Bowens Creek Lands

Management Plan

St. Clair Region Conservation Authority

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1.0 Introduction

For more than 15 years, St. Clair Region Conservation Authority and the County of Lambton have had a very successful partnership for the maintenance and development of the Perch Creek Habitat Management Area (HMA) and Marthaville HMA. In 2008, the County renewed contracts for maintenance of these two properties and added additional properties to be managed by the Authority, including the Bowens Creek Lands.

The Bowens Creek Lands management plan (10 year operational plan) was initially written to act as an appendix to the master agreement. The management plan provides direction to the Authority for the management of the property, as well as providing a guide for the costs associated with the required management including opportunities for revenues directly from the management or from potential grant sources.

In order to develop specific management recommendations, properties managed by the Authority are divided into subunits known as Vegetation Management Units (VMUs). Generally, each VMU is composed of a certain plant community, habitat, and/or landuse. If relevant, forest inventories are conducted and a basic description of the history, soil type, herbaceous plants, wildlife features of each VMU are provided. This information is used to develop recommendations for each VMU individually and for the Management Area as a whole.

The key recommendations for the management of Bowens Creek Lands, for the next ten years are as follow:

1. Management activities planned over the next 10 years are intended to enhance habitat at the site while continuing to provide some revenue from the agricultural portion of the property. It is likely that agricultural leases will eventually be replaced with naturalization projects.

2. Invasive species need to be monitored and a control plan developed for each.

3. Several rare species (some are SAR) have been identified either growing on or using the property. Their populations should be maintained or increased. Habitat enhancement projects (e.g. hibernacula) for relocated Butler's Garter Snakes should be researched.

4. Most of the tree planting on the site is completed unless (a) more agricultural land is converted to forest or (b) existing plantations experience significant mortality and require refills. There are four VMUs where planting should be considered – 7, 8, 11 and 13. This is a total of about 6 hectares (15 acres) of which 1 hectare is currently leased for Agriculture.

5. Trails can and should be created for inspections and management. They should be blocked at the access with gates.

6. There are currently no authorized recreation trails on the properties and there does not appear to be any reason to develop them over the next ten years.

7. Hydro One maintains high voltage and normal transmission lines on the properties. They should be contacted and a permanent liaison set up so that their maintenance activities are not counter-productive to plans and management by SCRCA/County.

2.0 Property Location and Description

Bowens Creek Lands are located in St. Clair Township to the east and west of the St. Clair Parkway between Oil Springs Line and Bickford Line on Lots 4, 5, 6, 10 & 11, Front Concession of the geographical Township of Moore (Map 1). Bowens is divided into two separate parcels. The southern parcel is made up of parts of lots 4, 5 and 6 (71.9 hectares), while the northern parcel includes parts of lots 10 and 11 (73.6 hectares). A railroad/hydro transmission corridor runs north to south across both parcels. A high-pressure liquid petroleum pipeline corridor crosses the north end of lot 11 from west to east.

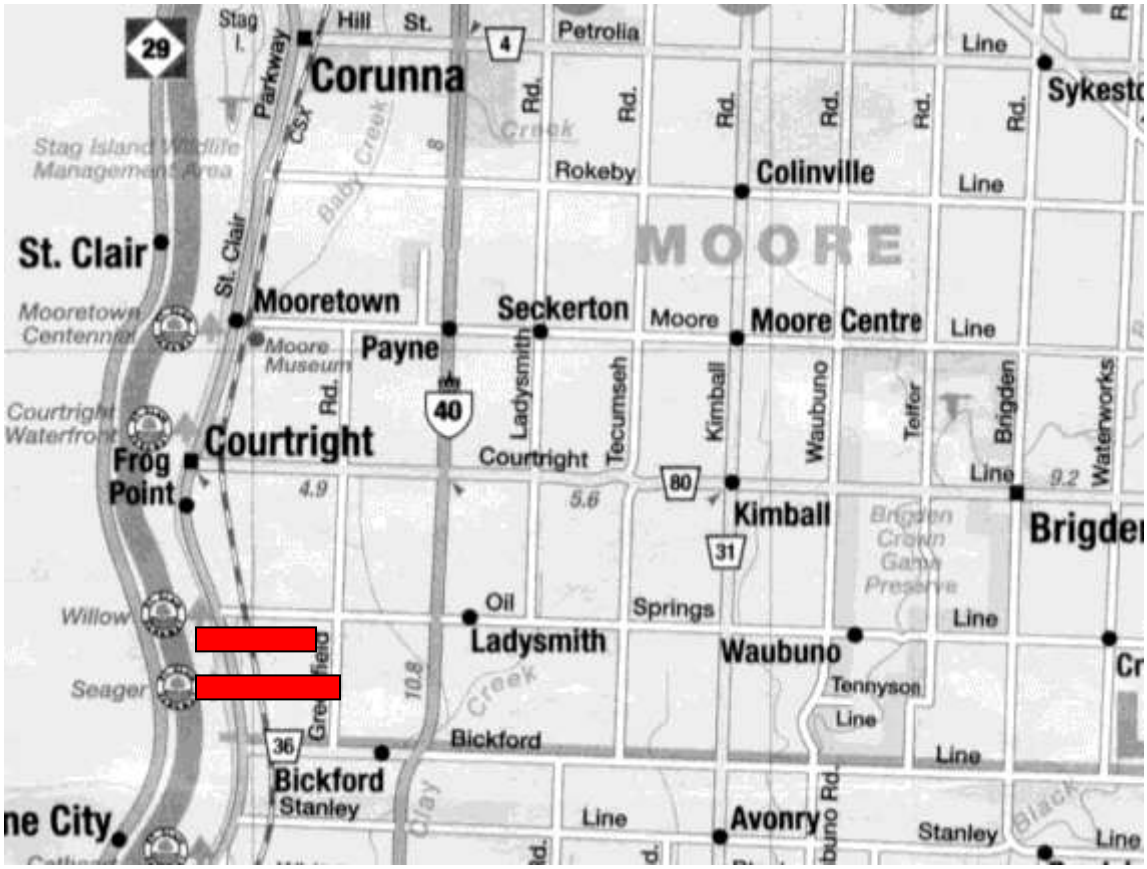
Map 2 shows the VMUs of Bowens Creek Lands (146 hectares in total). Bowens consists of 54.4 hectares in agricultural lease (VMUs 1, 2, 3, and 7), 26.4 hectares of naturalized land (VMUs 4, 6, 8 and 13), and a remaining 64.8 hectares of natural forest or natural regeneration of trees and shrubs with a few open areas (VMUs 5, 9, 10, 11, 12, 14, 15).

2.1 History of Bowens Creek Lands

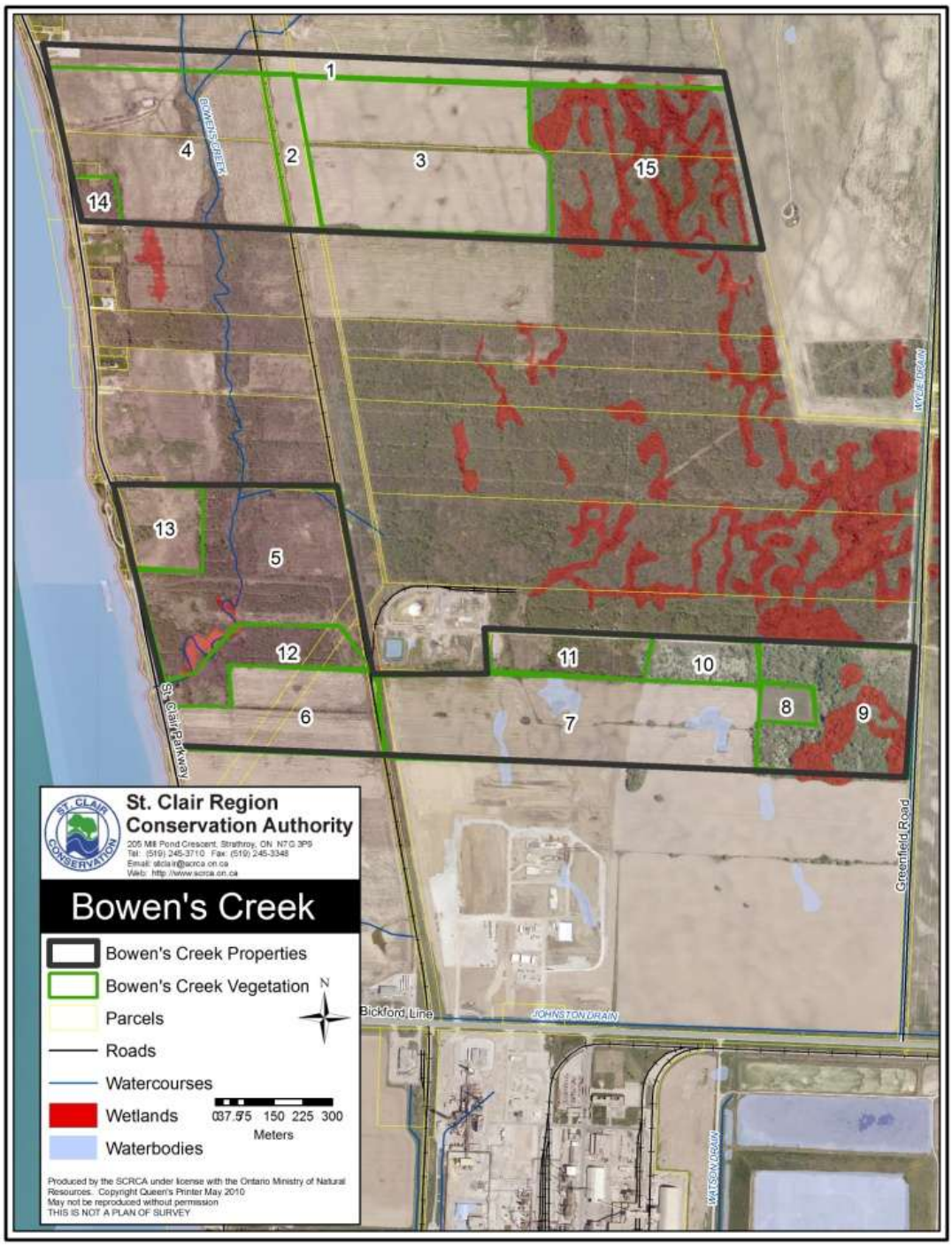
Aerial photographs from 1962 show very little forest on the property. Much of VMU 15 was wetland forest, but most of the western third of this unit was open pasture. Almost all of VMUs 5, 10, 11, 12, and 13, were used for agricultural production. There were some large trees in VMU 9, but it was more wooded pasture than forest.

The Bowens Creek Lands were acquired by the County of Lambton from the Monsanto Corporation during the 1990s. Most of the upland portions of the site which were used for agriculture when the county acquired the property remained in that use until 2001. It was decided to retain the land west of the railroad tracks for future public use and to keep the lands east of the tracks for future industrial development. The agricultural land west of the tracks was planted to trees and shrubs between 2001 and 2006. The pipeline area in the north end lot 11 (VMU 1) and the hydro corridor along the east side of the railroad (VMU 2), are currently leased for agriculture. Growing trees on either of these sections is impractical, so continued agriculture production is recommended for as long as the pipeline and hydro corridors exist. On lots 9 and 10, the Bowens Creek Drain was cleaned out under the Drainage Act in 2006.

Land not leased for agriculture is being maintained as a natural area with a focus on encouraging growth of the trees and shrubs in upland areas to expand local natural habitat. For the next 10 years there seems to be no reason to create trails on the property nor to open it up for public use. After the plantations and some of the natural regeneration areas begin to mature it may be worthwhile laying out trails for birdwatchers and hikers.



Map 1. Location of Bowens Creek Lands



Map 2. Bowens Creek Lands Vegetation Management Units (VMUs)

2.2 Species at Risk / Provincially Rare Plants

Fifteen locally rare species are found on Bowens Creek lands (Table 1). Four of these species are considered to be "Species at Risk" (SAR): Riddell's goldenrod or *Oligoneuron riddellii* (synonym *Solidago riddellii)* ("Special Concern" nationally and provincially), Shumard oak or *Quercus shumardii* ("Special Concern" nationally and provincially), Hooded Warbler or *Wilsonia citrine* or ("Threatened" nationally, "Special Concern" provincially) and climbing prairie rose or *Rosa setigera* ("Special Concern" nationally and provincially). These species have protection under the Species at Risk Act (SARA) and the Endangered Species Act (ESA).

These SAR each have unique habitat requirements (Table 2). The SAR at Bowens have different and sometimes conflicting habitat requirements, the expansion of habitat that is good for one SAR can be detrimental to another.

In Ontario, the Hooded Warbler breeds in the interiors of large upland tracts of mature deciduous and mixed forest, and in ravines. It selects habitats in which small openings in the forest canopy have permitted a dense growth of low understory shrubs, and it abandons areas once the vegetation becomes too thin or too tall. Jon McCracken, jmccracken@birdscanada.org, at Bird Studies Canada (BSC) should be consulted regarding logging practices before any harvest of VMUs where Hooded Warbler has been located (i.e., VMU 15). BSC generally recommends logging to create gaps no larger than 300 -1,000 meters. A permit from the Ministry of Natural Resources may be required for any logging activity.

In contrast, Riddel's goldenrod grows in wet prairie, and several populations persist along railways. Railway right-of-ways can be favourable sites for prairie species such as Riddell's goldenrod, perhaps because they have not been cultivated. Also, mowing and brush cutting by railway maintenance crews, and fires sparked by trains, have helped keep this habitat open. The Shumard oak, which is moderately shade tolerant, prefers to grow in moist soils, and can grow close to water and in swampy areas. Climbing Prairie Rose colonizes old fields and is a member of the early successional community.

Bowens Creek has been proposed as a location for re-located Butler's Garter Snakes (Threatened provincially and nationally) from a development site in Point Edward. Like Riddels's goldenrod, these snakes prefer open habitats, such as dense grasslands and old fields. Butler's Garter Snakes also require small marshes and seasonal wet areas and where they feed on leeches and earthworms. The most preferable VMUs for this are VMU 13 and a portion of VMU 5. Ron Gould, ron.gould@ontario.ca, at the Ministry of Natural Resources should be consulted regarding management of Butler's Garter Snake.

Table 1. Provincially Rare Species Previously Recorded for the Bowens Creek Property

Common Name	**Scientific Name**		**Location**
	Genus	Species	(VMU)
Tickseed sunflower	*Bidens*	*coronata*	15
Cuckoo flower	*Cardamine pratensis*	*ssp. angustifolia*	15
Eastern narrowleaf sedge	*Carex*	*amphibole*	15
Slender looseflower Sedge	*Carex*	*gracilescens,*	15
Pignut hickory	*Carya*	*glabra*	14
Giant shellbark hickory	*Carya*	*lacinosa*	15
Pumpkin ash	*Fraxinus*	*profunda*	15
Spring avens	*Geum*	*vernum*	14
Stalked water horehound	*Lycopus cf.*	*rubellus*	15
***Riddell's goldenrod**	***Oligoneuron***	***riddellii***	**5**
Pin oak	*Quercus*	*palustris*	15
***Shumard oak**	***Quercus***	***shumardii***	**5, 9, 15**
***Climbing prairie rose**	***Rosa***	***setigera***	**15**
Ironweed	*Vernonia*	*missurica*	15
***Hooded Warbler**	***Wilsonia***	***citrine***	**15**

*Ranked either S3 (rare to uncommon in Ontario) or S2 (very rare in Ontario) by the Ministry of Natural Resources
From Jacques Whitford's *Draft Terrestrial Environmental Baseline Report*, 2007

Table 2. Bowens Creek Species at Risk Habitat Requirements

Common Name	**Scientific Name**		**Habitat Requirement**	**Suitable VMU**
	Genus	*Species*		
Riddell's goldenrod	*Oligoneuron*	*riddellii*	wet prairie	1,2, 5,13
Shumard oak	*Quercus*	*shumardii*	moist soils close to water and in swampy areas	5, 8, 9, 10, 11, 12, 15
Hooded Warbler	*Wilsonia*	*citrine*	the interiors of large upland tracts of mature deciduous and mixed forest, and in ravines	15
Butler's Garter Snake	*Thamnophis*	*butleri*	open habitats, such as dense grasslands and old fields	5, 13
Climbing prairie rose	*Rosa*	*setigera*	old fields, early succession	12,13, 15

2.3 Exotic and Invasive Species

Exotic species are those that are not native to Ontario. Invasive species have the ability to compete with and replace native Ontario species in their natural habitats. Eight exotic/invasive species have been identified at Bowens Creek: Invasive Phragmites (*Phragmites australis subsp. Australis*), Northern Catalpa (*Catalpa speciosa*), Black Locust (*Robinia pseudoacacia*), Maiden Grass *(Miscanthus sinensis)*, Emerald Ash Borer (EAB) (*Agrilus planipennis*) Purging and Glossy Buckthorn (*Rhamnus sp.)* and Manitoba Maple (Table 3). Herbicide application or removal with appropriate follow-up re-treatment and spot treatments are recommended for the identified exotic and invasive species at Bowens Creek.

Manitoba Maple is an example of a debatably invasive plant that is not exotic to Canada, but it has greatly extended its range in response to human activities. Manitoba Maple grows in areas well beyond its original area because it grows quickly and seeds itself readily in a variety of disturbed habitats, especially in and around urban centers. In VMU 14, the Manitoba Maple undoubtedly originated from plantings around the building site. Its removal is recommended for this reason.

In some parts of Lambton County, Norway spruce (*Picea abies*) is considered invasive. Despite it being present in the area as a planted species for over a century, there is very little to no regeneration. For this reason, Norway spruce is not treated as an exotic/invasive on Bowens Creek Lands. In fact, Norway spruce provides winter cover on soils (e.g., Caister and Brookston clay) where survival is low for all Ontario native coniferous species except eastern red cedar. Some eastern red cedar was planted for demonstration purposes in VMU 4.

Table 3. Bowens Creek Species Exotic and Invasive Species

Common Name	**Effected VMU**	**Management**
Invasive phragmites (*Phragmites australis subsp. Australis)*	5	Herbicide, re-treatment, and 2-3 year spot treatments
Northern catalpa (*Catalpa speciosa*)	4, 14	Removal
Black locust (*Robinia pseudoacacia*)	4	Removal
Maiden grass (*Miscanthus sinensis*)	6	Herbicide
Purging and glossy buckthorn (*Rhamnus sp.)*	5, 9, 10,11, 14, 15	Removal
Emerald Ash Borer (EAB) *(Agrilus planipennis)*	All VMUs with ash	Leave trees for habitat, unless they are hazardous
European honeysuckle (*Lonicera japonica*)	5, 14	Removal
Manitoba maple (*Acer negundo*)	14	Removal

3.0 Vegetation Management Unit Inventory

Bowens Creek and several adjacent properties were the subject of an intensive study to determine the feasibility of developing a new refinery in the area. A *Draft Terrestrial Environmental Baseline Report*, by Jacques Whitford, was published with limited distribution in 2007. In that report, Bowens Creek Lands were subdivided in to units based on plant and habitat communities using the Ecological Land Classification (ELC) system. For the purposes of property management, land with similar ELC designations was aggregated into 15 larger Vegetative Management Units (VMUs) during field work completed by SCRCA staff in 2008. Classifying the land by VMUs is more practical than using smaller sized ELC designations. Table 4 lists the ELCs which were groups for each VMU.

For the purposes of this report species like white and green ash, red and Shumard Oak and silver and red maple are often lumped together in the inventory for two reasons:

a) Because the species listed together hybridize and some trees have features from both species.
b) When the leaves are on the ground they tell us a species is present but not which tree the leaves belong to. The buds are usually too high to study and therefore are not of any assistance in identifying the tree. For the ashes it may not matter because the EAB is present and kills both species.

Table 4. Comparison of ELC Designation by Ecoplan Limited (2007) and Vegetation Management Units prepared by SCRCA 2008

VMU#	*SCRCA Designation*	*J W #*	*ELC Designation*	*ELC Description*	*SAR and Provincially Rare Species*
1	Pipeline Corridor	None	None	None	None
2	Hydro Corridor	None	None	None	None
3	Agricultural Field	None	None	None	None
4	Deciduous Plantation	042	CUP1-5	Silver maple plantation	None
		022	CUT1	Mineral Cultural Thicket	None
5	Deciduous/ Hawthorn Forest	052	CUT1	Mineral Cultural Thicket	Riddell's goldenrod
		051	FOD2-2	Fresh Oak Hickory Deciduous	Shumard oak
		056	FOD7-4	Black Walnut Lowland Deciduous	None
6	Deciduous Plantation	None	None	None	None
7	Agricultural Crop Field	None	None	None	None
8	Deciduous Plantation	None	None	None	None
9	Wet Deciduous Forest	059	SWD3-2	Silver maple Mineral deciduous Swamp	Shumard oak
		031	CUT1	Mineral Cultural Thicket	None
		058	SWD1-2	Bur Oak Mineral Deciduous Swamp	Shumard oak
		020	FOD7	Moist Lowland Deciduous	Shumard oak, pin oak
		06	CUT1	Cultural Mineral Thicket	None
10	Mature Hawthorn Forest	019	CUT1	Cultural Mineral Thicket	None
11	Old Field Meadow/ Shrub Forest	018	CUM1-1	Moist Old-field Meadow	Pin Oak
12	Old Field Meadow/ Open Hawthorn	053	CUT1 FOD2-2 FOD7-4	Cultural Mineral Thicket Dry – Fresh Oak – Hickory Deciduous Forest Type Fresh Type – Moist Black Walnut Lowland Deciduous Forest Type	None
13	Old Field Meadow/ Plantation	None	None	None	None
14	Deciduous Forest	037	CUT1	Cultural Mineral Thicket	Pignut hickory, spring avens
15	Deciduous Forest/ Wooded Swamp	014	SWD1-1	White Oak Mineral Deciduous Swamp	Giant shellbark hickory, pumpkin ash, stalked water horehound, Shumard oak, pin oak, climbing prairie rose.
		013	FOD9	Moist Oak Maple Hickory	Tickseed sunflower, cuckoo flower, eastern narrowleaf sedge, slender looseflower sedge, giant shellbark hickory, Shumard oak , pin oak, ironweed
		011	SWD3-2	Silver Maple Mineral Deciduous Swamp	Shumard oak

JW = Jacques Whitford an author of Terrestrial Technical Study Report for portion of Bowens Creek Lands.

VMU 1. Pipeline Corridor

ELC Designations	None
Area	8.6 hectares
SAR/ Provincially Rare Plants	None (Ecoplan Limited, 2007)
Soils	Brookston clay
Drainage	Imperfect with artificial drainage to improve agricultural productivity
Ten Year Management	This unit is currently part of the agricultural lease. If possible it should be naturalized. The possibility of planting grasses/forbs, shrubs or trees should be explored.

VMU 2. High Voltage Power Transmission Corridor

ELC Designations	None
Area	3.3 hectares
SAR/ Provincially Rare Plants	None (Ecoplan Limited, 2007).
Soils	Brookston clay
Drainage	Imperfect with artificial drainage to improve agricultural productivity.
Ten Year Management	This unit is currently part of the agricultural lease. If possible it should be naturalized. The possibility of planting herbaceous plants or shrubs should be explored. Hydro One maintains high voltage and normal transmission lines on the properties. They should be contacted and a permanent liaison set up so that their maintenance activities are not counter-productive to plans and management by SCRCA and Lambton County.

VMU 3. Agricultural Field

ELC	None

Designations

Area	23.1 hectares
SAR/ Provincially Rare Plants	None (Ecoplan Limited, 2007)
Soils	Brookston clay
Drainage	Imperfect with artificial drainage to improve agricultural productivity
Ten Year Management	This field is part of an agricultural lease. The possibility of finding appropriate funding and planting to forest should be explored. Since the field is large, planting would be a multi-year project. A three year phased planting, progressing from the south of the property to the north, (reducing agricultural land by about one third at a time), would allow the unplanted sections to continue to be farmed until the resources for planting became available. It is possible that wetlands could be created in natural depressions, thereby supplementing local waterfowl habitat.

VMU 4. Deciduous Plantation

ELC Designations CUP1-5 Silver Maple Plantation, CUT1 Mineral Cultural Thicket (Ecoplan Limited, 2007)

Area 19.9 hectares

SAR/ Provincially Rare Plants None (Ecoplan Limited, 2007)

Soils Caister clay

Drainage Good to poor

History Prior to 2001 this VMU was three crop fields rented to an agricultural tenant. The area was planted in three stages 2001, 2002 and 2004. A total of about 30,000 seedling trees and shrubs were planted. Some have died but other "volunteers" have seeded in from neighboring trees and shrubs. Many species suffered from deer browsing but most are now tall enough that browsing is not an issue. There was a lot of volunteer cottonwood and black locust in the northwest plantation (2004). The plantings were funded in part by the Great Lakes Sustainability Fund. It was noted that this is the only authority-managed property where catalpa is regenerating. It is regenerating in this VMU as well as VMU 14 where the seed trees are located.

Species Composition

Species	***%***	***Height (m)***	***Condition***
Green and white ash	35	3-5	good
Soft maple	30	3-5	good
Carolina Poplar/ Eastern cottonwood	10	7-8	good
Other species*	25		

*shagbark hickory, bitter hickory, bur oak, swamp white oak, white oak, red oak, white cedar, eastern red cedar, Norway spruce, black locust, honey locust and northern catalpa

Eastern cottonwood, northern catalpa, black locust were not planted. Norway spruce was planted for future winter cover because none of Ontario's native coniferous species except eastern red cedar will live more than a few years on Caister and Brookston clay. Some eastern red cedar was planted for demonstration purposes. Unfortunately, because of its reputation with agricultural interests it is not grown by most nurseries and is very hard to obtain. They are now about two meters tall which is more than two times the height of any other conifer planted on the site. It is

extremely slow growing and usually is over topped and killed by taller species after 15-20 years.

Shrubs and Vines	Silky dogwood, red osier dogwood, gray dogwood, high-bush cranberry and nannyberry.
Herbaceous Plants	Meadow grasses & weeds
Diseases and Insects	Nothing of significance
Ten Year Management	This VMU will be left alone except for herbicide and mowing treatments along the road to control weeds and bring the headland rows to the free-to-grow stage. This should take two to three years. Refill may be necessary depending on the percentage of trees affected by EAB. If significant numbers of ash die they should be refilled with other species preferably those which have shown they will do well on the site. Invasive species like catalpa and black locust should be removed before they start producing seed. Although considered invasive in some parts of Lambton County Norway spruce (*Picea abies*) has been present as a planted species for over a century with very few if any regeneration so this exotic can be left. The area should be inspected annually for disease, harmful insects and invasive exotic plants. Any tree species which occurs in the shrub rows along the electric wires should be removed as soon as possible

Figure 1. Two Bur Oak (dark green tree indicated by arrows) five years after planting.

VMU 5. Deciduous/Hawthorn Forest

ELC Designations	CUT-1 Mineral Cultural Thicket, FOD 2-2 Fresh Oak Hickory Deciduous and FOD 7-4 Black Walnut Lowland Deciduous (Ecoplan Limited, 2007).
Area	18.6 hectares
SAR/ Provincially Rare Plants	Riddell's goldenrod "Special Concern" SAR, Shumard oak "Special Concern" SAR (Ecoplan Limited, 2007).
Soils	Caister clay
Drainage	Imperfect to poor
History	This area was virtually cleared of trees and used for agriculture until the property was purchased for industrial purposes. There were however some larger trees along the gully in the south end where the forest was never entirely cleared. The 1962 aerial photography shows two small woodlots which were grazed. They are now two aged stands with some large and extra large oaks and a much younger stand comprised primarily of hawthorn and ash. The presence of quince near the road indicates there was once a house not far away on the north side of Bowens Creek. There was another set of buildings on the south side. There is a high voltage line in the southeast corner of this unit and a normal hydro line, which comes in from the road where this VMU borders VMU 13. Trees will not be allowed to grow in these corridors. This VMU is used more than any other by people on ATVs. There are several trails maintained by their continued use. ATVs are major vectors of invasive species because they pick up seeds embedded in mud and transport it to other locations. They are also causing some erosion where the trails go up and down slopes and across waterways. Some of the larger hawthorns were present before the grazing was discontinued. The ash has started to seed in as the hawthorn thinned the grass and therefore reduced the mouse population.

Species Composition

Species	*%*	*Height (m)*	*DBH (cm)*	*Condition*	*Regeneration*
Hawthorn	60	3-5	n/a	Good-poor	yes
Green and white ash	20	3-5	n/a	Good	yes
Other species*	20	3-25	.5- 62+	n/a	n/a

*shagbark hickory, bitter hickory, bur oak, white oak, red oak, shumard oak, eastern red cedar, Norway spruce, silver maple, black walnut, eastern cottonwood, peachleaf willow, white elm, European cherry and European crabapple.

The canopy varies from open meadow through open shrub and hawthorn to closed hawthorn and even open canopy of larger species. In the closed hawthorn canopy areas the number of stems per ha were often as high as 3000.

Shrubs and Vines

European honeysuckle, currant, quince, staghorn sumac, Virginia creeper, American prickly-ash, gray dogwood, nannyberry, purging buckthorn and glossy buckthorn.

Herbaceous Plants

Most of this area still has ground cover of grasses and broad-leaved plants. No detailed inventory was conducted.

Insects and Diseases

Emerald Ash Borer (EAB)

Wildlife and Wildlife Features

This is an early succession habitat with lots of herbaceous vegetation close to the ground for ground dwelling animals. The small areas of forest provide higher canopy, sources of mast and some wind protection.

Figure 2. Berries and leaves of glossy buckthorn, *Rhamnus frangula*

Ten Year Management

This is a valuable habitat for early succession species including Riddell's golden rod (Ecoplan Limited, 2007). The extent of the population of Riddell's Goldenrod should be mapped and then a plan to retain, enhance or move it over time should be created. It could be seeded into the electric transmission corridors if those corridors cross suitable sites.

If viable acorns are found on the Shumard Oak in this unit they could be planted in the adjacent VMU 6 plantation. There is insufficient numbers of ash of merchantable size to warrant a salvage harvest.

It should be monitored for insect and disease problems as well as invasive species annually and appropriate measures taken if something is found.

Gates and signs should be erected to try to eliminate unauthorized ATV use.

There is a small area of invasive Phragmites in the floodplain of Bowens Creek. It has virtually eliminated all other species in most of the area. It can be controlled or eliminated. Usually, re-treatment is required on 10% or less of an area the second year and probably spot treatment is required every 2-3 years after that.

About two hectares of the VMU is to be opened up if Butler's Garter Snakes are relocated to VMU 13 and VMU 5. Hawthorns could be removed, meadow overseeded, and mowing will be used to maintain the meadow.

Mowing/Haying should be conducted to reduce impact on Butler's Garter Snakes. Ron Gould of the Ministry of Natural Resources should be consulted as a resource for management pertaining to Butler's Garter Snake. For example, the Department of Natural Resources (2010) suggests the following:

> -Conduct mowing in small patches in a monthly rotational pattern, with no more than 33% of the available grassland habitat on the site affected in any one year.
>
> -Mower blades should be set a minimum of 8 inches off the ground.
>
> -Conduct when weather conditions are most likely to avoid snake activity: during the hottest period of the day when sunny conditions prevail and air temperatures exceed 27° C, OR on very cool, overcast days when temperatures are below 10°C.

VMU 6. Deciduous Plantation

ELC Designations None

Area 10.1 hectares

SAR/ Provincially Rare Plants None (Ecoplan Limited, 2007)

Soils Caister clay

Drainage Imperfect to poor.

History The area was planted in 2 stages - a direct seeding with nuts in the fall of 2004 and seedlings in 2005. The directly seeded plants do not seem to be competing as well as the seedling transplants. Prior to the reforestation this VMU was leased for agricultural production. A high voltage power line was constructed across this unit several years ago. Hydro One requires that only shrubs and herbaceous plants are planted and maintained beneath the power line.

Species Composition

Species	***%***	***Height (m)***	***Condition***
Silver maple	45	1-2	good
Swamp white & Bur oak	20	1- 1.5	n/a
Shagbark hickory	5	1	n/a
Honey locust	5	1-1.5	n/a
Other species*	25	0.5-1	

*Hard maple, Norway spruce, white oak, bitter hickory, red oak, black walnut

Shrubs and Vines Silky dogwood, nannyberry, black elderberry, and ninebark.

Herbaceous Plants Early succession grasses and broad-leaved plants.

Diseases and Insects Nothing of significance

Ten Year Management The trees and shrubs in this VMU should receive vegetation control treatments until they reached “free-to-grow” status.

There is a clump of maiden grass, an invasive non-native grass at the road, which should be eliminated.

Figure 3. Trees in VMU 6 still require tending until they reach "free-to-grow" status

VMU 7. Agricultural Crop Field

ELC Designations	None
Area	20.9 hectares
SAR/ Provincially Rare Plants	None (Ecoplan Limited, 2007).
Soils	Brookston clay
Drainage	Imperfect with artificial drainage to improve agricultural crop production.
Ten Year Management	If any Bowens Creek cropland is to be returned to forest, this field, or portions of it, is preferable for a number of reasons, including its location adjacent to larger forest and the depressions that become wet in the springtime. The addition of VMU 7 to the forest in VMUs 9, 10 and 11, would eventually create interior nesting habitat as well as productive forest. The plantation at the east end (VMU 8) should be refilled and it will require access for maintenance equipment. A border of several rows of trees and shrubs along the South boundary would provide a wildlife corridor to the plantation (VMU 6) across the rail line. This is an ideal location for up to five acres of wetland creation since depressions already exist. On some maps these depressions are already marked as waterbodies. It is likely that wetland could be restored relatively easily in this location. For constructed wetlands, buffers of tall grass prairie, meadow grasses/forbs in the disturbed areas could help to prevent the establishment of invasive Phragmites or other invasive plants. Emergent vegetation (such as native cattails) could be planted in the newly created wetland at a ratio of about 1:1 plants to open area, thus creating waterfowl habitat and also preventing the establishment of invasive Phragmites in the disturbed area could managed by transplanting Cattail from other sites while the plant is dormant in the winter. VMU 8 should be refilled, but this time either VMU 7 needs to be planted or there needs to be arrangements made with the tenant that there is a permanent right-of- way to get equipment back to VMU 8 to control the grass and other weed competition.

VMU 8. Deciduous Plantation

ELC Designations None

Area 1.3 hectares

SAR/ Provincially Rare Plants None (Ecoplan Limited, 2007).

Soils Brookston clay

Drainage Imperfect to poor.

History This unit was planted to trees and shrubs in 1999. Because it was then decided to leave VMU 7 as a field very little maintenance was carried out. Between the high deer population and slow growth rate most of the trees have disappeared.

Species Composition

Species	***%***	***Height (m)***
Green ash	90	1-3
Other species*	10	n/a

*Silver maple, eastern cottonwood, white elm and swamp white oak

Shrubs and Vines Red osier dogwood.

Herbaceous Plants Meadow grasses & weeds

Diseases and Insects Nothing of significance

Ten Year Management This unit was originally planted to try to fill in the gap between the trees to the south and north thus creating a larger block of forest with more potential for interior nesting species of birds.

VMU 8 should be refilled, but this time either VMU 7 needs to be planted or there needs to be arrangements made with the tenant so there is a permanent right-of- way to get equipment back to VMU 8 to control the grass and other weed competition.

VMU 9. Wet Deciduous Forest

ELC SWD3-2 Silver Maple Mineral Deciduous Swamp, CUT 1 Mineral Cultural

Designations Thicket, SWD1-2 Bur Oak Mineral Deciduous Swamp, FOD7 Moist Lowland Deciduous, (Ecoplan Limited, 2007).

Area 11.5 hectares

SAR/ Provincially Rare Plants Shumard oak "Special Concern" SAR (Ecoplan Limited, 2007).

Soils Brookston clay

Drainage Imperfect to poor.

History Although the area had timber removed it was probably never entirely cleared and the extent of agricultural operations was grazing by livestock. In the1962 aerial photograph it appears to be wooded pasture. It is now a two-aged stand with the large and extra large trees left from before the grazing period. The second stand of pole to medium sized trees has grown since the grazing period.

Species Composition

Species	***%***
Bur, swamp and white oak	25
Soft maple	20
Green ash	20
White elm	15
Sycamore	10
Other species*	10

*Eastern cottonwood, Manitoba maple, European crabapple, bitter hickory, shagbark hickory, red oak, Shumard oak, and basswood.

Basal Area Basal Area readings varied from 10-30 and Averaged 21.4 m^2/ha

Size Class	POLEWOOD	SAWLOG CLASS				TOTAL
	Polewood 10-24 cm	Small sawlog 26-36 cm	Medium sawlog 38-48 cm	Large sawlog 50-60 cm	X-Large sawlog 62 cm+	
AGS BA (m^2/ha)	5	5.4	2.2	0.8	3.4	16.4.
UGS BA (m^2/ha)	1	2.4	0.6	0.8	0	5.2
Total BA (m^2/ha)	6	7.8	2.8	1.6	3.4	21.6

DBH - diameter at Breast height, 1.3m off the ground
AGS - acceptable growing stock – trees which will be as valuable, or more valuable in ten years than they are now.
UGS - unacceptable growing stock – trees which will be less valuable in ten years than they are now.

Shrubs and Vines Grape, rose, choke cherry, American prickly ash, glossy buckthorn and buttonbush. The rose is growing in the shade.

Herbaceous Plants None were recorded during the survey

Diseases and Insects Dutch Elm Disease (DED)

EAB– it is likely that all ash trees in this woodlot will be dead within 10 years. Thus, all ash is classed UGS

Ten Year Management Shumard Oak, a SAR of "Special Concern", has been identified in here. Any cutting (commercial harvest or otherwise) should try to create openings large enough to allow this species to regenerate.

In years when there is a seed crop some of the seed should be collected and then hand-planted into the rows in suitable locations within existing plantations.

VMU 10. Mature Hawthorn Forest

ELC Designations CUT 1 Cultural Mineral Thicket (Ecoplan Limited, 2007).

Area 3.2 hectares

SAR/ Provincially Rare Plants None (Ecoplan Limited, 2007).

Soils Brookston clay

Drainage Imperfect to poor.

History This area was reverting to forest before grazing was discontinued.

Species Composition

Species	***%***	***Height (m)***	***Regeneration***
Hawthorn	40	5-6	n/a
Soft maple	20	5-20	Yes
Bur oak	10	20	n/a
Other species*	30	.5-1	n/a

* European apple, white elm, eastern cottonwood, shagbark hickory, red oak, green ash and basswood.

Shrubs and Vines: Gray Dogwood, grape, purging buckthorn, glossy buckthorn, buttonbush, rose, and poison ivy.

Herbaceous Plants Meadow grasses & weeds

Diseases and Insects Dutch Elm Disease (DED)

Ten Year Management This unit can be allowed to reforest on its own without additional planting

It should be monitored for invasive species – particularly both species of buckthorn. Appropriate measures should be taken to control or eliminate them.

VMU 11. Old Field Meadow/ Shrub Forest

ELC Designations CUM1-1 Moist Old-field Meadow (Ecoplan Limited, 2007).

Area 4.3 hectares

SAR/ Provincially Rare Plants Pin Oak (Ecoplan Limited, 2007).

Soils Brookston clay

Drainage Imperfect to poor.

Shrubs and Vines: Purging buckthorn, gray dogwood, nannyberry

History This area was open field when agricultural operations ceased and it is in the process of returning to forest. There are still some open areas dominated by herbaceous plants, some areas dominated by shrubs and others where the shrubs have already been shaded out by trees.

Species Composition

Species	***%***	***Height (m)***	***Regeneration***
Hawthorn	30	3-5	Yes
Soft maple	20	n/a	n/a
Bur oak	20	n/a	Yes
Other species*	30	n/a	Yes

* European apple, shagbark hickory, bur oak, peachleaf willow and pin oak

Herbaceous Plants Meadow grasses & weeds

Diseases and Insects Nothing of significance

Ten Year Management The most significant feature in this VMU is the pin oak recorded by Ecoplan in 2007. It should be monitored for seed and if any is produced it could be direct seeded into plantations on this property or sent to a nursery to be grown into trees for out planting.

The unit itself could use some assistance with reforestation, although site preparation and subsequent tending may be difficult.

VMU 12. Old Field Meadow/ Hawthorn Forest

ELC Designations CUT1 Cultural Mineral Thicket, FOD2-2 Fresh Oak Hickory Deciduous, FOD7-4 Black Walnut Lowland Deciduous (Ecoplan Limited, 2007).

Area 5.2 hectares

SAR/ Provincially Rare Plants Shumard Oak "Special Concern" SAR (Ecoplan Limited, 2007).

Soils Caister clay

Drainage Imperfect to poor.

History Most of this area was open field when agricultural operations ceased and it is returning to forest. The canopy is still quite open and herbaceous plants which normally inhabit old fields are still quite common. Two small areas were pastured forest and are now two aged stands similar to VMU 9. In the early succession hawthorn the number of woody stems per hectare is between 4000 and 5000.

Historically, this VMU has been an area used by ATVs. There have also been destructive bush parties.

Species Composition

Species	***%***	***Height (m)***
Hawthorn	60	3-6
Green/white ash	30	3-7
Other species*	10	n/a

*European apple, bird cherry, black walnut, shagbark hickory, bitter hickory, bur oak, white oak, swamp white oak, red oak/Shumard oak, ironwood, soft maple, hard maple, European silver poplar, eastern cottonwood, white elm, peachleaf willow and Norway spruce.

Shrubs and Vines Gray dogwood

Herbaceous Plants Garlic mustard, meadow grasses & weeds

Diseases and Insects Nothing of significance

Ten Year Management

This area has great potential for forest for both timber and wildlife values.

The ATV activities together with destructive bush parties need to be curtailed.

The exotic species should be inventoried and plans drawn up for the control or elimination of each species.

Seed could be collected from the Shumard oak for planting somewhere on the property.

Trees cannot be grown in the hydro corridor so it can be managed for shrubs or for herbaceous species like Riddell's goldenrod.

VMU 13. Old Field Meadow/Plantation

ELC Designations	None (Ecoplan Limited, 2007).
Area	3.8 hectares
SAR/ Provincially Rare Plants	None (Ecoplan Limited, 2007).
Soils	Caister clay
Drainage	Imperfect to poor.
History	This area was an open field when agricultural operations ceased on the property. Part of it was hand-planted with trees in 1999, but following the original application of herbicide no additional tending was carried out. The result is very low survival (< 5% of plantings).
Species composition	Green ash, soft maple, cottonwood, white elm, black walnut, European white willow and white spruce.
Shrubs and Vines	European highbush cranberry, gray dogwood and grape.
Herbaceous Plants	Meadow grasses & weeds
Diseases and Insects	Nothing of significance

Ten Year Management

This site can be maintained, as open meadow habitat by mowing, if Butler's Garter Snake is in this area.

Mowing/Haying should be conducted to support Butler's Garter Snakes. Specifics may be identified the Ministry of Natural Resources in the relocation permit. The Department of Natural Resources suggests the following:

-Conduct mowing in small patches in a monthly rotational pattern, with no more than 33% of the available grassland habitat on the site affected in any one year.

-Mower blades should be set a minimum of 8 inches off the ground.

-Conduct when weather conditions are most likely to avoid snake activity: during the hottest period of the day when sunny conditions prevail and air temperatures exceed 27° C, OR on very cool, overcast days when temperatures are below 10° C.

The creation of hibernacula or other habitat that accommodates various life stages of the Butler's Garter Snake should be considered if Butler's Garter Snakes are relocated to Bowens Creek Lands.

VMU 14. Deciduous Forest

ELC Designations 3-2, CUT 1 and CUM1 (Ecoplan Limited, 2007).

Area 1.2 hectares

SAR/ Provincially Rare Plants Pignut hickory and spring avens (Ecoplan Limited, 2007).

Soils Caister clay

Drainage Imperfect to poor.

History This woodlot appears to have been partially cleared. There was once a set of buildings at the north end (actually in VMU 4). The northern catalpa, European crab apple and Manitoba maple undoubtedly came from plantings around the building site. The southern two thirds of this VMU was not cleared but certainly pastured. It is likely that the polewood sized trees and saplings have emerged after the livestock were removed. The rest of the trees were present during the grazing period.

Species Composition

Species	***%***
Bur, swamp and white Oak	35
White ash	30
Shagbark hickory	20
hawthorn	5
Other species*	10

*Manitoba maple, red oak, black cherry and Northern catalpa (SCRCA did not find the pignut hickory).

Shrubs and Vines Grape, Virginia creeper, choke cherry, gray dogwood, purging buckthorn and European honeysuckle

Herbaceous Plants None were recorded during the survey

Diseases and Insects Nothing recorded

Basal Area Basal area readings varied from 14-22 and averaged 18 m^2/ ha

Size Class	POLEWOOD	SAWLOG CLASS				TOTAL
	Polewood 10-24 cm	Small sawlog 26-36 cm	Medium sawlog 38-48 cm	Large sawlog 50-60 cm	X-Large sawlog 62 cm+	
AGS BA (m^2/ha)	11	0	3	0	3	17
UGS BA (m^2/ha)	0	1	0	0	0	1
Total BA (m^2/ha)	11	1	3	0	3	18

AGS - acceptable growing stock – trees which will be as valuable, or more valuable in ten years than they are now.
UGS - unacceptable growing stock – trees which will be less valuable in ten years than they are now.
DBH - diameter at Breast height) 1.3m off the ground

Ten Year Management

- There is a significant component of exotic species: Manitoba maple, catalpa, honeysuckle and purging buckthorn. These trees should be removed because they are supplying seed, which is and will continue to infest the plantations in VMU 4.
- According to Ecoplan there is at least one pignut hickory in this stand It was the only one recorded in that report. It should be located and then seed collected for out planting of this species on the property.

VMU 15. Deciduous Forest/ Wooded Swamp

ELC Designations SWD1-1, FOD 9 (Ecoplan Limited, 2007).

Area 20.8 hectares

SAR/ Provincially Rare Plants Shumard oak ("Special Concern" SAR), climbing prairie rose ("Special Concern" SAR), giant shellbark hickory, pumpkin ash, stalked water horehound, pin oak, tickseed sunflower, cuckoo flower, eastern narrowleaf sedge, slender looseflower sedge and ironweed (Ecoplan Limited, 2007).

The Ministry of Natural Resources found Shumard Oak ("Special Concern" SAR) and Hooded Warbler ("Threatened" nationally, "Special Concern" provincially) in this block of forest.

Soils Brookston clay

Drainage Imperfect to poor

History Some of the west edge was virtually cleared in the past and has a significant portion of shrubs and small trees which do not occur in the rest of the stand. The 1962 aerial photo shows this area as pasture with increasing density of tree cover from west to east. The entire woodlot would have been cut over for timber and firewood for the ships plying the St Clair River in the19th century.

In 1962 this was the largest piece of forest on the property now owned by the County. It is therefore expected that it would have the greatest diversity of woodland species - including rare species.

Species Composition

Species	***%***
Soft maple (silver and red)	40
Green ash and white ash	20
Red oak and Shumard oak	15
White elm	5
Sycamore	10
Other species*	10

*Bur and swamp white oak, pin oak, eastern cottonwood, Manitoba maple, hard maple, American blue-beech, American beech, European crabapple, bitter hickory, shagbark hickory, giant shellbark hickory, hawthorn, and basswood

Shrubs and Vines Grape, wild climbing rose, poison ivy, Virginia creeper, choke cherry, black elderberry, red elderberry, American prickly ash, gooseberry, glossy buckthorn, Japanese barberry, and buttonbush.

Herbaceous Plants None were recorded during the survey

Diseases and Insects

Dutch Elm Disease, black knot on choke cherry, Nectria (target) canker on basswood, ash rough bark disease, Eutypella (Cobra) canker on ash.

Ash makes up 20% of the growing stock and will likely be lost to EAB over the next 2-5 years.

Basal Area

Basal area readings varied from 22-32 and averaged 27.2 m^2/ha

Size Class	POLEWOOD	SAWLOG CLASS				TOTAL
	Polewood 10-24 cm	Small sawlog 26-36 cm	Medium sawlog 38-48 cm	Large sawlog 50-60 cm	X-Large sawlog 62 cm+	
AGS BA (m^2/ha)	6.8	8.2	2.6	3.4	2.2	23.2.
UGS BA (m^2/ha)	1	1	0.2	1.2	0.6	4
Total BA (m^2/ha)	7.8	9.2	2.8	4.6	2.8	27.2

AGS - acceptable growing stock – trees which will be as valuable, or more valuable in ten years than they are now.
UGS - unacceptable growing stock – trees which will be less valuable in ten years than they are now.
DBH - diameter at Breast height) 1.3m off the ground

Ten Year Management

- If any of the ash can be salvaged for timber it should be done as soon as possible. Salvaging all merchantable ash would leave over 100 pole size ash per hectare.
- If any harvesting is done, the wet nature of the site and the rare species will have to be taken into account in both the marking and the harvest. Jon McCracken of Bird Studies Canada should be consulted with regard to logging practices. Ron Gould at the Ministry of Natural Resource should also be contacted. A provincial permit may be required.
- Shumard Oak, a SAR, has been identified in this unit. Any cutting (commercial harvest) or otherwise should try to create openings large enough to allow this species to regenerate.
- In years when there is a seed crop some of the seed should be collected from the rare species and then hand-planted into the rows in suitable locations within existing plantations.

4.0 General Management Strategies

Management objectives can generally be classified into one of the following categories as outlined in '*A Guide to Stewardship Planning for Natural Areas*' published by the Ontario Ministry of Natural Resources (MNR):

1. Environmental Protection
2. Forest Products
3. Recreation
4. Wildlife
5. Nature Appreciation

The MNR guide lists a sixth category, "investment," but because there is no intention of selling the property it is not considered in this document. Table 5 below ranks the priorities at Bowens Creek by VMU. Overall, the key priorities for Bowens Creek are environmental protection /wildlife enhancement followed by revenue generated from forest products (Table 5). Recreation is not a priority at Bowens Creek.

1. *Environmental Protection and Wildlife Enhancement*
   Environmental protection and wildlife are the primary management objectives. Bowens Creek has 15 locally rare species and four SAR. In addition, Butler's Garter Snakes (Threatened Provincially and Nationally) may be relocated from a development site in Point Edward to Bowens Creek. Thus it is important to maintain habitat for existing and re-introduced SAR (Table 1). There will be enhanced to benefit certain wildlife by creating ponds (VMU 7 and/or VMU 3), maintaining meadow, opening up hawthorn thicket etc.

2. *Forest Products*
   Revenue derived from forest management (e.g., ash salvage) should be used to support additional management actions (e.g., control or removal of invasive species, controlled burns, trail maintenance, signage etc.) within the Bowens or other natural areas owned by the County.

3. *Recreation*
   There are no plans to create authorized trails within the next ten years. ATV use is to be discouraged, particularly in SAR Habitat.

4. *Nature Appreciation and Education*
   The success of this management plan relies, to some degree, on the education of the public and stakeholders. Therefore, it is important to communicate the goal/objectives of the management plan. Information hikes and other events on the property in the winter, spring and fall will provide a great opportunity to raise

awareness of the ecological importance of the area as well as management strategies and progress.

Table 5. Summary of Current Use and Projected Priorities

VMU #	*Area (ha)*	*Current Use*	*Goal/Priority*				
			Same use continued (y/n)	*Environment Protection*	*Wildlife*	*Recreation*	*Forest Products*
1	8.6	Pipeline	y + agr	0	0	0	N/A
2	3.3	Hydro Corridor	y + agr	0	0	0	N/A
3	23.1	Crop field	y	N/A	N/A	N/A	N/A
4	19.9	Plantation	y	1	2	0	3
5	18.6	Natural reforestation	y +Hydro Corridor	1	2	0	3
6	10.1	Plantation	y +Hydro Corridor	1	2	0	3
7	20.9	Crop field	y + plantation	N/A	N/A	N/A	N/A
8	1.3	Plantation	y	1	2	0	3
9	11.5	forest	y	1	2	0	3
10	3.2	Forest	y	1	2	0	3
11	4.3	Shrub forest /meadow	y	1	2	0	N/A
12	5.2	Open hawthorn	y	1	2	0	N/A
13	3.8	Meadow/ Plantation	y	1	2	0	N/A
14	1.2	Forest	y	1	2	0	0
15	20.8	Forest	y	1	2	0	3
Total Area	155.9						

Agr. = agriculture

In order to meet these goals the following strategies are recommended:

1. Management activities planned over the next 10 years are intended to enhance habitat at the site while continuing to provide some revenue from the agricultural portion of the property. It is likely that agricultural leases will gradually be terminated as lands are naturalized.

2. Invasive species need to be monitored and control plans developed for each.

3. Several rare species (some are SAR) have been identified either growing on or using the property. Their populations should be maintained or increased as appropriate in consultation with the Provincial Recovery Planning for SAR. Habitat enhancement projects (e.g., hibernacula) for relocated Butler's Garter Snakes should be researched.

4. Most of the tree planting on the site is completed unless (a) more agricultural land is converted to forest or (b) existing plantations experience significant mortality and require refills. There are four VMUs where planting should be considered – 7, 8, 11 and 13. This is a total of about 6 hectares (15 acres) of which 1 hectare would be from areas currently leased for Agriculture.

5. Trails can and should be created for inspections and management They should be blocked with gates at the access points.

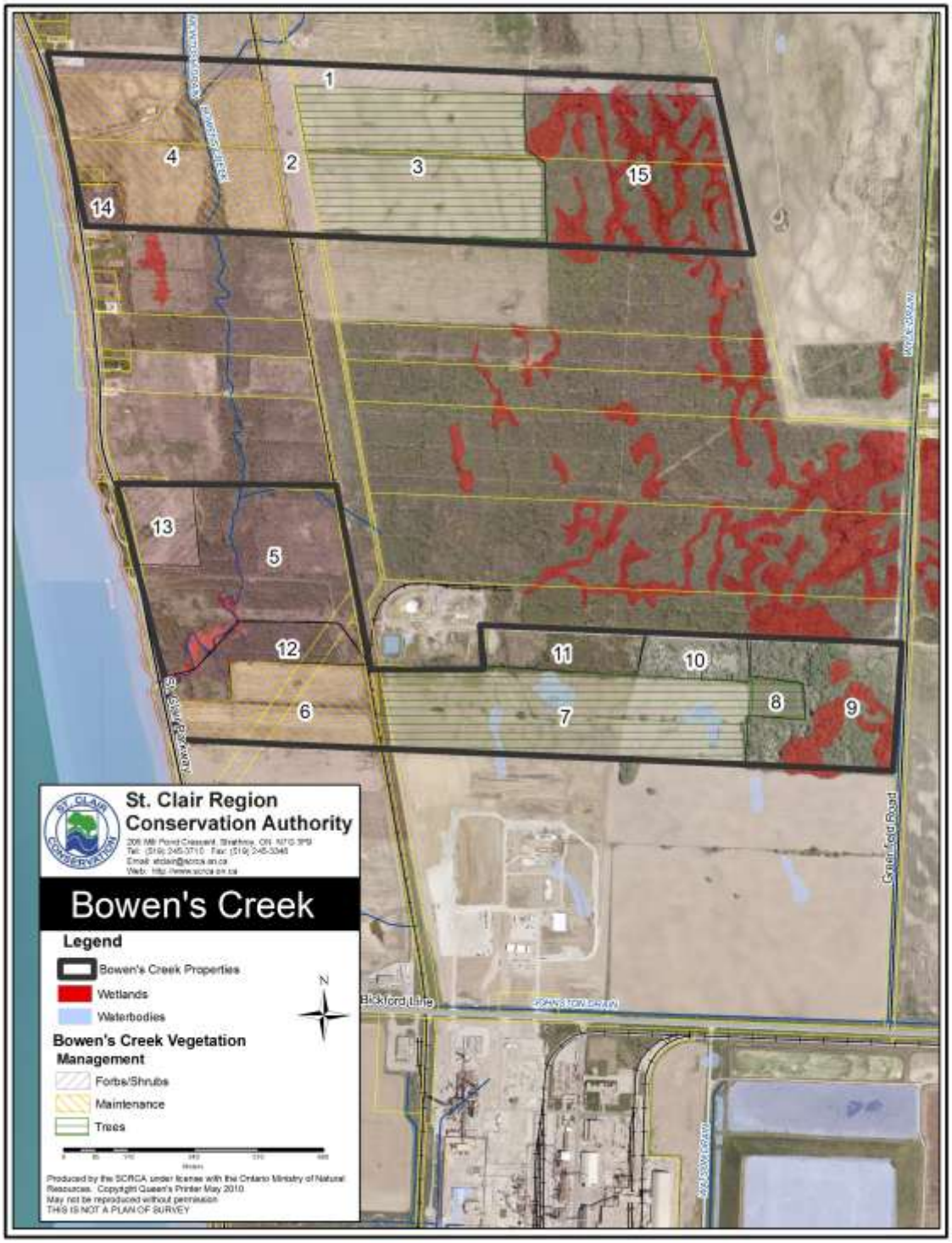
6. There are currently no authorized recreation trails on the properties and there does not appear to be any reason to develop them over the next ten years.

7. Hydro One maintains high voltage and normal transmission lines on the properties. They should be contacted and a permanent liaison set up so that their maintenance activities are not counter productive to plans and management by the SCRCA/County.

Table 6 and Map 3 below show a proposed timeline for property management activities.

Table 6. Management Summary Timeline by VMU

Treatment	*VMU*	*Area (ha)*	*Year*
Agricultural lease	1,2,3,7	55.9	Annual until naturalized
Tree planting	3,7,8	45.3	2011-2016
Forbs/meadow grassed/ tall grass prairie planting or shrubs	1,2	11.9	2011-2015
Maintenance	4,6	30	2011-2015
Wetland creation, wetland buffer, planting of emergent macrophytes	7	5-8	2011-2013
Butler's Garter Snake enhancement (meadow maintenance, hawthorn opening, hibernacula)	5, 13	22.4	ongoing
Invasive species	All	156	ongoing
Hazard ash tree removal	9, 12, 15	38	2011-2013



Map 3. Management Summary

Management for Rare Species

Rare species can be divided into two categories:

a) ranked as rare or very rare for Ontario but not protected by legislation
b) ranked as rare or very rare for Ontario and protected by provincial Endangered Species Act and/or federal Species at Risk Act (Table 1).

In the case of plants they can be identified and their locations fixed using GPS so they can be monitored periodically to determine the health of the plants and of the population. Wildlife, such as birds, generally cannot be relocated using GPS positioning. Areas where rare species are located will need to be monitored more frequently.

The woody species are relatively easy to identify throughout the years and are probably in little danger of being accidentally damaged or destroyed by any management activity. Specific trees can be located and checked annually for viable seed. When viable seed is produced some of it can be collected and direct seeded on this property or on other suitable sites in the county. The seed could also be sent to tree nurseries to produce seedlings for transplanting on the same sites.

The rare herbaceous plants can be treated in much the same manner as the trees. One of the issues, which is more of problem with Prairie Rose and herbaceous plants, is shade. Those plants which do not tolerate shade will have to be protected by removing invading trees and shrubs. It should not be forgotten that in 1962 about 90% of this property had little or no shade.

Habitat enhancement projects for relocated Butler's Garter Snakes should be researched. For example, snakes use underground chambers called hibernacula through winter to protect them from the cold. Manmade structures such as old wells, rock and log piles, building foundations and retaining walls, and natural features such as ant mounds and groundhog or crayfish burrows are examples of snake hibernation sites.

Management of rare species should be guided by current guidelines from the relevant Recovery Planning Teams.

Recommendations adopted by Council October 19, 2011

1. Continue/strengthen environmental (including control of invasive species) and wildlife enhancement while allowing safe and passive use by the Public.

2. Restrict use as follows:
   - Dogs - must be leashed
   - Motorized vehicles (ATVs, dirt bikes, snowmobiles, etc.) - not permitted

- Horseback riding - permitted on trails only at walking speed
- Hunting - not permitted
- Bicycles - permitted on trails only at recreational speeds (no extreme or bicycle-cross)

3. Focus on pedestrian use initially and consider multi-use trails in the future should demand warrant.

4. Erect signage with regards to: intended use, hours (daylight use only), ownership, property boundaries, interpretive areas, and trail designation.

Appendix A. Tree Species of Bowens Creek 2008

Abbr.	Common Name	Scientific Name: Species	Scientific Name: Genus
Ag	Green ash	*Fraxinus*	*pennsylvanica*
Aw	White ash	*Fraxinus*	*americana*
Bd	Basswood	*Tilia*	*americana*
Be	American beech	*Fagus*	*grandifolia*
Bu	American blue-beech	*Carpinus*	*caroliniana*
	Northern catalpa	*Catapla*	*speciosa*
Cr	Eastern red cedar	*Juniperus*	*virginiana*
Cw	White cedar	*Thuja*	*occidentalis*
Cb	Black cherry	*Prunus*	*serotina*
Pv	Choke cherry	*Prunus*	*virginiana*
	Mazzard/ European cherry	*Prunus*	*avium*
Pd	Eastern cottonwood	*Populus*	*deltoides*
	European crabapple	*Malus*	*sylvestris*
Ea	American elm	*Ulmus*	*americana*
Ht	Hawthorn	*Crataegus*	*spp.*
Hb	Bitternut hickory	*Carya*	*cordiformis*
Hp	Pignut hickory	*Carya*	*glabra*
Hs	Shagbark hickory	*Carya*	*ovata*
Lb	Black locust	*Robinia*	*pseudoacacia*
Gt	Honey locust	*Gleditsia*	*triacanthos*
Mh	Hard (Sugar) maple	*Acer*	*saccharum*
Mm	Manitoba maple	*Acer*	*negundo*
Mr	Red maple	*Acer*	*rubrum*
Ms	Silver maple	*Acer*	*saccharinum*
Ob	Bur oak	*Quercus*	*macrocarpa*
	Pin oak	*Quercus*	*palustris*
Or	Red oak	*Quercus*	*rubra*
Os	Shumard oak	*Quercus*	*shumardii*
Ow	White oak	*Quercus*	*alba*
Osw	Swamp white oak	*Quercus*	*bicolor*
	Feral pear	*Pyrus*	*communis*
Pc	Carolina poplar	*Populus x*	*canadensis*
Pl	White/silver poplar	*Populus*	*alba*
Sn	Norway spruce	*Picea*	*abies*
Sr	Red spruce	*Picea*	*rubens*
Sw	White spruce	*Picea*	*glauca*
Sy	Sycamore	*Platanus*	*occidentalis*
Wb	Black walnut	*Juglans*	*nigra*
Wpl	Peach Leaf willow	*Salix*	*amygdaloides*
Ww	White willow	*Salix*	*alba*

Appendix B. Shrubs and Vines of Bowens Creek

Common Name	Scientific Name	
	Genus	Species
Downie arrowwood	*Viburnum*	*rafinesquianum*
Japanese barberry	*Berberis*	*thunbergii*
Common blackberry	*Rubus*	*Allegheniensis*
Glossy buckthorn	*Rhamnus*	*frangula*
Purging buckthorn	*Rhamnus*	*cathartica*
Butttonbush	*Cephalanthus*	*occidentalis*
Gray dogwood	*Cornus*	*racemosa*
Red osier dogwood	*Cornus*	*stolonifera*
Silky Or swamp dogwood	*Cornus*	*amomum*
Black elderberry	*Sambucus*	*canadensis*
Gooseberry	*Ribes*	*spp*
Grape	*Vitis*	*spp*
European honey suckle	*Lonicera*	*tatarica*
Poison ivy	*Rhus*	*radicans*
American prickly-ash	*Xanthoxylum*	*americanum*
Dwarf ninebark	*Physocarpus*	*opulifolius*
Quince	*Cydonia*	*oblonga*
Rose	*Rosa*	*spp*
Nannyberry viburnum	*Viburnum*	*lentago*
Virginia creeper	*Parthenocissus*	*vitacea*

Appendix C. References

Ecoplans Limited (2007). Appendix A Terrestrial Environmental Baseline Report. *DRAFT Terrestrial Technical Study Report, Proposed Refinery Expansion Project*. Toronto: Shell Canada Products.

Wisconsin Department of Natural Resources (2000). Protocol for Incidental Take Authorization Butler's Garter Snake (*Thamnophis butleri*) Retrieved from on November 18, 2010 from http://dnr.wi.gov/org/land/er/take/pdfs/butlprot.pdf