longer be necessary. This would save considerable expenses as well. The 29.5 feet/9 m high gravel hill upon which the forest grows would make it more effective than the berm would be. Since forest is also recognized as a noise and visual buffer, the forest and hill combination provides the most effective noise and visual buffer and substitute for the berm (and would certainly be more attractive).
   There is no justification for destroying the old growth grove, and bulldozing away the two gravel hills, only to spend considerably more money to replace them with another gravel pile (a barren berm) in this specific portion of the road.

The Issue of Tree "Health" versus Old Growth Condition

Forests that are recognized as old growth are widely appreciated for their rarity and their many values and benefits, as described previously. Yet some in the forestry community still have a negative view of old growth forests because their perspective is that the function of forests is primarily to yield wood or other products for humans. Therefore, it is not surprising when a forester evaluates old growth trees and claims they are "unhealthy."

Coming from their specific perspective, younger forests with rapidly growing, "vigorous," straight trees, free of hollow trunks, are viewed as "healthy" and "desirable" (meaning economically desirable). In contrast, they label old growth trees as "decadent," "over-mature," and "undesirable." Many foresters routinely label old growth trees in a forest as "unhealthy" because they are not in the younger stage that would yield economically valuable wood products. It is not unusual for foresters to mistakenly claim that most of the trees in an old growth forest are "diseased" and "don't have long to live" and even that "the forest will fall apart."

These statements cannot be farther from the truth. Eastern North America was covered mostly by old growth forest when the first European settlers arrived. This forest was described as grand and inspiring. This great forest was not falling apart, was naturally self-perpetuating, and never needed man's "management."

In the case of the Heritage Maple Grove, 15 of the old growth trees in the primary (western) part of the grove have attained only 30 – 50 % of their maximum longevity. None have any diseases that will prevent them from growing toward their maximum age. The fact that one of the maples had its top broken off during a storm as long as a century ago is a common feature of old growth forests. Similarly, that fact that the Hop-hornbeam is hollow does not mean it is "diseased." It is important to emphasize, after all, that since it has reached as old as 500 years, this makes the statement that it has been healthy enough to achieve this longevity (and still has centuries to live). Broken tops, cavities in upper trunks, and hollow lower trunks are actually typical features of nearly every great old growth "Redwood," "Bald Cypress," and other famous giants that are thousands of years old. The same is true for the old growth trees of eastern North America. If hollow trunks and broken tops were signs of poor health, we wouldn't see very old trees with these features.

The health condition for the three easternmost trees is a different story. The two ancient Beech trees both have signs of the Beech bark disease, a blight spread by humans to this continent . This disease is tragically slowly spreading to, and gradually killing, most mature Beeches in North America. The two Beech trees will die because of this blight, possibly within ten years, but they will not die because of their age. Two of the three weakened, diseased trunks of one of the Beeches have been blown down. The huge easternmost Sugar Maple is in poor physical shape because it was struck by lightning, but again, not because it was old. In fact, its living lower branches make keep it living for another 75 years.

Maximum Longevity of Old Growth Trees Of the Heritage Maple Grove

	Maximum Longevity	Actual Age Range of Trees in Grove
Sugar Maple	~ 500 + year	150 - 275 yrs.
Beech	~ 500 years	250 -275
Hop-hornbeam	~ 600 + years	400-500
Cottonwood	325 years	100

Sources: personal tree coring and field age measurement data over a 20 year period, combined with field data from dozens of other forest scientists, published literature, personal communications. One of sources was Old Growth Forest Definitions for Ontario, 2003. Uhlig, P.A., G. Craig, C. Bowling, et. al., Ontario Min. of Natural Resources, Peterborough, Ont. , 43 pp.

METHODS USED

Field Research Methods

The entire grove was explored in order to locate every mature tree. This research effort took place on two separate days during winter 2005 – 2006, accompanied by a field assistant. Each tree was carefully examined and evaluated and the following data were recorded:

- The species of each tree was identified
- Measuring tape used to determine diameter/circumference
- The old growth features of each tree were identified and used to determine
  a) whether each individual tree was old growth or not, and
  b) collectively, to determine old growth status for the entire grove (see details on this procedure ahead)
- For each tree that was identified as old growth, its age was then estimated as closely as possible, based on its old growth features, combined with professional experience, and the tree's context within the forest
- For the storm-damaged Beech, the annual rings exposed on one of its broken trunks were counted. After measuring the hollow part, a very conservative extrapolation was calculated to reach an estimated age. The most important result was that the ring count itself reached 150 years (independent of any extrapolation). This meant the tree was confirmed as old growth. But since the section with the annual rings was less than half the radius, it was obvious that this Beech exceeded 200 years and is most likely within 250 – 300 years in age. It was assigned a conservative age of 250 years in this report.
- Height of the Hop-hornbeam was measured using a state-of-the-science Laser Rangefinder
  and a Clinometer that enable a precise, not estimated, measurement
- Field map was drawn, with relative location of each tree marked. Notable landscape features, knolls and kettle hole wetlands were also mapped.
- Digital photos and 35 mm slides of most of the trees were taken. These included close-ups of the bark, views of trunk with person standing next to it, view looking up the trunk, and a more distant view of tree showing silhouette and old growth branch pattern
- Distance of the trees from the road was estimated. This is relevant to determine because some of them would be affected by the proposed road widening
- The width of the grove along the road was closely estimated by using carefully measured paces to assist in later calculation of acreage off the grove using area photos.

Since the ground was covered by snow, no other botanical observations were made. The shrubs and understory young trees were not studied because of insufficient time in the day. They were also not relevant to the issue of determining or measuring the old growth trees.

Non-Field Research Methods

- Acreage measured – using field data, aerial photos, and official project development map, the acreage of the Grove was carefully measured. Acreage of a proposed buffer area around it was also measured (using hedgerows and farm road as boundaries).
- Vegetation map created based on field map, supplemented by aerial photo
- Maximum size records of Hop-hornbeam were obtained from available Canadian sources and all U.S. States. Personal files with records on ages and sizes of 14 old growth Hop-hornbeams measured by this investigator were analyzed, and used to support the field estimate of the tree's age.
- Contacted old growth experts, other specialists and literature for supplemental data on maximum age and size of Hop-hornbeams.

Methods Used to Identify Old Growth

Two decades of field research by this investigator, working in a team approach with other forest experts, have established a highly reliable set of physical features that can be used to recognize and identify both old growth forests, and old growth individual trees.

Because these physical features correlate so well with accurately identifying old growth trees, it is no longer necessary to use the slow, laborious process of tree coring (which requires use of a drill/auger device called an increment borer) to measure tree ages to determine if a tree is old growth. While coring is useful or desirable under certain conditions, large-scale coring of dozens of trees is no longer a necessity to identify old growth forests, as was once thought in the past. The historical background and rationale for this, as well as the use of physical features for identifying old growth, are described fully in the Appendix.

The use of tree coring in the Grove was specifically prohibited by the City as part of the agreement leading to permission to conduct research in the project site.

In order to identify old growth, the definition must be clear. (A detailed definition of old growth is described in the chart ahead.) A very brief version is as follows:

- An old growth forest is one in which its individual old growth trees are a major component of the forest's upper layer or canopy.

- An old growth tree is defined as a tree which is 150 years or older.

Therefore, the first step is to determine

a) which of the Grove's primary trees are old growth (past the threshold of 150 years or older), and

b) whether they are the dominant component of the canopy. Since all major trees in this Grove were confirmed as old growth, the Grove itself obviously meets the definition of an old growth forest.

A total of 22 old growth features (full list in Appendix) have been established that can be used to identify old growth forests and trees:

- Group 1, totaling 14 old growth features have been recorded on individual trees (3 of which were recorded in the Grove)

- Group 2 comprises 8 old growth features that can be recognized in the structure or species makeup of the general forest (3 of these were recorded in the Grove). Note, however, that the absence of a particular old growth feature does NOT mean a site is not old growth.

Generic Definition of Old Growth Forest

Old-Growth Forest has two parts to its definition:

1) a natural community that has been continuously forested since before European settlement, AND

2) that forest's canopy must be dominated by trees with ages of 150 years or older (mixed with mature trees).

Most old-growth forests typically have 8 or more trees per acre that are 150 years old or greater. However, because of the wide range of Old Growth Forests (from towering Pine Forests, to cliff-dwelling Cedar communities, to open savannah woodlands, to dwarfed swamp and subalpine forests), this figure is necessarily variable and is just a generalization. The 150-year figure is based on easily observed and well-documented changes that appear in trees around the 150-year mark. These include dramatic changes in bark, trunk and canopy branches, as well as changes in structure and appearance of the forest landscape itself. It is not a randomly-derived figure.

Old-Growth Grove: A small stand of Old Growth Forest, 20 acres or smaller

Old-Growth Forest Synonym:

- Ancient Forest

Closely related (near-synonym) terms referring to origin of forest before European settlement period:

- Pre-settlement Forest
- Original Forest

Closely related terms referring to a continuously forested site, not interrupted by disturbance (human or natural),so that it has reached a kind of climax stage for that site's conditions:

- Primary Forest
- First-Growth Forest

Closely related terms referring to a "pristine" Old Growth Forest with no disturbance, or negligible deliberate disturbance (particularly human disturbance), in its past history:

- Virgin Old Growth Forest (type of Old Growth with no human disturbance -- very rare!)
- Primeval Forest (minimal or negligible disturbance, preferably long ago)
- Primitive Forest (similar to Primeval Forest, less common term)

Old Growth Physical Features Present in the Heritage Maple Grove

The following physical features were present in the Grove and were used to identify its trees as old growth. Bold indicates "high confidence" old growth indicators. The others are "medium confidence" indicators, but they provide high confidence when present in combination, or if frequent, and/or well-developed. The general criteria for evaluating whether a tree or forest is old growth are described ahead. In actual practice, the investigator must account for the species-specific differences, habitat growing conditions, regional differences, knowledge of early settlement history, etc.

Old Growth Bark – applies only from one meter and higher above ground

- balding bark - patches of scaly or ridged bark that have exfoliated due to weathering, creating much smoother appearance
- shaggy bark - vertical ridges or large scales loosen and lift off from trunk surface, creating a "shaggy" appearance. However, they may not be loose, but may be rigid and cannot be broken off the trunk
- deeply ridged and grooved bark - vertical ridges become thicker, protrude more, with even deeper grooves between them; in some trees, the fissure depth can reach 2 to 5 inches

Staghorn-shaped Crown Branches

- boughs or thick branches in crown (upper part of tree) develop right-angled shape, creating an overall appearance suggestive of antlers (instead of V-shape or upward-pointing acute-angled branches typical of younger trees). This is caused by damage from centuries of wind and ice-storms and lightning, following by healing and re-growth and then thickening of the branches at the former breakpoints, creating the right-angled appearance

Large Diameter Trunks ("high confidence" for Hop-hornbeam and largest Sugar Maple)

Flared or Swollen Trunk Bases

Tall, Branchless Trunks (with or without large diameter)

- develops only for trees which have spent most of their early to middle life cycle growing vertically (without growing major sideways branches) so as reach the canopy

layer where the sunlight is abundant. Only at the canopy layer can they then grow spreading, horizontal crown branches (called "forest-grown form").

Hollow Trunks are relatively common

Bizarre Growth Forms: old gnarled and contorted branches

Moss Growth Up the Trunk

- applies only to moss growth that extends one meter above ground and higher . Moss (in our region) starts growing from the base up. It takes a long time for moss to gradually grow up a trunk. By the time, significant patches reach one to many meters up, at least 150 years have generally passed. (Does not apply along shores, in wetlands, deep ravines, or on high hill slopes that are often covered by cloud or fog)

The complete list of all old growth features and indicators is in Appendix 2.

Group 3 comprises 7 features that are “negative” indicators, that is, their presence indicates evidence of human disturbance such as cutting in the past; unless minor, these negative indicators lead the investigator to the conclusion that a site is not old growth. (None of these negative indicators were recorded in the Grove, supporting the conclusion of no evidence of cutting of mature or canopy trees in the last century. This grove was once open to cattle grazing decades ago, however, which seriously degraded its ground vegetation.)

Comparison of the Heritage Hop-hornbeam With Other Record-Size Hop-hornbeams

The Heritage Hop-hornbeam in the Heritage Maple Grove located within the proposed Hanlon Creek Business Park is not just of exceptional age (up to 500 years old), it is also a "champion-size" specimen. To appreciate how large and tall this outstanding tree is, it is valuable to compare its 21 in./53.3 cm diameter and 57 foot/7.4 m height to the recorded champion Hop-hornbeams for Ontario and to US records.

Although the Ontario champion is larger in diameter (36 in./92 cm), it is slightly shorter in height (56.1 feet/17.4 m) than the Hop-hornbeam in the Grove. The only other regional record that could be found in Ontario is for the Haldimand-Norfolk Region, which has one with a diameter that is virtually the same (20.9 in./53 cm), but much shorter (42.3 feet/12.9 m). As one would expect, the US and world champ (from Michigan) is clearly larger in diameter (36.2 in./92 cm) and taller (73 feet/22.2 m).

Hop-hornbeam has a very large range throughout eastern North America, being found not just throughout eastern Canada, but also in 34 American states. Considering this very large range, and the fact that it has a much longer growing season in the southern states, one would expect that many more American state champion Hop-hornbeams would easily surpass the size our Hop-hornbeam, which grows in a northern climate and on a poor, gravelly site.

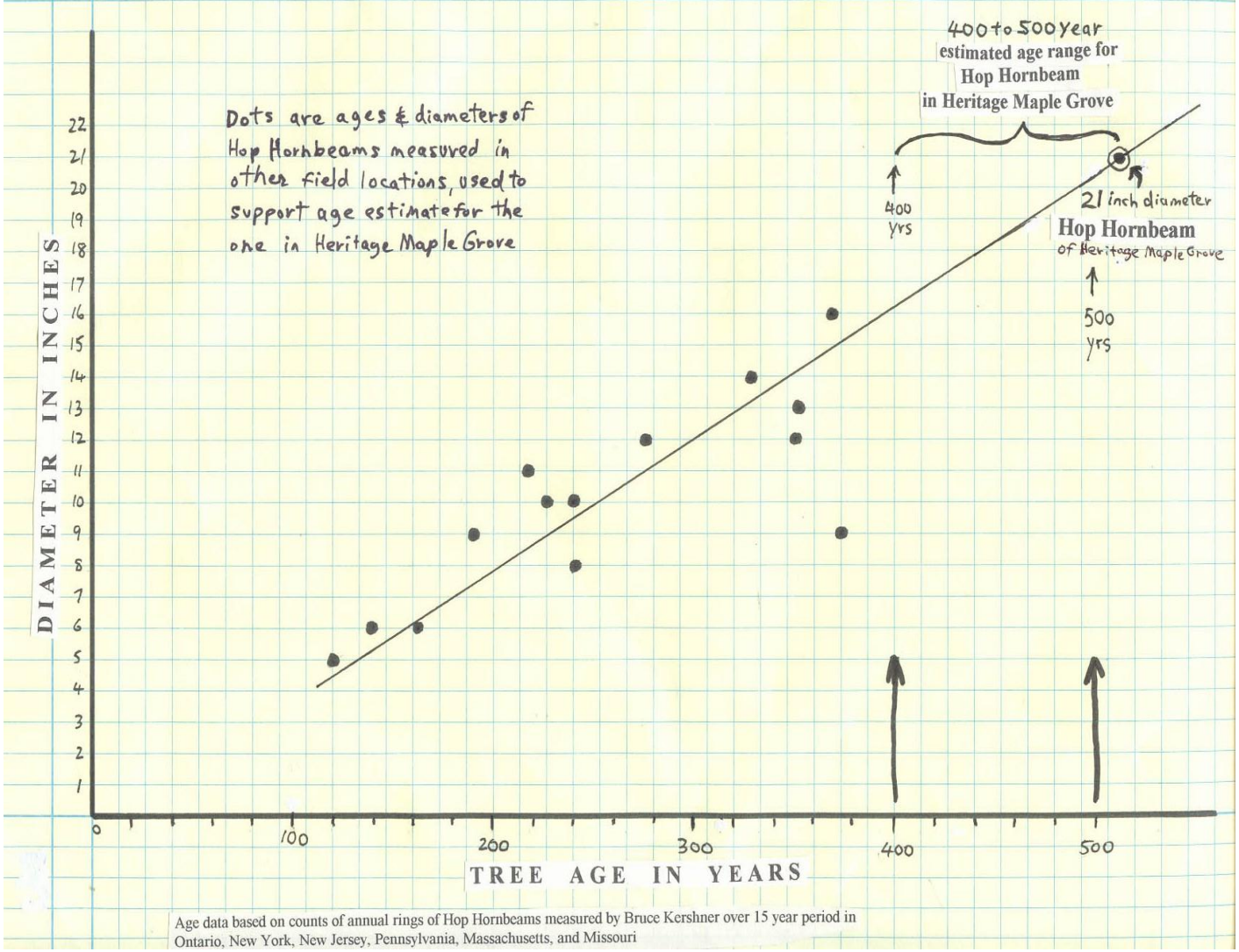
However, according to all the state champion tree records, the Hanlon Creek Heritage Hop-hornbeams:

- within 5 % of the diameter, or larger than, 65 % of all the State champion Hop-hornbeams
- same height or taller than 62 % of the State champion Hop-hornbeams

Sources: Honour Roll of Ontario Trees, 2002, Ontario Forestry Association; National Register of Big Trees, 2004, American Forests State Champion tree (or Big-tree) directories for every eastern US state that publishes one (33)

Fig. 5 **RELATIONSHIP OF HOP HORNBEAM AGE AND DIAMETER**

This data was used, together with old growth physical features, in context with data from the rest of the Grove's trees, to estimate age of the Hop Hornbeam in Heritage Maple Grove



Age data based on counts of annual rings of Hop Hornbeams measured by Bruce Kershner over 15 year period in Ontario, New York, New Jersey, Pennsylvania, Massachusetts, and Missouri

Impacts of the Project on the Heritage Maple Grove

According to current development plans, the impact of the project on the Heritage Maple Grove would be as follows:

1. The project would destroy the only documented old growth forest grove within the City of Guelph, to the awareness of this investigator.

- this also means that the only documented example of the original, pre-settlement landscape of Guelph would be destroyed, an irreplaceable loss to Ontario's human heritage, including its First Nations heritage.

- it would destroy the champion 500-year old Hop-hornbeam, so far the oldest hardwood tree in Wellington County, and one of the largest Hop-hornbeams not only in Canada, but in the world.

- destruction of this Grove would also deny the Guelph-area community of the following valuable opportunities that the Grove would offer if it were protected:

- education and research opportunities for area schools and University students

- appreciation of its heritage and scenic values by Guelph-area residents

- appreciation of its heritage and scenic values by employees of the Business Park in particular

- potential tourism benefits from promoting the site, which is so close to Highway 6

- protection of this Grove would reduce only 0.5% of the area of the project site from being used for development. If the proposed buffer around the Grove is added, the total reduction of development area within the project site totals 1 %.

2. Destroy two natural wetlands and the gravel moraine hills that serve a valuable natural water retention function at the uppermost part of the Hanlon Creek watershed.

- these wetlands provide likely habitat for rare amphibians. Previous studies by the City's consultants never sampled these sites for herpifauna. Therefore, this impact cannot be denied or confirmed until such a study is conducted.

3. Destroy the natural noise and visual buffer that the Grove and its 29.5 ft./9m high gravel hills currently provide. These features provide this "service" without cost to the community; therefore, destruction of the Grove and its gravel hills would be a foolish and fiscally irresponsible action that would be a waste of taxpayer dollars.

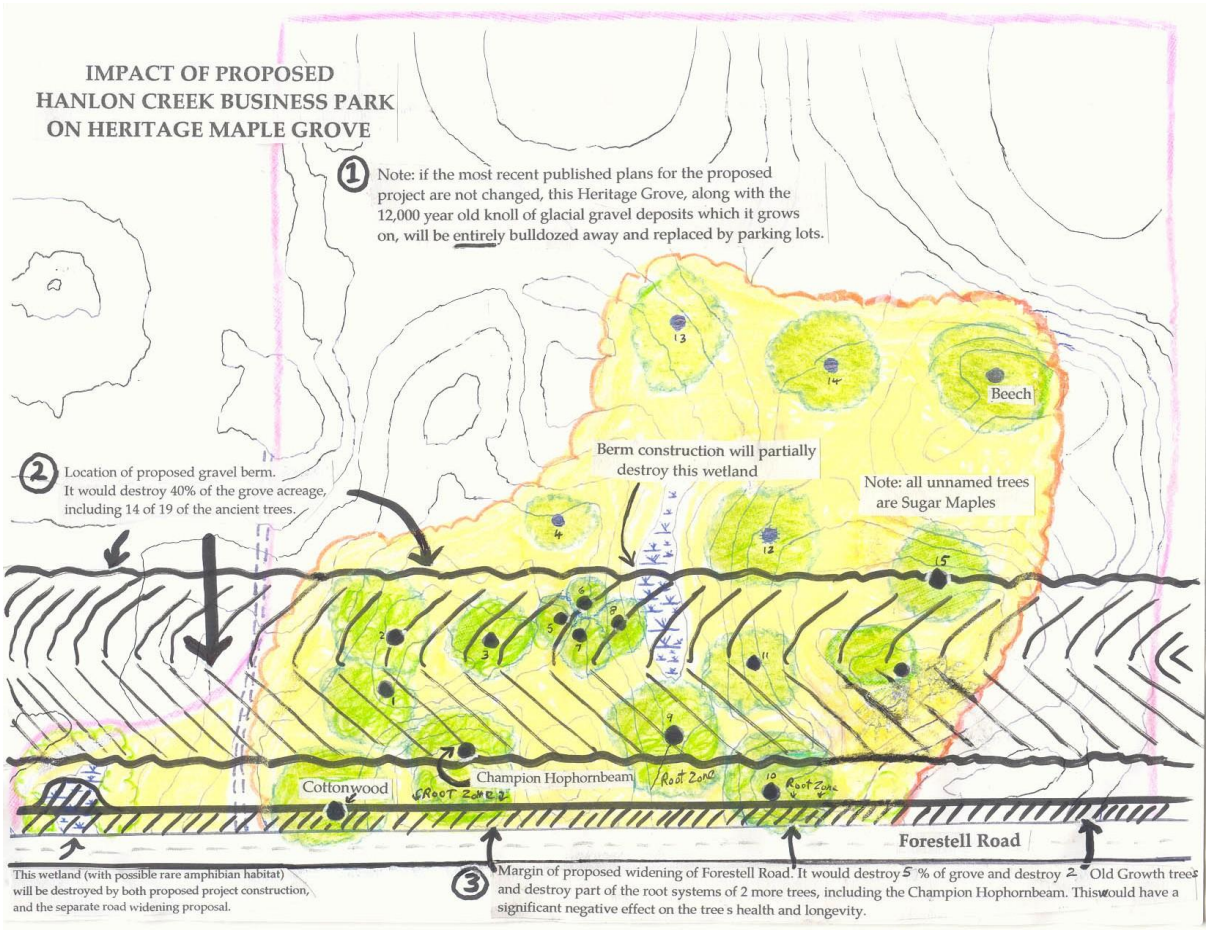


Fig. 6 Map of Impact of Hanlon Creek Business Park on Heritage Maple Grove

Other Development Impacts

Even if the Business Park development (for parking lots, new roads, and buildings) were re-designed so that the Grove were placed in a "No Development" zone just like all the other natural woodlands on the project site, there are two separate projects that would negatively impact the Grove.

Impacts of the Proposed Berm

Construction of the proposed berm, as shown on the following map, would destroy 40% of the Grove's acreage, including 14 of the 19 ancient trees, among them being the Heritage Hop-hornbeam. As stated previously, the Grove and the hills that it grows on would serve as an even better noise and visual buffer than an artificial, unvegetated berm.

Impacts of the Proposed Widening of Forestell Road

The proposed widening of the north side of Forestell Road, as shown on the following map, would destroy all vegetation and bulldoze part of the sloping hill along the stretch of the Grove that borders the road. This widening, which would extend 12 feet from the current margin of the road, would destroy approximately 5 % of the Grove. In particular,

- it would destroy the century-old Cottonwood

- it would destroy the 230-year old Sugar Maple #10

- it would damage the root systems of the Heritage Hop-hornbeam and the 200 year old Sugar Maple #9. This would have a significant negative effect on these trees' long-term health, and could possibly lead to their gradual death

- it would destroy half of the kettlehole wetland to the west of the Grove

Recommended Actions

1) Re-design the current project development plan to preserve the Grove (and the small wetland just to its west). Include the proposed buffer around it to prevent construction from causing collateral damage.

2) Cancel construction of the berm through the Grove

3) Re-design the Forestell Road widening so that it avoids cutting through the Grove

4) Invite area schools and University of Guelph to design and mark a nature trail loop through the Grove.
- this should include creation of a pamphlet and plaque next to selected trees describing their heritage and natural significance

5) Construct a road-side historic plaque explaining the significance of the Grove so visitors can appreciate its heritage and natural significance

6) Place a sign along Highway 6 pointing to the Grove

7) Describe and promote the Grove in the City's tourism literature, and the Business Park's promotional efforts

8) The City of Guelph should designate the Heritage Hop-hornbeam as an official "Heritage Tree" to give it formal legal protection under the powers of the Municipal Act and the Ontario Heritage Act (see following page for details).

9) The City of Guelph and/or the Ontario Ministry of Natural Resources should designate the Grove as a "Provincially Significant Woodland" to give it formal legal protection under the powers of the Ontario Planning Act (see following page for details.

Legal Designations That Can Be Used to Protect the Heritage Grove

DESIGNATION AS A "PROVINCIALLY SIGNIFICANT WOODLAND"
Under the Ontario Planning Act, a site can be designated as a "provincially significant woodland" if it meets appropriate criteria. Once so designated, municipalities are directed to protect these woodlands in the 2004 Provincial Policy Statement on Natural Heritage (Policy 2.1.2.3(b) which states:

"Development and site alteration will not be permitted in ... significant woodlands ... unless it has been demonstrated that there will be no negative impacts on the natural features or ecological functions for which the area has been identified."

Policy 2.1.2.5 adds that "Development and site alteration will not be permitted on adjacent lands" if it negative impacts the designated "significant woodland."

The Heritage Maple Grove clearly meets the criteria for a "provincially significant woodland", as follows:

- "Old Growth" or notable age, as described in the 1999 Ontario Ministry of Natural Resources Natural Heritage Reference Manual. Its criteria are based on the "standard definition" of the presence of trees 100 years in age or more, which this grove clearly exceeds.

Note: The Natural Heritage Reference Manual defines "Significant" and "Woodland" as follows:

"Woodland" = "treed areas that provide environmental and economic benefits such as erosion prevention, water retention, provision of habitat, [and] recreation ..."

"Significant" = woodlands "important in terms of features, functions, representation or amount, and contribution to the quality and diversity of an identified geographical or natural heritage system."

DESIGNATION AS A "HERITAGE TREE"
The Heritage Hop-hornbeam can be given legal protection by being specifically designated as an official "Heritage Tree." This can be accomplished as follows:

- 1990 Ontario Heritage Act, Part IV - the tree or the property it is on can be protected by the municipality under Sec. 29, or by the Province under Sec. 35.5
- 2001 Municipal Act (Sec. 135-138) enables the municipality to protect the Grove or its specific trees by establishing a Heritage Trees Conservation By-Law

Sources With Additional Information:
Discussion Paper #4a: Review of Significant Woodland Criteria. Technical Discussion Paper. Jan. 2005. City of Hamilton, Official Plan Review, Planning & Devel. Dept., 17 pp.

Suggested Guidelines for the Identification of Significant Woodslands in Southern Ontario. Feb. 2004. Ontario Nature. Conserving Southern Woodlands Project. 16 pp.

Heritage Trees Protection: Legislative Tools. Barbara Heidenreich. 2004. unpublished paper, 10 pp.

APPENDIX 1; THE METHOD OF USING PHYSICAL FEATURES TO IDENTIFY OLD GROWTH AND ESTIMATE TREE AGES

A Summary of How the Field Procedure Was Established

More than 25 years of field research have repeatedly shown that the method of identifying old growth based on any of the 22 physical features (plus 7 negative physical indicators) confidently enables one to distinguish between trees that are old growth (greater than 150 years old) or not old growth (less than 150 years). This is because they correlate so well to the old growth 150-year threshold.

The validity and reliability of these old growth indicators have been established by this investigator's field research, together with numerous scientists and forest researchers from a wide range of universities, government agencies and ministries, and non-government organizations. This process of establishing the correlation has been part of a decades-long field research effort co-lead by this investigator in a team-coordinated effort with many institutions including: Harvard University, Cornell University, Ohio State University, Holyoke College, Eastern Native Tree Society, researchers from the Pennsylvania Department of Conservation and Natural Resources, New York Dept. of Environmental Conservation, George Landis Arboretum, and the New York Old Growth Forest Association among others. In addition, the Western New York Old Growth Forest Survey, the Central New York Old Growth Forest Survey, and the Eastern New York Old Growth Forest Survey collaborated over many years of field work.

Because physical appearance of a tree's trunk, branches, bark, etc. can have subtle, complex, and non-objective aspects, the teamwork discussion and comparison in the field have been part of the important process in arriving at consistent and valid conclusions, ensuring accurate observations and recognizing new characteristics and exceptions.

In order to correlate the physical features with actual tree ages, very extensive coring of trees first took place over many years. Field data recorded the ages of a large number of trees, together with these trees' physical characteristics (on their trunks, bark, branches). Over the period from 1982 to present, consistent patterns relating specific physical features to whether the tree was greater or less than 150 years old were established. Over time, patterns were also established that now enable field researchers to even estimate the ages of trees to within 10 to 15% of their true age. This is done on a species-specific basis. Other factors such as regional differences, differences in growing site conditions, land use history, and other factors are always considered in this process.

The teamwork process was also required simply because the very act of manually drilling a single large tree is physically challenging, typically taking two to three strong-armed people 30 – 50 minutes to complete the entire process. This is especially so when trees with notably dense wood such as Sugar (or 'hard') Maple, Oaks, Hickories and Ironwood are cored. Not only does drilling a tree to get a core sample take considerable time, making a meticulous field count of the core's annual rings to measure its age also is a slow process. Furthermore, the sample must be carefully labeled and packaged in the field. In addition, the tree's diameter/circumference, photographs and physical location must be recorded. The teamwork process for coring large trees is also essential when trees are located on difficult locations (such as steep slopes, rim of cliffs), or when tree trunks are frozen in winter.

Another valuable benefit of using the team approach during field research is the valuable way that researchers have been able to check, correct and improve their skill in estimating ages of old growth trees. Typically, before an old growth tree is cored (to measure its age), members of the field team evaluate all the tree's features, including its context in the surrounding forest. Using these observations, researchers on the field team write down their age estimates before discussing it. While the tree coring is being performed, the team discusses each person's age estimate. Those whose estimates diverge markedly from the rest of the group explain what features lead them to their conclusions. When the field count of the annual rings is completed, an even more detailed discussion focuses on whose estimate was closest and what factors or features best explained the actual age obtained. By repeating this group discussion over many years, each researcher's age estimating skills are honed and improved. The correlation between the tree's age and its physical features are validated, improved or adjusted as needed. Most importantly, this teamwork process enables one to make reasonably accurate age estimates without coring trees. In particular, it enables one to identify with confidence which trees are old growth, and by extension whether the forest is old growth.

By successfully establishing a carefully assembled, easy-to-recognize set of physical features and indicators, old growth forests, as well as individual old growth trees, can now be reliably identified. As a result, forest researchers are no longer dependent on the difficult procedure of drilling deep holes in dozens or hundreds of trees per stand to identify old growth, or obtain a reasonably accurate idea about tree's ages. This is why close age estimates of trees in the Heritage Maple Grove can be reliably made without tree coring (which was prohibited anyway by the City).

It should be noted that one Guelph-area researcher maintains a standard practice of drilling into every mature tree in a forest stand, mistakenly believing this to be the only validly scientific way to determine if a forest (or any individual tree) is old growth or not. Decision-makers and other readers of this report should recognize that this researcher must not be familiar with the tree age estimating procedure described in the preceding paragraphs.

It Is Unnecessary and Even Undesirable to Drill Trees to Obtain Cores to Measure Tree Ages

The previous discussion explained why it is not required to undertake extensive drilling of trees to extract cores to measure tree ages and to determine old growth status of a forest. When the discovery of the Heritage Maple Grove was publicized in the media, the erroneous claim by a Guelph-area researcher was made that one can't estimate the age of a tree without first extracting a tree core by drilling a tree trunk with an increment borer. Not only is tree coring unnecessary to estimate tree ages, but there are additional reasons why extensive drilling of trees for this purpose is unnecessary, undesirable, or even unethical.

a) Coring Trees is Very Time-Consuming

Not only does it take 30 to 50 minutes as the median amount of time in most old growth sites to complete the coring process for a single, large diameter tree, it takes additional time to walk through a forest to find and select each appropriate tree to be cored (not all trees make appropriate sample trees for the coring process). Assuming about an hour per cored tree, it would take 100 hours to core 100 large trees in a single forest, or about 2.5 standard work weeks. In the Heritage Maple Grove alone (assuming that tree coring was a required procedure), it would have taken about 2.5 work days just to complete this process (requiring the employment of two or preferably three people each day because of the physically challenging effort to carry out the process).

- Regional Surveys to Discover Old Growth Forests Would be Rendered Infeasible – This investigator has led and conducted a dozen regional old growth surveys (many of them grant-funded, including one of southern Ontario's first regional surveys). These surveys' aims are not just to find the last surviving old growth forests, but to use these findings to help protect them. It is a vital point that, although old growth forests in southern Ontario are exceedingly rare, they are still steadily being lost to development (as might occur at this project), and also to logging. Only by finding them do we then have the opportunity to work to gain their protection.

b) Hampers Efforts to Protect Old Growth Forests

If all trees in a forest stand had to be cored in order to be able to confirm if it is old growth, then regional old growth surveys would be forced to proceed so slowly, they would only find and document old growth sites at a very slow rate. Therefore, efforts to protect old growth forests would be severely hampered since old growth forests that are still undiscovered can be bulldozed or cut down without anyone's knowledge.

c) Prevents Grant-funded Project Deadlines from Being Met

The goal of regional surveys is to find and document as many old growth forests in a specific region by the deadline set by the foundation that provides the grant funding for the survey project. If every potential old growth tree had to be cored to determine its age and identify whether it is old growth or not, deadlines for these extensive surveys could not be met (or at least very few old growth sites would be discovered within the time frame permitted under the research grant). For example, this investigator's most recent grant-funded regional old growth survey discovered about 50 old growth sites over a period of approximately four years in the eastern half of the Niagara Peninsula. If most or all of the trees had to be cored to determine if these forests were old growth or not, only 5%, probably less, of the old growth discoveries would have been found during the same time period. Once an old growth site has been found, it is then possible for any researcher in the future to document and study the site further (including tree coring).

d) Results in a Great Amount of Wasted Effort

Coring of large trees is not just physically demanding, it is a prohibitively exhausting exercise when dozens of trees must be done by a single field investigator, or even with one field assistant. Some university professors have dozens of students or graduate assistants to help them. But many other researchers are not so fortunate to have such free and readily available help.

Furthermore, a significant number of old growth trees turn out to be partly hollow, or have unreadable inner sections due to decay. Following the mistaken belief that "all the trees" must be cored means that a great deal of wasted effort and time will be spent coring these hollow or unreadable trees. In addition, if the aim is to core "all the trees," how do those who purport this belief respond to the fact that a 20-inch long increment borer cannot reach the center of the trunk of trees with diameters greater than 38-inch diameter?* Without reaching the center, an accurate age cannot be determined because a complete ring count can not be obtained. Such large trees are often common in old growth forests.

*One can't core all the way to the base of the borer because the bark thickness and irregularities of the trunk make it impossible to turn the device that close to the trunk.

e) Coring Trees is Very Expensive

Increment borers of the length needed to core old growth trees (20 inches) are very expensive devices, costing roughly $800, and are made by only two companies in the world. Coring large trees with softer wood is already physically challenging enough. Field researchers prefer to avoid coring trees with hard or dense wood, not just because they are much more physically demanding, but because the increment borer is much more likely to become stuck in the tree and be irremovable. This investigator has already lost three increment borers at a lost of nearly $2400. Sugar Maple, oaks, hickories, ash, and Hop-hornbeam are some of the tree species with very hard wood. Coring a tree in the winter when it is frozen makes it even more likely to become permanently lodged in the tree. Furthermore, an increment borer can become lodged in any tree species if the trunk is hollow or decayed because the auger just spins without turning through the spiral threads that it carved in the hard parts of the trunk. If one had to core all mature trees (which means hundreds of trees on just a few sizable forest sites), then one would have to core all large-sized specimens of tree species with hard wood. This would make it highly likely that the borer will be lost within a relatively short time-frame. Obviously, this approach is absurd and infeasible.

f) Coring Trees is Often Not Permitted on Some Properties

As is the case with the Hanlon Creek Business Park, the owners of many properties will not allow coring of their trees. This situation has been frequently encountered by this investigator. Obviously, the non-invasive methods developed by this and other investigators is the ideal approach to this restriction.

If one were to believe the erroneous assertion that one must core every tree before being able to identify tree ages or to identify if a site is old growth, then the "no tree coring" restriction on the project site would have prevented any old growth research from being conducted. The Heritage Maple Grove, therefore, would never have been identified as old growth, and no case could be made to protect it. The result of this erroneous assertion is that the Grove would not have been able to have been identified as old growth. Thus, it would likely be destroyed by this project, a tragic loss to the Guelph community, and to the environmental diversity of the region.

g) Coring Trees is Considered Unethical by Many People

Many naturalists and naturalist groups, First Nations, owners of properties with old growth forests (including government agencies and non-profit trusts), and numerous individuals consider coring old growth trees to be an unethical act. They consider it to be unnecessary "violating" of a venerable, ancient life form. They point out that it may also be detrimental to the tree's health. Drilling holes in a rare species of tree or a champion-sized tree could also be viewed as especially unethical for those additional reasons. At the very least, supporters of this view claim that if there is no truly compelling reason to drill a hole into the heart of a centuries-old tree, and especially if there is an alternate way of reliably estimating its age, then coring an old growth tree is simply unnecessary and unjustified, and therefore unethical.

While a case can be made that carefully coring a tree can be done without affecting the health of the tree, there is still a strong argument on the side of treating ancient forest trees, which are rare, in a special, respectful and sensitive manner. Coring every tree in a forest is an opposite and cavalier approach that treats old growth trees as if they are just routine objects.

As stated before, old growth experts are also capable of using old growth physical features to estimate ages of old growth trees with considerable accuracy, often to within 10% margin of error. This is based upon many years of experience, and is applied on a species-specific basis. However, the specific age estimates for individual trees is still above and beyond the more basic conclusion as to whether the tree (or forest in general) is old growth or not. Regarding the specific age estimates for the old growth trees in the Heritage Maple Grove, this investigator stands by their accuracy. If there were any minor inaccuracy in the age estimates of any individual trees, their old growth features ensure they are all 150 years or older. Therefore, the identification of the Grove as old growth remains unchanged.

The real and vital question is not whether there is any variation in the exact age of the trees that comprise the Grove. This is actually irrelevant to the most critical issue: since there is overwhelming evidence that the Heritage Maple Grove is old growth, the focus should be on getting it protected. Such a rarity with major heritage value is obviously far more important than the esoteric, overly technical focus on the exact ages of specific trees that has been raised by one or two people in the Guelph community.

Non-Invasive Techniques to Obtain Annual Ring Counts to Measure Tree Ages

Fortunately, there are alternative, non-invasive ways to measure tree ages for the purposes of identifying or confirming the old growth status of a forest. The data obtained from these methods, combined with the use of the numerous old growth physical features previously discussed, ensures extreme reliability whether or not a forest is old growth, as well as additional data on the typical age classes that the most common trees fall into (in other words, which old growth trees most likely fall into the 150-200 year age class, 200-300 year class, etc.).

1) Annual Ring Counts Obtained From Fallen and Broken Trees

Tree trunks which have fallen or broken recently frequently reveal easily countable annual rings. This enables one to obtain age measurements that can be more accurate than a tree coring. Some trees fall and break into sections, that is, logs, with annual rings exposed at either end. Other trees may break a short distance above their base, leaving a jagged stump, with annual rings that are also easy to count.

Old growth forest sites, especially those of larger acreages, often have a significant number of such age-revealing stumps and logs of a variety of tree species. In the case of the Heritage Maple Grove, because of its small acreage, it coincidentally provided only one sample of a "broken tree trunk" with visible annual rings. In the case of the 100-acre Central Cedar Woodland north of Laird Road, 16 age measurements were obtained from fallen and broken trees for 4 species.

2) Stumps and Logs From Previous Cutting

When trees are cut by humans, the age rings on their trunk cross sections are clearly revealed and easily counted. Although old growth forests typically have had minimal tree cutting in their history, nevertheless, trees sometimes fall across trails. When this occurs, they must be cut to clear them away. On properties with trail systems through old growth forests, a significant number of such logs provide another non-invasive source of tree age data. Though no trails exist in the Maple Grove, a large, lower bough or secondary trunk of a Black Cherry (Prunus serotina) along the roadside margin of the Grove was cut in the past. The tree did not display any old growth features. The annual ring count of its cut portion confirmed that it was not old growth (though it grew more slowly and was therefore older than expected).

Exact Tree Age Measurements Are Not Required to Identify if a Site is Old Growth

As explained earlier, in order to identify and confirm if a woodland site is old growth, one must first determine if its meets the minimum 150 year age threshold (part of the old growth definition). Therefore, it is only critical to determine if the predominant age of the major trees is greater than 150 years (old growth), or less than 150 years (mature forest, but not old growth).

Exact measurements of tree ages, as obtained by invasive tree coring, are not necessary since a 185 year old tree, a 250 year old tree, and a 225 year old tree all exceed the 150 year threshold, and are therefore old growth trees. Furthermore, measuring the ages of every tree or most trees by tree coring is not feasible, not always permissible, or even unethical.

On the other hand, one can reliably identify if a tree is or is not old growth by whether it possesses any old growth physical features. This does not require determining its exact age, since this method simply enables one to distinguish if it is old growth or not. When numerous trees are evaluated using this method, combined with any physical features of the forest habitat that are also recognized as old growth indicators, one can identify if the forest as a whole is old growth.

Old growth experts are also capable of using the old growth physical features to estimate ages of old growth trees to estimate with considerable accuracy, often to within 10% margin of error. This is based upon many years of experience, and is applied on a species-specific basis. However, the specific age estimates for individual trees is still above and beyond the more basic conclusion as to whether the tree (or forest in general) is old growth or not.

Regarding the specific age estimates for the old growth trees in the Heritage Maple Grove, this investigator stands by their accuracy. If there were any minor inaccuracy in the age estimates of any individual trees, their old growth features ensure they are all 150 years or older. Therefore, the identification of the Grove as old growth remains unchanged.

The real and vital question is not whether there is any variation in the exact age of the trees that comprise the Grove. This is actually irrelevant to the most critical issue: since there is overwhelming evidence that the Heritage Maple Grove is old growth, the focus should be on getting it protected. Such a rarity with major heritage value is obviously far more important than the esoteric, overly technical focus on the exact ages of specific trees that has been raised by one or two people in the Guelph community.

APPENDIX 2: PHYSICAL FEATURES USED TO IDENTIFY OLD GROWTH

Note: old growth features recorded in the Maple Grove are marked in bold italics

A. Highly Confident Old Growth Features

The presence of these old growth features are almost certain indicators that a tree or forest is old growth.

GROUP 1 –

1. Old Growth Bark ("Antique Bark") When trees reach 150 years old, the bark changes on most species, which looks very different from bark of younger trees
    - balding, shaggy bark, deeply ridged and grooved; large plates
    - Trees that display this: pines, maples, birches, oaks, tulip tree, sycamore, black gum, cottonwood, black cherry, ashes, hickories, sassafras, walnut, basswood, flowering dogwood, cucumber magnolia. Hemlocks get rusty-hued
2. Staghorn-shaped Crown Branches
    - Thick trunk ends in horizontally radiating short, craggy boughs bent at right angles - caused by centuries of damage and healing from ice and wind storms, lightning
3. Large Diameter Trunks (30+ inches diameter)
    - Several "Big-Trees" per acre, preferably 8 or more per acre, are an excellent indicator. Most common "Big-Tree" species: oaks, maples, hemlock, pines, hemlock, ash, birch, beech, basswood, walnut, sycamore, black cherry
    - The Big-Tree Rule does NOT apply to fast growing trees that rarely grow in Old Growth Forests: willows, aspens, cottonwood, paper and gray birch, black walnut
    - Lack of Big-Trees does NOT mean "not old growth." Small-tree Old Growth is found in harsh environments such as rocky slopes, hill-tops, cliffs, wetlands, sand dunes, alvars
4. Bizarre Growth Forms
    - gnarled and contorted branches
    - thick, leaning trunks
5. Presence of Commercially Valuable Tree Species of Moderate to Large Size
    - Include medium to large black walnut, cedars, black cherry, white pine – excellent sign!
6. Growth of Old Growth-Dependent Lichen Species
    - 50+ species recorded to date on branches
7. Cliff-Dwelling Trees - Cedars, certain Pine and Birch species, Hemlock, Hop-hornbeam
    - moderate size growing out of narrow cracks or on ledges with no soil accumulation
    - bizarre growth forms, such as extremely contorted trunk and branches
    - trees growing out of cliff faces or cliff rims with upside-down shape of trunk

B. Moderately Confident Old Growth Features

Several other old growth features are less confident indicators that a tree or forest is old growth. But they provide a confident conclusion of old growth when several of the features exist together on the same tree, or on many trees in the same forest.

8. Flared or Swollen Trunk Bases
9. Tall, Branchless Trunks (with or without large diameter)
    - Lowest bough starts at 25 to 40 feet up, or even as high as 60 to 90 feet!
10. Hollow Trees are relatively common
11. Abundance of Long-lived or Shade-tolerant Trees
    - Best indicators are hemlock, sugar maple; white, bur , swamp, chinkapin, and red oaks; yellow and black birch, tulip tree, beech, black gum, white cedar, white ash, walnut, hop-hornbeam
    - Trees that indicate it is NOT old growth (if numerous): willows, aspens, cottonwood, paper and gray birch, sumac, black locust
12. Moss Growth Up the Trunk – Applies only to moss growth that extends up the trunk one meter and higher.
    - The higher up a trunk that moss grows, the more confident that the tree is of great age. Reason: moss grows very slowly, and starts growing from the base (in our region – does not apply on upper hill elevations, shorelines, deep ravines, swamps). Best moss-growers: yellow birch, sugar maple, ashes, cucumber magnolia, white oak. Do not get moss mixed up with lichens, which can be light green
13. Spiral Grain Around the Trunk
14. Growth of Large Burls
15. Bizarre Growth Forms - the older some trees get, the more likely they are to develop bizarre shapes.
    - fused or intertwined trunks, sometimes of different tree species
    - fused branches, sometimes forming "windows"
    - trunks growing on thick "stilt-roots" (hemlock, yellow birch)
    - misshapen" trunks often described as gnarly, knobby, picturesque, charismatic

- trunks grow leaning at an angle ("Leaners"), or their trunks sharply change direction ("Zigzag trunks")
- harsh growing conditions prevent trees from growing to normal size (Dwarf Trees) and/or they develop shapes that deserves them to be nicknamed "Bonsai" Trees. These grow on cliffs or mountain summits, bogs, swamps, sand dunes, alvars.
- ancient trees associated with cliffs and talus slopes attain fantastic shapes, designated by nicknames such as "Daredevil" trees (trunks project horizontally out over cliffs, as much as 40 feet out), "Upside-down" Trees (trunks hang down cliffs), "Root Ladder" trees. These are primarily cedars, hemlock, yellow and black birch, hop-hornbeam, pitch pine

GROUP 2 - Old Growth Features of the General Forest, not on Specific Trees

Note that the absence of old growth features of the general forest structure does NOT mean a site is not old growth.

16. Many Large Logs in Different Stages of Decay
    - Created by large standing trees that fall here and there over a long period of time, with the older logs reaching greater stages of decay. In contrast, logging (actually "de-logging") in the past removes large trees that would otherwise contribute to the supply of older logs. Absence of logs, however, does not always imply anything.

17. Pit and Mound Shapes – this feature may shift into Group 1 if individual old growth trees are growing on top of these mounds.
    - Depressions and mounds, 2 to 5 foot deep and high, are only caused by toppling of large trees in the long-ago past, which then decayed away to leave "grave monuments" as reminders they were there. If large trees grow on pits-and-mounds, it ensures a continuous time period of many centuries that large trees have made up this forest.
    - Past logging eliminates big trees (that can create pit-and-mounds), and agriculture flattens out pit-and-mounds. Absence of pit-and-mounds, however, does not mean much.

18. Abundant and Diverse Populations of Fungi/ Mushrooms, Lichens, Mosses, and Ferns.
    - Old Growth Forests are the best place to find the most mushrooms, lichens, and primitive plants. Reason: large, continuous supplies of decaying logs; thick carpets of decaying leaves and rich organic soil; millennia of relatively stable conditions for soil colonies of fungi to grow undisturbed, and no shocks from the introduction of bright light or drying conditions caused by logging or natural disasters. 51 species of lichen grow only in Old Growth Forests. However, scarce fungi, moss or ferns does not imply much.

(GROUP 2 - Old Growth Features of the General Forest, not on Specific Trees) continued ...

19. Multiple Layers of Vegetation Clearly Developed Below the Canopy Layer
    - The 3 lower layers are herbaceous, shrub and understory layers
    - A "supercanopy" layer can also form, made typically of white pines that tower over the rest of the forest canopy. These are usually a highly confident old growth feature

20. Extensive Growth of Certain Herbaceous (Wildflower) Species That Are Intolerant of Disturbance and Require Stable, Shaded, Moist Forest Conditions

21. Forest Structure Characterized by Wide Variety of Tree Sizes and Tree Ages, as well as Canopy Gaps due to natural tree falls of large trees (does not apply to certain old growth pine and hemlock stands)

22. Scattered, Dead Standing Trees (Snags)

23. Major Accumulations of Fallen Woody Material (branches and leaves on Forest Floor) (technically called "coarse woody debris)

C. Negative Indicators

A few, scattered stumps or minor signs of the above disturbance-indicators does NOT rule out an Old Growth Forest. It just indicates that it had some past disturbance. But if disturbance-indicators are extensive or frequent enough (and Old-Growth Indicators are rare or absent), these general forest features lead to the conclusion that a site is NOT old growth.

1. Numerous Stumps

2. Logging Road Corridors through the woods

3. Open-Grown Trees with branches that start 5 to 15 feet from the ground, spreading horizontally out (indicating the trees started in a sun-lit field or clearcut).
    - does not apply to Savannah-grown Trees, or trees whose form indicates they once grew in a Savannah community that has since disappeared and been replaced by new forest growth

4. Abundance or Significant Proportion of Tree Species That Typify "Earlier Succession" Stages and Young and Disturbed Forests
    - these all require sunlight and disappear when shaded out by shade-tolerant trees as they

grow up, around and over the earlier successional vegetation

- examples are aspens, black locust, white and gray birch, Manitoba maple (ash-leaf maple or box-elder), willows, hawthorns, Norway maple

5. Presence of Planted Trees or a Significant Number of Non-native Trees

- presence of planted or non-native trees, such as Norway spruce, Scotch or Austrian pine, native white and red pines, larches, tree of heaven (ailaanthus), Norway maple, black locust.

6. Significant Proportion of Multi-trunked ("Coppiced") Trees, indicating logging at some time in the past

- when certain trees are cut, they sprout from the stump, developing two to several trunks from the same base. Examples: red and black oak, red maple, birches, tulip tree (tulip poplar)

7. Old Stone Walls Running Through the Forest

APENDIX 3: ANCIENT FORESTS - THEIR UNIQUE VALUES AND BENEFITS

- They contain the oldest, tallest and largest living things, attributes worthy in their own right
- They are a unique scientific, research and educational resource. They provide pristine outdoor laboratories where natural process can be studied and taught, free of the conflicts of human disturbance. They are among the only places for us to learn what the maximum longevity, height, and size that trees can attain, and where to find and study the rarest species.
- They provide habitats for numerous rare and endangered animals and plants, many of which have few other places to live. In eastern North America, there are 56 species of wildlife that prefer, or thrive best in, very mature or old growth forests. They are the home for the highest proportion of threatened and rare species. At least 60 species of plants are found nowhere else except in Eastern ancient forests.
- They serve as irreplaceable genetic banks, saving examples of life forms that may have value for the future because their genes enabled them to survive under severe conditions and to achieve great longevity, or the greatest height or size; or are examples of genetic attributes from past ages, still surviving in our times.
- They are living historic monuments since they preserve the original landscape. They are the only place where you can see (and walk through!) the last surviving landscapes of the pre-European era when only Native People lived here. They are part of our irreplaceable legacy.
- They are a source of enduring beauty and aesthetics, and are sought after as a source or model for art, photography, poetry and literature. Ancient Forests are one of the top five most admired Nature scenes, according to national surveys of the public. Old Growth Forests are one of the most popular nature scenes to appear on calendars, post cards, and photographs.
- Their forest cathedral settings and hushed primeval forest create places for inspiration and communing with the Creator. They teach lessons of wisdom about recycling, life and death, symbiosis, timelessness and the Eternal. They are indeed majestic examples of the "Lord's Creation."
- They provide pristine places for people to renew themselves and receive therapeutic benefits by getting away from the stresses of daily life
- They can benefit the local or tourism economy. Large and ancient trees are always rated at the top of the list of admired natural features by the tourism public. Because they are so highly valued, people will spend money to visit them. By protecting and publicizing our local old growth forests, local communities can benefit financially, and can enhance their reputation. (Possessing a primeval forest is a "classy" asset to showcase.)

Some foresters dismiss Old-Growth Forest, claiming they have no economic value while uncut, or they call them "wasted timber." Wood products are not the only economic value of magnificent and primeval forests. Ancient forest possesses economic value in the uncut, unmanaged condition, as a permanent, long-term tourist and recreation-business resource. Cutting down "Heritage Forest" or Historic or Champion Trees for the short-term profit is a skewed and destructive way to treat an irreplaceable treasure.

APPENDIX 4: MYTHS AND MISCONCEPTIONS ABOUT OLD GROWTH FORESTS

Myth #1: "Forests, including Old Growth Forests, 'need management' to remain healthy." Variations of this myth are that "Old Growth Forests will break up or fall down if not managed." The great forests of eastern North America were described in terms of awe by the first Europeans who explored or wrote about the New World. They didn't get that way because humans 'managed' them. The Old Growth Forests that survive today are simply survivors of those "great forests." Trees in these forests often attain ages of 300 to 450 years old (even older for some species). Trees that are several centuries old (and only part way toward their maximum longevity) cannot be generalized as "unhealthy," or they would not have gotten that far. Many types of Old Growth Forest are self-perpetuating (climax), a statement that they maintain themselves on their own, long before Europeans arrived, and will not break up (except due to disasters or human-introduced problems).

While many big-tree pine forests that started due to long-ago fires or blowdowns may gradually change to a hardwood forest, logging under the guise of "management" introduces unnatural damage and parasites due to logging roads. Further, removal of trees destructively prevents the future recycled biomass from providing soil nutrients needed to grow more 'big-trees' (and dens for cavity nesters and other specialized wildlife, also organic-soil seedlings, wildflowers). "Prescribed burns" or thinning (but not removal) of younger, invading hardwoods is an acceptable 'natural area' management in specialized cases where humans have disrupted the natural cycles.

Myth #2: "You can't tell if a tree is Old Growth without coring it." Those who believe that you cannot closely estimate the age of a tree, without invasively drilling an increment borer into it, are simply not up to date in the latest forest research. After decades of researching the wide range of physical features (on bark, trunk, upper boughs) that develop almost only on Old Growth trees, one can confidently identify if a tree is Old Growth or not, and specialists can closely estimate many tree's ages. Annual ring counts of recently fallen trees provide useful supplemental data also.

Myth #3: "Old Growth Forests contain many unhealthy trees, compared to younger and managed forests, which have healthy and vigourous trees." People who see forests primarily from a wood products and economic perspective label Old Growth Forests as "decadent" or "over-mature." These are terms defined strictly according to the financial value of trees as wood products, such as being past the financially ideal "mature" age to provide the best wood product. Towering trees or trees of great antiquity can not be considered "decadent" any more than historic landmark buildings, or archeological sites. A related myth is that "A hollow tree is a sign of poor health; since Old Growth trees are often hollow, they are unhealthy." All ancient Redwoods and 2000 year old Western Red Cedars are hollow (as are our greatest eastern Old Growth trees), but they are not considered unhealthy, far from it! In fact, hollowness can strengthen the structure of tree trunk as often as it might make it more unstable, because of laws of physics (and depending on how thin or thick the remaining trunk is, how close to the ground the hollowness reaches, and what species of tree it is).

Myth #4: "Old Growth Forests don't provide any economic or financial benefits." This is simply not true, except that they don't yield wood products. The most impressive Old Growth Forests can however, benefit the local or tourism economy. Large and ancient trees are always rated at the top of the list of admired natural features by the tourism public. Because they are so highly valued, people will spend money to visit them; examples: Haliburton Forest, Backus Woods, Temagami, Great Smokies, Redwoods, Cook Forest (PA). By growing the oldest, tallest and largest living things, protecting them benefits the wood industry by preserving their genetic banks for future use to provide seeds with improved long-term longevity, resistance and size. Other benefits include heritage, wildlife (espec. rare and endangered species), inspirational, scientific, educational, artistic, and recreation (such as birding, hunting of certain game species) benefits.

Myth #5: Old Growth Forests are poor habitat for wildlife or game, or are low in bio-diversity." Another widely believed myth, Ancient Forests provide ideal habitat for the greatest number of rare and endangered wildlife species of any forest type. Whether rare or not, more than 70 wildlife species require/prefer Old Growth or very mature forests for part or all of their life cycle. More than 90 species of wildflowers, ferns, shrubs, and trees also thrive best in Old Growth or undisturbed mature or very mature forests. Even some game species (some examples: bear, bobcat, wood duck) benefit from Old Growth or very mature or undisturbed forest habitat.

Myth #6: “All of the original Old Growth Forests of southern Ontario (and eastern North America) were cut down.” Variations of this myth include beliefs like “This entire county was clear-cut.” While only a fraction of one per cent of Old Growth survives in southern Ontario and Eastern U.S., southern Ontario's Old Growth sites are expected to total more than 200 when surveys are ultimately completed. Almost 70 sites are documented in Niagara Peninsula alone. Impressive Old Growth has already been discovered in the Windsor area, even though it is only 4 % forested!

Myth #7: “Old Growth Forests are comprised of large trees (referred to as ‘big-tree forests’).” While many Old Growth Forests contain impressive trees, trees do not have to be large to be Old Growth. In fact, some of the oldest eastern forests are dwarf forests near timber line, boulder slopes, cliffs, dunes, and wetlands. Some Old Growth growing on very shallow soil over flat bedrock contain only medium-size trees that are hard to recognize as ancient except to specialists.

Myth #8: “A forest must be “virgin” to meet the definition of “Old Growth.” "Virgin" Forest is a type of Old Growth that has never had <u>any</u> logging or other intentional human disturbance. But most Old Growth has had some minor or early cutting in its history, though not enough to eliminate a significant proportion of Old Growth trees. This long-held, unfortunate myth, believed by "old-school" scientists, foresters, and government staff, has prevented many valuable Old Growth Forests from being recognized as worthy for protection. This is because at least 99 % of Old Growth is not "virgin." Virgin Old Growth is the "rarest of the rare" and is almost never found. A related myth is that “A forest must be “climax” (reached the climax stage of forest succession) to meet the definition of “Old Growth.” Hemlock-Maple-Beech forests, and Carolinian forests, are typical climax forests that become Old Growth. But Old Growth White and Red Pine Forests are not climax forests, though their gradual change can take centuries if the originating windstorm or fire is not repeated.

Myth #9: “Old Growth Forests are a waste of good timber, if not harvested.” Since Old Growth Forests comprise only a fraction of one per cent of total forests (and still disappearing), logging them (and the species that depend on them) simply pushes them closer to extinction. This is no different than shooting Bald Eagles for their feathers. For those that view forests <u>solely</u> for their economic value as wood products, or as 'fiber crops,' no justification for protecting Old Growth is possible. But Old Growth provides 10 benefits and values (including economic) (see Myth #4) that cannot be provided by younger or heavily managed forests. With the tallest, largest and oldest living forms, cutting down “Heritage Forests” or Champion Trees for their financial value is an unwise way to treat an irreplaceable treasure.

Myth #10: “Small Old Growth groves have no ecological value and therefore are not worthy of protection.” Depending upon the person who believes this serious misconception, the minimum size often cited is 20 to 40 acres. This myth has also led to the 'de-valuing' of worthy Old Growth groves (1 to 40 acres), weakening efforts to gain protection for them. The 'ecological value' referred to above describes the need for forests to cover larger areas in order that all natural process and ecological cycles are ensured over the long term. But there are many other types of values and benefits that smaller Old Growth tracts provide, and those who restrict themselves to only one of them (as in this case), simply are blinded to those other values. These include wildlife, historical, genetic banks, inspirational, and others previously cited.

UPDATED ANALYSIS:

Impacts of the Proposed Berm

Based on updated information about the dimensions of the proposed berm obtained since the preliminary draft of this report was written, the impacts of this berm have been re-analyzed. Figure 6, "Impact of Proposed Hanlon Creek Business Park on Heritage Business Park," as submitted in the preliminary draft, was based on assumed dimensions for the berm which reflected figures from other similar projects this investigator has encountered. Those impact statistics and drawings printed on Figure 6 and in the preliminary draft report's text should be replaced by the updated analysis provided ahead.

Using the "Hanlon Creek Business Park Proposed Zoning" Map produced by the GSP Group consultants for their environmental report (2005), I carefully measured the width of the proposed berm. The text of the report did not specifically mention the actual width of the berm, so the map was used to determine its width, based on the 1:12,500 map scale printed on the map. The berm was exactly 1 mm. wide on the map, which would result in an actual width of 12.5 meters wide when constructed.

The area of the forest that would have to be destroyed would have to be wider than this, however, since earth-moving vehicles would need access along both sides of the berm in order to construct it. A reasonable figure, based on my actual experience with past similar projects, is that a corridor of approximately 5 meters on each side of the berm zone would be required to construct the berm. Thus, 2 x 5 meters = 10 meters plus the actual berm corridor of 12.5 meters totals 22.5 meters. The length of the berm, which would extend from the southwest margin to the southeast margin of the grove, is approximately 160 meters.

This calculates out to approximately 0.37 hectare/0.9 acre, or a total of about 26%, of the Heritage Maple Grove that would be destroyed by construction of the berm. This would destroy 5 to 7 of the old growth trees. Among these killed trees is the Heritage Hop-hornbeam. The berm construction would also likely damage the root systems of 3 more old growth trees, which could shorten their lifespan. As stated previously, the Grove and the hills that it grows on would serve as an even better noise and visual buffer than an artificial berm. This would be true even though coniferous vegetation is planned to be planted on the berm. This is because the forest grove occupies a much wider buffer, even though it is deciduous. Furthermore, the hill knolls provide a notably taller natural (and free) berm (mostly 3 to 6 meters above the road) than the expensive proposed 2-meter high berm. Lastly, any planted vegetation will take a decade or two to grow to the size that would be sufficient to become effective visual and noise buffers.