

# WINSTON CHURCHILL - BALLINAFAD

<b>Region of Peel</b>	<b>NAI Area # 8050</b>	<b>Credit Valley Conservation Authority</b>
<b>Town of Caledon</b>	<b>Size: 717 hectares</b>	<b>Watershed: Credit River</b>
<b>Con 11 Lots 30, Con 6 WHS Lots 27-32, Con 5 WHS Lots 28-34</b>	<b>Ownership: 78 % private, 22% public (CVC, Ontario Heritage Trust, Town of Caledon, Region of Peel)</b>	<b>Subwatersheds: Credit River – Forks of the Credit to Cheltenham; Credit River – Cheltenham to Glen Williams</b>

## General Summary

This exceptional, high quality natural area is situated on the Niagara Escarpment and is comprised of a large escarpment forest, depression wetlands, small cliffs and talus slopes. Soils tend to be thin here and there are many bedrock exposures that support limestone-loving species that are uncommon in Ontario. The deciduous forests tend to be mature, high quality communities. Only a few of the deciduous forests were of lesser quality, regenerating from past agricultural and logging disturbance. Past quarrying in this area was evidenced by large rock piles, rectangular ground depressions and bedrock cuts created through limestone and sandstone extraction. One area re-naturalizing on old quarry floor had a very unique assemblage of vegetation typically found in northern Ontario with species such as blueberry and wintergreen growing over moss and lichen covered rock.

This is a very large natural area that is part of a natural corridor along the Niagara Escarpment. This area's large size, location on an important provincial corridor, high habitat diversity and variety of microclimates all contribute to a high biodiversity. This area supports Species At Risk and many rare species, some Carolinian species plus several regionally rare vegetation communities. Current disturbance is low here and the natural area is in excellent condition.

NAI ELC surveyors, botanists and ornithologists have provided 52% data coverage for the core NAI inventories (vegetation communities, plant species, breeding birds) plus incidental observations of other fauna over the delineated area (Table 1). Ministry of Natural Resources botanists and ornithologists also conducted an inventory of the flora and breeding birds at this site in 1993. Their data has been included in this summary but it should be noted that these records are at the boundary of being out of date. Two CVC Terrestrial Monitoring plots are located in this natural area and the plant, breeding bird and amphibian species data from it between 2002 and 2013 contributes to the species known from this natural area.

Fish species were inventoried on-site and at upstream and downstream sampling stations, by CVC and consultant biologists between 1997 and 2007. As there are no significant barriers to fish movement between this natural area and the upstream and downstream stations, the data were extrapolated from both upstream and downstream, to this site. Fish sampling in the main Credit River has been included in this summary as part of the natural area touches the river.

**Table 1: NAI Field Visits**

Visit Date	Inventory Type
24 July 1997	Fish
unspecified date 1999	Fish
15 Sept. 1999	Fish
4 June 2004	Fish
14 Sept. 2004	Fish

11 Aug. 2005	Fish
18 Aug. 2005	Fish
24 Aug. 2005	Fish
24 July 2007	Fish
10 May 2011	Turtles

12, 13 May 2011	Turtles
8-10 June 2011	Breeding birds
14-16 June 2011	ELC
21, 22 June 2011	Breeding birds
23, 24 June 2011	ELC
27 June 2011	Breeding birds
28 June 2011	ELC, Breeding birds
1 July 2011	Breeding birds
5 July 2011	Breeding birds
6, 7 July 2011	ELC
12, 13 July 2011	ELC
14 July 2011	Breeding birds

15 July 2011	ELC
18-20 July 2011	ELC
22 July 2011	ELC
8 June 2012	Flora
26 June 2012	ELC, Turtles
27 June 2012	Turtles
28, 29 June 2012	ELC, Turtles
3-5 July 2012	ELC
10-12 July 2012	ELC
27 July 2012	Turtles
4 June 2013	Breeding birds
19 June 2013	Breeding birds

### Natural Feature Classifications and Planning Areas

This natural area is part of:

Life Science ANSI – northwest half of area within provincially-significant Caledon Mountain Slope Forest LS-ANSI

ESA – northwest part within Caledon Mountain ESA

PSW – Caledon Mountain Wetland Complex

Niagara Escarpment Plan

### Physical Features

This area lies in two physiographic regions. The eastern two thirds of the area lies in the Niagara Escarpment physiographic region and the western third of the area is in the Horseshoe Moraines physiographic region (Chapman and Putnam, 1984). The Niagara Escarpment physiographic region is characterized by an escarpment that forms a significant break in the bedrock of the region. The escarpment has formed from the differing erosion rates of the bedrock layers, the softer lower shale layers eroding out from under the hard dolostone cap rock until portions of the cap rock collapse to form a cliff face and talus slope. The Horseshoe Moraines physiographic region is characterized by north-south trending ridges of sand and silt glacial deposits.

The upper portion of the escarpment, and the western half of the natural area, has dolostone of the Amabel/Lockport Formation as the bedrock. A narrow strip running north-south through the middle of the area has older dolostone of the Manitoulin Formation as the bedrock. Below the escarpment, in the eastern part of the area the bedrock is shale of the Queenston Formation. In this area, the escarpment cliff feature is fragmented resulting in a descending series of low cliffs or rocky outcrops interspersed with rocky terraces. The rock is often fractured into blocks and crevices although not as dramatic in extent as occurs in the area of Belfountain and Caledon Mountain or in Halton Region to the southwest. The terraces have several wetlands and small ponds on them.

Soils above the escarpment tend to be thin and are loams with good drainage. Soils below the escarpment in this area are clay tills and also drain well.

This site includes cliff faces, crevices, caves and talus slopes.

Numerous small first and second order streams arise on the escarpment slope and from the terrace wetlands and ponds in the north, east and south parts of this natural area. Some of the streams may be intermittent due to the fractured nature of the bedrock. The streams flow directly into the Credit River, which flows a short distance (less than 0.5 km) from the south edge of this natural area. Second Creek, a short, fourth order Credit River tributary, flows through the southwest part of this area. A large pond exists along the course of Second Creek. There are numerous small natural

ponds and vernal pools on terraces of the escarpment. Seepage areas are also widespread in this area.

There are Credit Valley Conservation Terrestrial Monitoring Program forest and wetland plots in this natural area. There are also two Credit Valley Conservation Integrated Watershed Monitoring Program stations associated with this area: one where a tributary stream crosses Ballinafad Road and flows into the natural area, where fish species are monitored, and one along Winston Churchill Boulevard where fish species and stream geomorphology are monitored. These monitoring stations provide additional longer-term data and details on changes in the health of the environment here.

## **Human History**

The Winston Churchill – Ballinafad natural area is within one kilometre of Cheltenham and Terra Cotta. Cheltenham was settled in 1820, centering on a grist mill built on the Credit River, by settler Charles Haines. Haines later built a larger grist mill with increased milling capacity (more millstones) in response to increased wheat production on Peel Plain farms to the south and east of the Credit River valley. A sawmill was added to the village businesses, across the river from the grist mill and by the 1850s was a milling and marketing centre for the wheat-producing local agricultural economy, with a store, a bed and chair manufacturing business, a tavern, two distilleries, a church and school in addition to the mills. Two railway lines were built through Cheltenham: the Hamilton & Northwest Railway in 1874 and the Credit Valley Railway in 1877, increasing the area's importance as a transportation and marketing centre.

Terra Cotta was originally named Tucker's Mill, and was settled around the same time as Cheltenham but developed more slowly. The hamlet also centered around a mill on the Credit River. In the pioneer days, spawning Atlantic Salmon were so abundant in the Credit River that it was said that "you could cross the Credit River by walking on their backs" (Esquesing Historical Society, 2012). The community name was noted as Salmonville by the post office in 1866, but was later changed to Terra Cotta (for the red colour of the shale-based soils) in 1891.

As with other parts of the study area, the settlers practiced subsistence farming during the early years but as more land was cleared and local roads improved, and particularly with the arrival of the railways, farming became a commercial enterprise as access to outside markets improved. By the late 1800s all of the land with good agricultural potential had been cleared. But unlike other parts of the study area in addition to agriculture, quarrying also played an important role in shaping the landscape and in the growth of local communities.

Quarrying operations cut limestone and sandstone from the Niagara Escarpment a short distance to the north of the village of Terra Cotta, in this natural area. Limestone was primarily quarried in small operations and was burned for lime production. A lime kiln is mapped just east of the end of Heritage Road (Historica Research Ltd, 1990). The Rogers Quarry was established east of Winston Churchill Boulevard, across from the current public entrance to Terra Cotta Conservation Area and within this natural area. This quarry was first opened between 1840 and 1850 and was expanded in the 1850s. Stone from this quarry was used to build a local school and church. A gravity tramway was constructed between this quarry and the railway line to the south, replacing the hauling of stone by horse and wagon. By 1900 this quarry employed 50 men at peak operation periods (Historica Research Ltd., 1990). Additional stone quarrying extended along the escarpment slope across Heritage Road to the north and northeast. Credit Valley sandstone was widely known for its high quality and appears in a variety of important Toronto buildings (Esquesing Historical Society, 2012). The quarry workings are still visible in the natural area today and a small amount of quarrying continues. Some of the quarry pits have filled with water and now appear as ponds. Plantations have been established to re-vegetate some of the cleared old quarry lands.

Utilizing the older layers of red Queenston shale exposed below the escarpment, the Cheltenham Brickworks opened in 1914. The brickworks used electricity from water power of the Credit River (Esquesing Historical Society, 2012). The brickworks quarried immediately to the south of this natural

area and in its heyday produced 90,000 bricks per day in seven kilns. The brickworks closed in 1964 and then re-opened in 1993 by Brampton Brick for shale extraction (Scheinmann, 2009). Another brickyard, Terra Cotta Brick Company was established in 1906 in the area immediately south of the southwest corner of this natural area. The shale extraction for the brickworks likely also necessitated the clearing of vegetation from this part of the natural area.

Part of the Winston Churchill – Ballinafad natural area is in CVC's Terra Cotta Forest property, and another portion of the area is public property that is managed by CVC. Both of these are undeveloped. The Bruce Trail and some side trails run through this natural area. The Caledon Trailway a wider, gravel multi-use trail (for walking, cycling, horseback riding) crosses through the south end of this natural area, following the abandoned railway line. Part of this natural area lies in the Mineral Resource Extraction designation of the Niagara Escarpment Plan.

This large natural area is mostly bordered by roads: Winston Churchill Blvd. along the southwest side, Ballinafad Road along the west side, Olde Base Line along the northwest edge and Mississauga Road along most of the northeast side. The south edge of the natural area is bordered by the residential area of Terra Cotta. The east corner of the area is adjacent to an active shale quarry and part of the southeast tip of the natural area is under aggregate extraction license to Brampton Brick (total licensed area 99 ha; Ontario Ministry of Natural Resources, 2014). As extraction at parts of the Brampton Brick quarry have extended to below the local water table, it is possible that the hydrology of the Winston Churchill – Ballinafad natural area may have been affected. The central part of this natural area is also under a (Class B) aggregate extraction license to Credit Valley Sandstone (total area under license 40 ha; Ontario Ministry of Natural Resources, 2014). Heritage Road and Boston Mills Road penetrate into the centre of the natural area but dead end due to the escarpment terrain. Both of these roads, as well as the perimeter roads have small clearings associated with rural residences.

## **Vegetation Communities**

The general community types present here are coniferous forest (6%), deciduous forest (52%), mixed forest (10%), marsh (2%), coniferous swamp (4%), deciduous swamp (4%), mixed swamp (2%), submerged shallow aquatic (0.2%), mixed shallow aquatic (0.5%), open aquatic (0.3%), cultural meadow (2%), cultural thicket (0.5%), cultural savannah (4%), cultural woodland (8%) and plantation (4%).

A total of 105 vegetation communities of 51 different types were mapped over the 52% of this area to which the ELC surveyors had access (Table 2). Four of the communities are regionally rare: Dry-Fresh White Pine - Red Pine Coniferous Forest (FOC1-2), Dry-Fresh Red Oak Deciduous Forest (FOD1-1), Fresh-Moist Sugar Maple - Hemlock Mixed Forest (FOM6-1) and White Cedar - Conifer Organic Coniferous Swamp (SWC3-2).

Several of the communities at this site contain patches of vegetation different from their surrounding community type that are too small to map and recognize as separate communities. Although small, these patches still contribute additional habitat diversity and are noted as inclusions. The Dry-Fresh Red Oak Deciduous Forest community (FOD1-1) contains an inclusion of Dry-Fresh White Pine - Oak Mixed Forest (FOM2-1) which is regionally rare, as well as an inclusion of Fresh-Moist White Cedar - Hardwood Mixed Forest (FOM7-2) vegetation. The Dry-Fresh White Pine - Red Pine Coniferous Forest community (FOC1-2) contains inclusions of Dry-Fresh White Cedar Coniferous Forest (FOC2-2) and Dry-Fresh Poplar Deciduous Forest (FOD3-1) vegetation. One of the Dry-Fresh White Cedar Coniferous Forest communities (FOC2-2) contains an inclusion of Black Ash Organic Deciduous Swamp (SWD5-1) vegetation. Another of the Dry-Fresh White Cedar Coniferous Forest communities has a Silver Maple Organic Deciduous Swamp (SWD6-2) inclusion. The Dry - Fresh White Pine Naturalized Coniferous Plantation (FOCM6-1) has a Dry-Fresh Scotch Pine Naturalized Coniferous Plantation (FOCM6-3) inclusion. The Dry-Fresh Poplar Deciduous Forest community (FOD3-1) contains four different types of inclusions: Reed Canary Grass Mineral Meadow Marsh (MAM2-2), Poplar Mineral Deciduous Swamp (SWDM4-5), Willow Mineral Thicket Swamp (SWT2-2) and Red-

osier Mineral Thicket Swamp (SWT2-5). Several of the Dry-Fresh Sugar Maple Deciduous Forest communities (FOD5-1) have inclusions. The young representative of this community type has inclusions of Dry-Moist Old Field Meadow (CUM1-1), Buckthorn Cultural Thicket (CUT1-B) and Cattail Graminoid Mineral Meadow Marsh (MAMM1-2). The mid-aged representative of the community type has a Dry-Fresh Poplar Deciduous Forest (FOD3-1) inclusion. The mature Dry-Fresh Sugar Maple Deciduous Forest communities tend to have different types of inclusions. One of the mature Dry-Fresh Sugar Maple Deciduous Forest communities has inclusions of Dry-Fresh Sugar Maple - White Ash Deciduous Forest (FOD5-8) and Dry-Fresh Sugar Maple - White Birch - Poplar Deciduous Forest (FOD5-10). Another of these mature communities has Dry-Fresh Sugar Maple - Oak Deciduous Forest (FOD5-3), Dry-Fresh Sugar Maple - White Ash Deciduous Forest (FOD5-8) and Fresh-Moist Ash Lowland Deciduous Forest (FOD7-2) inclusions. A third mature Dry-Fresh Sugar Maple Deciduous Forest community (FOD5-1) has four different inclusion types: Dry-Fresh White Cedar Coniferous Forest (FOC2-2), Fresh-Moist Sugar Maple - Hardwood Deciduous Forest (FOD6-5), Dry-Fresh Scotch Pine Naturalized Coniferous Plantation (FOCM6-3) and Red-osier Organic Thicket Swamp (SWT3-5) vegetation types. One of the Dry-Fresh Sugar Maple - White Ash Deciduous Forest (FOD5-8) communities has an inclusion of Mixed Conifer Coniferous Plantation (CUP3-H) and another of the same community has an inclusion of Forb Mineral Meadow Marsh (MAM2-10). A third Dry-Fresh Sugar Maple - White Ash Deciduous Forest community has inclusions of Cattail Graminoid Mineral Meadow Marsh (MAMM1-2). Another Dry-Fresh Sugar Maple - White Ash Deciduous Forest community has four types of inclusions: Fresh-Moist Ash Lowland Deciduous Forest (FOD7-2), Dry-Fresh White Pine Naturalized Coniferous Plantation (FOCM6-1), Cattail Graminoid Mineral Meadow Marsh (MAMM1-2) and Native Forb Old Field Meadow (CUM1-A). One of the Dry-Fresh Sugar Maple - Paper Birch - Poplar Deciduous Forest communities (FOD5-10) contains Reed Canary Grass Mineral Meadow Marsh (MAM2-2) and Broad-leaved Cattail Mineral Shallow Marsh (MAS2-1A) inclusions. Both Fresh-Moist White Elm Lowland Deciduous Forest communities (FOD7-1) contain inclusions, one with an inclusion of Native Deciduous Cultural Woodland (CUW1-A3) and the other with an inclusion of Poplar Mineral Deciduous Swamp (SWDM4-5). The Fresh-Moist Poplar Deciduous Forest community has inclusions of Fresh-Moist White Elm Lowland Deciduous Forest (FOD7-1) and Willow Mineral Thicket Swamp (SWT2-2) vegetation. One of the Dry - Fresh Sugar Maple - Hardwood Deciduous Forest communities (FODM5-11) has an inclusion of White Elm Mineral Deciduous Swamp (SWD4-2) and another has an inclusion of Dry-Moist Old Field Meadow (CUM1-1). Another of the Dry - Fresh Sugar Maple - Hardwood Deciduous Forest communities (FODM5-11) has inclusions of Native Deciduous Cultural Woodland (CUW1-A3) and Native Forb Old Field Meadow (CUM1-A). A different Dry - Fresh Sugar Maple - Hardwood Deciduous Forest community has Dry-Fresh Sugar Maple - White Birch - Poplar Deciduous Forest (FOD5-10) and Native Forb Old Field Meadow (CUM1-A) inclusions. One of the mature Dry - Fresh Sugar Maple - Hardwood Deciduous Forest communities (FODM5-11) has four different types of inclusions: Silver Maple Mineral Deciduous Swamp (SWD3-2), Willow Mineral Thicket Swamp (SWT2-2), Red-osier Mineral Thicket Swamp (SWT2-5) and Reed Canary Grass Mineral Meadow Marsh (MAM2-2). One of the Dry - Fresh Sugar Maple - Hardwood Calcareous Shallow Deciduous Forest (FODR1-1) communities contains inclusions of Dry-Fresh Sugar Maple - White Birch - Poplar Deciduous Forest (FOD5-10) and Forb Mineral Meadow Marsh (MAM2-10) vegetation. The Dry-Fresh White Cedar - Paper Birch Mixed Forest community (FOM4-1) includes small patches of Dry-Fresh Sugar Maple - Hardwood Deciduous Forest (FODM5-11), Forb Mineral Meadow Marsh (MAM2-10) and Reed Canary Grass Organic Meadow Marsh (MAM3-2) vegetation types. One of the Dry-Fresh White Cedar - Hardwood Mixed Forest communities (FOM4-A) contains an inclusion of Red-osier Mineral Thicket Swamp (SWT2-5) vegetation. The Fresh-Moist Sugar Maple - Hemlock Mixed Forest community (FOM6-1) contains an inclusion of Forb Mineral Meadow Marsh (MAM2-10) vegetation in a wetter spot.

Several of the aquatic and wetland communities also have inclusions although because most of these communities are smaller than the forest communities, they have fewer inclusions. The Narrow-leaved Sedge Mineral Meadow Marsh community (MAM2-5) contains an inclusion of Broad-leaved Sedge Mineral Meadow Marsh (MAM2-6) vegetation. The Mixed Mineral Meadow Marsh (MAMM3-1) contains four different types of inclusions: Dry-Fresh White Ash Deciduous Forest (FOD4-2), Dry-Fresh Sugar Maple - White Birch - Poplar Deciduous Forest (FOD5-10), Fresh-Moist Ash Lowland

Deciduous Forest (FOD7-2) and Mixed Conifer Coniferous Plantation (CUP3-H). One of the Cattail Graminoid Mineral Meadow Marsh communities (MAMO1-2) contains an inclusion of Dry-Fresh White Cedar - Hardwood Mixed Forest (FOM4-A) vegetation. The Water Lily - Bullhead Lily Mixed Shallow Aquatic community (SAM1-A) contains an inclusion of Cattail Organic Shallow Marsh (MAS3-1). The White Cedar - Conifer Organic Coniferous Swamp community (SWC3-2) contains inclusions of Silver Maple Organic Deciduous Swamp (SWD6-2) and White Birch - Poplar Organic Deciduous Swamp (SWD7-1) vegetation. One of the Black Ash Mineral Deciduous Swamp communities (SWD2-1) contains Dry-Fresh White Cedar - Hardwood Mixed Forest (FOM4-A) and Balsam Fir - Hardwood Organic Mixed Swamp (SWMO4-1) inclusions. One of the Red (Green) Ash Mineral Deciduous Swamp communities (SWD2-2) contains inclusions of Poplar Mineral Deciduous Swamp (SWDM4-5) and Purple-stemmed Aster Mineral Meadow Marsh (MAMM2-3) vegetation. The Silver Maple Organic Deciduous Swamp community (SWD6-2) contains a Dry-Fresh Sugar Maple Deciduous Forest (FOD5-1) inclusion. One of the Poplar Mineral Deciduous Swamp communities (SWDM4-5) contains an Apple Deciduous Shrub Thicket (THDM2-10) inclusion in an elevated part of the community that was previously cleared. The White Cedar - Hardwood Mineral Mixed Swamp community 9SWM1-1) contains several inclusions of Dry-Fresh White Cedar Coniferous Forest (FOC2-2) vegetation as well as an inclusion of Willow Mineral Thicket Swamp (SWT2-2) vegetation. One of the White Cedar - Hardwood Organic Mixed Swamp communities (SWM4-1) contains a Dry-Fresh Sugar Maple - Hardwood Deciduous Forest (FODM5-11) inclusion. The White Cedar - Hardwood Calcareous Rock/Bedrock Mixed Swamp community (SWMR1-1) contains a Fresh-Moist White Cedar - Hardwood Mixed Forest (FOM7-2) inclusion.

This natural area does not contain many cultural communities but several of the ones that are present have inclusions. One of the Native Forb Old Field Meadow communities (CUM1-A) contains two different inclusion types: of Fresh-Moist Ash Lowland Deciduous Forest (FOD7-2) and Willow Mineral Thicket Swamp (SWT2-2) vegetation types. The other Native Forb Old Field Meadow community includes small patches of Native Deciduous Cultural Woodland (CUW1-A3) and Reed Canary Grass Mineral Meadow Marsh (MAM2-2) vegetation. One of the Exotic Cultural Savannah communities (CUS1-B) contains an inclusion of Native Deciduous Cultural Woodland (CUW1-A3) vegetation that could be related to the community present before much of the tree canopy was removed, creating a cultural savannah. The Buckthorn Cultural Thicket community (CUT1-B) contains inclusions of Forb Mineral Meadow Marsh (MAM2-10) and Manna Grass Mineral Shallow Marsh (MAS2-G) vegetation. One of the Native Deciduous Cultural Woodland communities (CUW1-A3) contains an inclusion of Dry-Moist Old Field Meadow (CUM1-1) vegetation.

Most of the treed communities at this site are middle-aged, although 12 are young and 17 are mature. Cavity trees are present in the older forest communities.

The Winston Churchill – Ballinafad natural area contains four large blocks of interior forest habitat (100m in from the edge of contiguous treed communities) capable of supporting area-sensitive species. The largest block of interior forest is in the northern half of the natural area. Two additional large blocks of interior forest lay to the east and west of the end of Heritage Road, in the central part of the site. A fourth large block of interior forest occurs in the south central part of the site. Several other medium-sized and small blocks of interior forest exist closer to the fragmented edges of the site.

**Table 2: ELC Vegetation Communities**

Map reference *	Vegetation type	Size in hectares	% of natural area
FOC1-2	Dry-Fresh White Pine - Red Pine Coniferous Forest <b>Regionally rare</b>	7.19	1.00
FOC2-2	Dry-Fresh White Cedar Coniferous Forest (8 communities)	23.70	3.31
FOCM6-1	Dry - Fresh White Pine Naturalized Coniferous Plantation	1.84	0.26
FOD1-1	Dry-Fresh Red Oak Deciduous Forest <b>Regionally rare</b>	4.37	0.61

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FOD3-1	Dry-Fresh Poplar Deciduous Forest	2.34	0.33
FOD5-1	Dry-Fresh Sugar Maple Deciduous Forest (13 communities)	105.10	14.66
FOD5-8	Dry-Fresh Sugar Maple - White Ash Deciduous Forest (5 communities)	15.48	2.16
FOD5-10	Dry-Fresh Sugar Maple - Paper Birch - Poplar Deciduous Forest (2 communities)	3.85	0.54
FOD7-1	Fresh-Moist White Elm Lowland Deciduous Forest (2 communities)	2.52	0.35
FOD8-1	Fresh-Moist Poplar Deciduous Forest	1.20	0.17
FODM5-11	Dry - Fresh Sugar Maple - Hardwood Deciduous Forest (8 communities)	60.05	8.37
FODR1-1	Dry - Fresh Sugar Maple - Hardwood Calcareous Shallow Deciduous Forest (3 communities)	9.81	1.37
FOM3-2	Dry-Fresh Hemlock - Sugar Maple Mixed Forest (2 communities)	6.95	0.97
FOM4-1	Dry-Fresh White Cedar - Paper Birch Mixed Forest	6.76	0.94
FOM4-A	Dry-Fresh White Cedar - Hardwood Mixed Forest (9 communities)	20.22	2.82
FOM6-1	Fresh-Moist Sugar Maple - Hemlock Mixed Forest <b>Regionally rare</b>	1.67	0.23
FOM7-1	Fresh-Moist White Cedar - Sugar Maple Mixed Forest	2.11	0.29
FOMM9-2	Fresh-Moist White Pine - Hardwood Mixed Forest	4.93	0.69
MAM2-2	Reed-canary Grass Mineral Meadow Marsh	0.23	0.03
MAM2-5	Narrow-leaved Sedge Mineral Meadow Marsh	1.63	0.23
MAMM3-1	Mixed Mineral Meadow Marsh	3.06	0.43
MAMO1-2	Cattail Graminoid Mineral Meadow Marsh (2 communities)	1.75	0.24
MAS2-1A	Broad-leaved Cattail Mineral Shallow Marsh	0.88	0.12
MAS3-1	Cattail Organic Shallow Marsh	1.57	0.22
MAS3-1A	Broad-leaved Cattail Organic Shallow Marsh	1.73	0.24
SAM1-6	Bladderwort Mixed Shallow Aquatic	0.50	0.07
SAM1-A	Water Lily - Bullhead Lily Mixed Shallow Aquatic	3.15	0.44
SAS1-4	Water Milfoil Submerged Shallow Aquatic	1.57	0.22
SWC3-2	White Cedar - Conifer Organic Coniferous Swamp <b>Regionally rare</b>	19.16	2.67
SWD2-1	Black Ash Mineral Deciduous Swamp (2 communities)	3.51	0.49
SWD2-2	Red (Green) Ash Mineral Deciduous Swamp (2 communities)	1.87	0.26
SWD3-2	Silver Maple Mineral Deciduous Swamp (2 communities)	1.25	0.17
SWD4-2	White Elm Mineral Deciduous Swamp	1.64	0.23
SWD4-3	Paper Birch - Poplar Mineral Deciduous Swamp	1.37	0.19
SWD5-1	Black Ash Organic Deciduous Swamp	1.87	0.26
SWD6-2	Silver Maple Organic Deciduous Swamp	2.51	0.35
SWD7-1	White Birch - Poplar Organic Deciduous Swamp	5.40	0.75
SWDM4-5	Poplar Mineral Deciduous Swamp (2 communities)	1.67	0.23
SWM1-1	White Cedar - Hardwood Mineral Mixed Swamp	2.91	0.41
SWM4-1	White Cedar - Hardwood Organic Mixed Swamp (2 communities)	3.28	0.46
SWMM4-2	Black Ash - Conifer Mineral Mixed Swamp (2 communities)	6.31	0.88
SWMR1-1	White Cedar - Hardwood Calcareous Rock/Bedrock Mixed Swamp	0.74	0.10

CUM1-A	Native Forb Old Field Meadow (2 communities)	4.19	0.58
CUM1-c	Exotic Forb Old Field Meadow	3.13	0.44
CUT1-B	Buckthorn Cultural Thicket	2.01	0.28
CUS1-2A	White Cedar Cultural Savannah	1.53	0.21
CUS1-B	Exotic Cultural Savannah (2 communities)	3.23	0.45
CUW1-A3	Native Deciduous Cultural Woodland (2 communities)	1.07	0.15
CUP3-2	White Pine Coniferous Plantation (2 communities)	5.67	0.79
CUP3-C	White Spruce Coniferous Plantation	1.80	0.25
CUP3-H	Mixed Conifer Coniferous Plantation	1.14	0.16
	<b>TOTAL AREA INVENTORIED</b>	<b>373.44</b>	

\* Note: The map reference code refers to the vegetation type shown on mapping for this area and also to the Appendix list of species typically encountered in this vegetation type.

### Species Presence

A data-sensitive species is present in this natural area. CVC can be contacted for additional information.

### Vascular Plants

A total of 659 vascular plant species are present, of which 504 (77%) are native.

Two of these are Species At Risk (Table 3). Butternut (*Juglans cinerea*, S-rank S3?) is Endangered both nationally and provincially. Hart's-tongue Fern (*Asplenium scolopendrium* var. *americanum*, S-rank S3) is considered Special Concern both nationally and provincially. Both of these species are also provincially rare. An additional seven plant species present here are also provincially rare. They are: Eastern Narrow-leaved Sedge (*Carex amphibola*, S-rank S2), Carey's Sedge (*Carex careyana*, S-rank S2), Large Toothwort (*Cardamine maxima*, S-rank S3), Northern Tubercled Orchid (*Platanthera flava* var. *herbiola*, S-rank S3), Slender Mountain-mint (*Pycnanthemum tenuifolium*, S-rank S3), Bristly Buttercup (*Ranunculus hispidus* var. *hispidus*, S-rank S3) and Lakecress (*Rorippa aquatica*, S-rank S3?). One hundred fifty-eight of the species here are regionally rare (Table 4). One algal species, one lichen species, one liverwort species, four moss species and two fungal species were also identified at this site.

### Birds

A total of 82 species of birds have been observed in this natural area, of which 81 (99%) are native. Four of these are Species At Risk (Table 3). Canada Warbler (*Wilsonia canadensis*), Wood Thrush (*Hylocichla mustelina*) and Red-headed Woodpecker (*Melanerpes erythrocephalus*) are Threatened nationally and considered Special Concern provincially. Eastern Wood-pewee (*Contopus virens*) is Special Concern nationally and provincially. There is also a historical record (from 1991) of Grasshopper Sparrow (*Ammodramus savannarum*) from this site. Grasshopper Sparrow is now considered Special Concern nationally.

The extensive amount of interior forest habitat present in this natural area provides for the breeding of eleven species of area-sensitive forest interior birds, namely Black-and-white Warbler (*Mniotilta varia*), Black-throated Blue Warbler (*Dendroica caerulescens*), Black-throated Green Warbler (*Dendroica virens*), Brown Creeper (*Certhia americana*), Hairy Woodpecker (*Picoides villosus*), Ovenbird (*Seiurus aurocapilla*), Pileated Woodpecker (*Dryocopus pileatus*), Red-breasted Nuthatch (*Sitta canadensis*), Scarlet Tanager (*Piranga olivacea*), Veery (*Catharus fuscescens*) and Winter Wren (*Troglodytes troglodytes*). Meadow and open country habitat here supports three species of grassland birds: Eastern Kingbird (*Tyrannus tyrannus*), Field Sparrow (*Spizella pusilla*) and Willow Flycatcher (*Empidonax traillii*). Wetlands and ponds in this natural area provide habitat for two waterfowl species, Mallard (*Anas platyrhynchos*) and Wood Duck (*Aix sponsa*), and for two wetland-nesting species, Pied-billed Grebe (*Podilymbus podiceps*) and Sora (*Porzana carolina*). This natural area also supports two colonial-nesting bird species, Great Blue Heron (*Ardea herodias*) and Green



Heron (*Butorides virescens*). Two raptor species, Broad-winged Hawk (*Buteo platypterus*) and Cooper's Hawk (*Accipiter cooperii*), are supported in this natural area.

## Fish

A total of 15 fish species have been observed in this natural area, 14 of which (93%) are native. None are at risk or rare. An additional eight species are recorded historically, including two Species At Risk (Atlantic Salmon, *Salmo salar* from 1991; Redside Dace, *Clinostomus elongatus* from 1954 and 1975).

Most of the fish species occurring in this natural area prefer warm water conditions or are tolerant of warm water and low dissolved oxygen conditions, although there are pockets of cooler waters that support cool/cold water species such as Brook Trout (*Salvelinus fontinalis*), Brown Trout (*Salmo trutta*), Fantail Darter (*Etheostoma flabellare*) and Golden Shiner (*Notemigonus crysoleucas*). Shade from the abundant tree cover in this natural area plus discharge of groundwater into streams, indicated by the presence of Northern Redbelly Dace (*Phoxinus eos*) which is normally associated with groundwater discharge in headwater areas, helps to create and maintain these cooler water habitats.

Two species at this site, Brook Trout and Brown Trout are of recreational interest and are important predators in aquatic ecosystems.

## Butterflies, Skippers and Moths

A total of 24 species of butterflies/skippers have been observed in this natural area, of which 22 (92%) are native. One of these is a Species At Risk (Table 3). Monarch (*Danaus plexippus*, S-rank S2N,S4B) is considered Special Concern both nationally and provincially. Monarch is also provincially rare.

## Dragonflies and Damselflies

A total of 17 species of dragonflies/damselflies have been observed in this natural area, all of which are native.

## Invertebrates

One species of terrestrial crayfish occurs in this natural area.

## Herpetofauna

A total of 16 species of herpetofauna have been observed in this natural area, all of which are native. These consist of eight frog/toad species, four salamander species, two turtle species and two snake species. Two of these are Species At Risk (Table 3). Western Chorus Frog (*Pseudoacris triseriata*) is Threatened nationally. Eastern Snapping Turtle (*Chelydra serpentina*, S-rank S3) is Special Concern both nationally and provincially. Eastern Snapping Turtle is also provincially rare.

All eight of the frog/toad species were heard calling from wetlands during their breeding season, indicating breeding activity.

## Mammals

A total of 15 species of mammals have been observed in this natural area, all of which are native. Three of these are bat Species At Risk (Table 3). Little Brown Myotis (*Myotis lucifugus*) and Northern Myotis (*Myotis septentrionalis*, S-rank S3) are both Endangered nationally and provincially. The Tri-colored Bat (*Pipistrellus subflavus*, S-rank S3?) is Endangered nationally. Two of these bat species, Northern Myotis and Tri-colored Bat, are also provincially rare.

**Table 3: Designated Species At Risk**

Scientific name	Common name	COSEWIC	COSSARO	S rank	G rank
Data-sensitive species	Contact CVC for details				
<b>VASCULAR PLANTS</b>					
<i>Asplenium scolopendrium</i> var. <i>americanum</i>	Hart's-tongue Fern	SC	SC	S3	G4T3
<i>Juglans cinerea</i>	Butternut	END	END	S3?	G4
<b>BIRDS</b>					
<i>Wilsonia canadensis</i>	Canada Warbler	THR	SC	S4B	G5
<i>Contopus virens</i>	Eastern Wood-pewee	SC	SC	S4B	G5
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	THR	SC	S4B	G5
<i>Hylocichla mustelina</i>	Wood Thrush	THR	SC	S4B	G5
<b>BUTTERFLIES</b>					
<i>Danaus plexippus</i>	Monarch	SC	SC	S2N, S4B	G5
<b>HERPETOFAUNA</b>					
<i>Chelydra serpentina</i>	Eastern Snapping Turtle	SC	SC	S3	G5
<i>Pseudacris triseriata</i>	Western Chorus Frog	THR		S4	G5
<b>MAMMALS</b>					
<i>Myotis lucifugus</i>	Little Brown Myotis	END	END	S4	G5
<i>Myotis septentrionalis</i>	Northern Myotis	END	END	S3	G4
<i>Pipistrellus subflavus</i>	Tri-colored Bat	END		S3?	G5

**Table 4: Regionally rare species (Kaiser, 2001)**

Scientific name	Common name	S rank	G rank
<b>VASCULAR PLANTS</b>			
<i>Anemone americana</i>	Round-lobed Heptica	S5	G5
<i>Anemone cylindrica</i>	Long-fruited Anemone	S4	G5
<i>Aralia racemosa</i> ssp. <i>racemosa</i>	Spikenard	S5	G4G5T4T5
<i>Asplenium platyneuron</i>	Ebony Spleenwort	S4	G5
<i>Asplenium rhizophyllum</i>	Walking-fern Spleenwort	S4	G5
<i>Asplenium scolopendrium</i> var. <i>americanum</i>	Hart's-tongue Fern	S3	G4T3
<i>Asplenium trichomanes</i> ssp. <i>trichomanes</i>	Maidenhair Spleenwort	SU	G5T5
<i>Bidens tripartita</i>	Three-Lobe Beggar-ticks	S5	G5
<i>Borodinia laevigata</i>	Smooth Rockcress	S5	G5
<i>Brachyelytrum erectum</i>	Bearded Shorthusk	S4S5	G5
<i>Calopogon tuberosus</i>	Tuberous Grass-pink	S4S5	G5
<i>Carex albursina</i>	White Bear Sedge	S5	G5
<i>Carex alopecoidea</i>	Foxtail Sedge	S5	G5
<i>Carex cephaloidea</i>	Thinleaf Sedge	S5	G5

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<i>Carex comosa</i>	Bristly Sedge	S5	G5
<i>Carex diandra</i>	Lesser Panicked Sedge	S5	G5
<i>Carex digitalis</i>	Slender Wood Sedge	S4S5	G5
<i>Carex eburnea</i>	Ebony Sedge	S5	G5
<i>Carex flava</i>	Yellow Sedge	S5	G5
<i>Carex hirtifolia</i>	Pubescent Sedge	S5	G5
<i>Carex hitchcockiana</i>	Hitchcock's Sedge	S5	G5
<i>Carex laevivaginata</i>	Smooth-sheath Sedge	S4	G5
<i>Carex lasiocarpa</i>	Slender Sedge	S5	G5
<i>Carex laxiflora</i>	Loose-flowered Sedge	S5	G5
<i>Carex leptoneura</i>	Finely-nerved Sedge	S4	G4
<i>Carex magellanica</i> ssp. <i>irrigua</i>	Boreal Bog Sedge	S5	G5T5
<i>Carex prairea</i>	Prairie Sedge	S5	G5?
<i>Carex scabrata</i>	Rough Sedge	S5	G5
<i>Carex sprengei</i>	Longbeak Sedge	S5	G5?
<i>Carex trisperma</i> var. <i>trisperma</i>	Three-seed Sedge subspecies	S5	G5T5
<i>Carex tuckermanii</i>	Tuckerman Sedge	S4	G4
<i>Carex utriculata</i>	Bladder Sedge	S5	G5
<i>Carex woodii</i>	Pretty Sedge	S4	G4
<i>Caulophyllum giganteum</i>	Giant Blue Cohosh	S4?	G4G5Q
<i>Chrysosplenium americanum</i>	American Golden-saxifrage	S5	G5
<i>Cinna latifolia</i>	Drooping Woodreed	S5	G5
<i>Claytonia caroliniana</i>	Carolina Spring Beauty	S5	G5
<i>Corallorhiza striata</i>	Striped Coralroot	S4	G5
<i>Cornus amomum</i> ssp. <i>obliqua</i>	Silky Dogwood	S5	G5T5
<i>Crataegus holmesiana</i>	Holmes' Hawthorn	S4S5	G5
<i>Crataegus succulenta</i>	Fleshy Hawthorn	S5	G4G5
<i>Cryptogramma stelleri</i>	Steller's Rockbrake	S4S5	G5
<i>Cuscuta gronovii</i>	Gronovius Dodder	S5	G5
<i>Cypripedium acaule</i>	Pink Lady's-slipper	S5	G5
<i>Cypripedium parviflorum</i> var. <i>pubescens</i>	Large Yellow Lady's-slipper	S5	G5
<i>Cypripedium reginae</i>	Showy Lady's-slipper	S4	G4
<i>Deparia acrostichoides</i>	Silvery Spleenwort	S4	G5
<i>Dirca palustris</i>	Eastern Leatherwood	S4?	G4
<i>Drosera rotundifolia</i>	Roundleaf Sundew	S5	G5
<i>Dryopteris clintoniana</i>	Clinton's Wood Fern	S4	G5
<i>Dryopteris goldiana</i>	Goldie's Wood Fern	S4	G4
<i>Eleocharis intermedia</i>	Matted Spike-rush	S4	G5
<i>Eleocharis palustris</i>	Creeping Spike-rush	S5	G5?
<i>Elymus canadensis</i>	Canada Wildrye	S4S5	G5
<i>Elymus riparius</i>	Eastern Riverbank Wildrye	S4?	G5
<i>Epilobium coloratum</i>	Purple-leaf Willow-herb	S5	G5
<i>Epilobium leptophyllum</i>	Linear-leaved Willow-herb	S5	G5
<i>Equisetum fluviatile</i>	Water Horsetail	S5	G5
<i>Equisetum palustre</i>	Marsh Horsetail	S5	G5
<i>Equisetum pratense</i>	Meadow Horsetail	S5	G5
<i>Equisetum variegatum</i> var. <i>variegatum</i>	Variegated Scouring Rush	S5	G5
<i>Eriophorum viridicarinatum</i>	Green Keeled Cottongrass	S5	G5
<i>Fallopia scandens</i>	Climbing False-buckwheat	S4S5	G5
<i>Galium aparine</i>	Catchweed Bedstraw	S5	G5
<i>Galium circaezans</i>	Wild Licorice	S5	G5
<i>Galium lanceolatum</i>	Torrey's Wild Licorice	S5	G5
<i>Galium tinctorium</i>	Stiff Marsh Bedstraw	S5	G5

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<i>Galium trifidum</i> ssp. <i>trifidum</i>	Small Bedstraw	S5	G5T5
<i>Gaultheria hispidula</i>	Creeping Snowberry	S5	G5
<i>Geum rivale</i>	Purple Avens	S5	G5
<i>Glyceria borealis</i>	Boreal Mannagrass	S5	G5
<i>Glyceria septentrionalis</i>	Floating Manna-grass	S4	G5
<i>Homalosorus pycnocarpus</i>	Narrow-leaved Glade Fern	S4	G5
<i>Hydrophyllum canadense</i>	Blunt-leaf Waterleaf	S4	G5
<i>Hypopitys monotropa</i>	American Pinesap	S4	G5
<i>Impatiens pallida</i>	Pale Jewelweed	S5	G5
<i>Juniperus communis</i> var. <i>depressa</i>	Dwarf Juniper	S5	G5T5
<i>Lactuca biennis</i>	Tall Blue Lettuce	S5	G5
<i>Leersia virginica</i>	Virginia Cutgrass	S4	G5
<i>Lemna trisulca</i>	Star Duckweed	S5	G5
<i>Lindera benzoin</i>	Spicebush	S5	G5
<i>Linnaea borealis</i> ssp. <i>longiflora</i>	Twinflower	S5	G5T5
<i>Liparis loeselii</i>	Loesel's Twayblade	S4S5	G5
<i>Lobelia cardinalis</i>	Cardinal Flower	S5	G5
<i>Lonicera hirsuta</i>	Hairy Honeysuckle	S5	G4G5
<i>Lonicera oblongifolia</i>	Swamp Fly-honeysuckle	S4S5	G4
<i>Ludwigia palustris</i>	Marsh Seedbox	S5	G5
<i>Lycopodium clavatum</i>	Running Clubmoss	S5	G5
<i>Lysimachia thyrsoiflora</i>	Water Loosestrife	S5	G5
<i>Maianthemum trifolium</i>	Three-leaf Solomon's-seal	S5	G5
<i>Malaxis monophyllos</i> var. <i>brachypoda</i>	White Adder's-mouth	S4	G5T4
<i>Medeola virginiana</i>	Indian Cucumber-root	S5	G5
<i>Melica smithii</i>	Smith Melic Grass	S4?	G4
<i>Menispermum canadense</i>	Canada Moonseed	S4	G5
<i>Menyanthes trifoliata</i>	Bog Buckbean	S5	G5
<i>Milium effusum</i>	Tall Millet-grass	S4S5	G5
<i>Moneses uniflora</i>	One-flower Wintergreen	S5	G5
<i>Muhlenbergia glomerata</i>	Marsh Muhly	S5	G5
<i>Myriophyllum sibiricum</i>	Common Water-milfoil	S5	G5
<i>Myriophyllum verticillatum</i>	Whorled Water-milfoil	S5	G5
<i>Najas flexilis</i>	Slender Naiad	S5	G5
<i>Nuphar variegata</i>	Yellow Cowlily	S5	G5T5
<i>Oclemena nemoralis</i>	Bog Aster	S5	G5
<i>Ophioglossum pusillum</i>	Adder's Tongue	S4S5	G5
<i>Orthilia secunda</i>	One-side Wintergreen	S5	G5
<i>Osmorhiza longistylis</i>	Smoother Sweet-cicely	S5	G5
<i>Osmunda claytoniana</i>	Interrupted Fern	S5	G5
<i>Osmunda regalis</i> var. <i>spectabilis</i>	Royal Fern	S5	G5T5
<i>Packera aurea</i>	Golden Ragwort	S5	G5
<i>Patis racemosa</i>	Black-seed Ricegrass	S4	G5
<i>Pedicularis canadensis</i>	Early Wood Lousewort	S5	G5
<i>Penstemon digitalis</i>	Foxglove Beardtongue	S4S5	G5
<i>Penstemon hirsutus</i>	Hairy Beardtongue	S4	G4
<i>Persicaria hydropiperoides</i>	Mild Water-pepper	S5	G5
<i>Persicaria virginiana</i>	Virginia Knotweed	S4	G5
<i>Phlox divaricata</i>	Wild Blue Phlox	S4	G5
<i>Physalis heterophylla</i>	Clammy Ground-cherry	S4	G5
<i>Picea glauca</i>	White Spruce	S5	G5
<i>Pilea fontana</i>	Springs Clearweed	S4	G5
<i>Platanthera flava</i> var. <i>herbiola</i>	Northern Tubercled Orchid	S3	G4T4Q

<i>Poa alsodes</i>	Grove Bluegrass	S4	G4G5
<i>Polypodium virginianum</i>	Rock Polypody	S5	G5
<i>Potamogeton foliosus</i>	Leafy Pondweed	S5	G5
<i>Potamogeton pusillus ssp. tenuissimus</i>	Berchtold's Pondweed	S4S5	G5T5
<i>Potentilla anserina</i>	Silverweed	S5	G5
<i>Pyrola chlorantha</i>	Greenish-flowered Wintergreen	S4S5	G5
<i>Ranunculus flabellaris</i>	Yellow Water-crowfoot	S4?	G5
<i>Ranunculus hispidus var. hispidus</i>	Bristly Buttercup	S3	G5T5
<i>Rhamnus alnifolia</i>	Alderleaf Buckthorn	S5	G5
<i>Rhododendron groenlandicum</i>	Common Labrador Tea	S5	G5
<i>Ribes hirtellum</i>	Smooth Gooseberry	S5	G5
<i>Rumex orbiculatus</i>	Water Dock	S4S5	G5
<i>Salix amygdaloides</i>	Peach-leaved Willow	S5	G5
<i>Salix exigua</i>	Sandbar Willow	S5	G5
<i>Salix lucida</i>	Shining Willow	S5	G5
<i>Salix serissima</i>	Autumn Willow	S4	G4
<i>Schoenoplectus acutus</i>	Hard-stem Bulrush	S5	G5
<i>Sisyrinchium montanum</i>	Strict Blue-eyed-grass	S5	G5
<i>Solidago patula</i>	Roundleaf Goldenrod	S5	G5
<i>Solidago uliginosa</i>	Bog Goldenrod	S5	G4G5
<i>Sparganium emersum</i>	Green-fruited Burreed	S5	G5
<i>Sparganium eurycarpum</i>	Broad-fruited Burreed	S5	G5
<i>Spinulum annotinum</i>	Stiff Clubmoss	S5	G5
<i>Staphylea trifolia</i>	American Bladdernut	S4	G5
<i>Symphotrichum boreale</i>	Rush Aster	S5	G5
<i>Symphotrichum pilosum var. pilosum</i>	Old Field Aster	S5	G5T5
<i>Symplocarpus foetidus</i>	Skunk Cabbage	S5	G5
<i>Teucrium canadense ssp. canadense</i>	Canada Germander	S5?	G5T5
<i>Triosteum aurantiacum</i>	Orange-fruit Horse-gentian	S5	G5
<i>Turritis glabra</i>	Tower-mustard	S5	G5
<i>Utricularia vulgaris</i>	Greater Bladderwort	S5	G5
<i>Vaccinium myrtilloides</i>	Velvetleaf Blueberry	S5	G5
<i>Veronica scutellata</i>	Marsh-speedwell	S5	G5
<i>Viola cucullata</i>	Marsh Blue Violet	S5	G4G5
<i>Viola macloskeyi ssp. pallens</i>	Smooth White Violet	S5	G5T5
<i>Viola renifolia</i>	Kidney-leaf White Violet	S5	G5
<i>Viola selkirkii</i>	Great-spurred Violet	S5	G5?
<i>Zanthoxylum americanum</i>	Northern Prickley Ash	S5	G5

### Site Condition and Disturbances

This natural area is in good condition. For an area of its size, it has little fragmentation. This is in part due to its unsuitability for agriculture. The historical quarry workings here have disturbed the interior core areas of the site although for the most part, quarrying activity has ceased, the areas are regenerating natural vegetation communities and habitat continuity is being restored. The removal of soils and surrounding vegetation during quarrying has made regeneration slower and patchy and in most cases communities that are different from those originally present are taking over. For example, east of Heritage Road at the old Brooke quarry site, soil has been removed, there are cut pits in the bedrock, there are drainage cuts leading from the pits over to the slope edge and there are large piles of rock rubble. In some cases the disturbance associated with quarrying has allowed the introduction of non-native species into the interior of the habitat patch. Large amounts of the forest would have been removed to fuel lime and brick kilns and to sustain nearby sawmills and building needs. One community at this site shows signs past (over 30 years old) widespread diameter limit logging. This

activity too, has been an avenue for the introduction of non-native species, although the community is on the edge of the natural area. A few other clearings, possibly for small agricultural fields or as large yards associated with residences are now being allowed to regenerate natural vegetation.

Almost all communities in this natural area have some disturbance from non-native species. The communities that do not have non-native species are Dry-Fresh White Cedar Coniferous Forests (FOC2-2) or Dry-Fresh White Cedar - Hardwood Mixed Forests (FOM4-A) or shallow aquatic and marsh communities. Generally, disturbance from non-native species is light, with exotic species occurring as single individuals or small clumps scattered through the community. Several communities have more intensive occurrences of non-native or invasive species resulting in more moderate disturbance. These tend to be cultural communities, thus those more severely impacted by past land use and communities adjacent to residential areas and the railway (now the Caledon Trailway). A few other communities are dominated by extensive infestations of non-native and invasive species. A large number of the invasive species that occur at this site are transformer-type, having the ability to change the character of natural communities if their populations go unchecked. These problematic invasive species here are: Common Buckthorn (*Rhamnus cathartica*), Garlic Mustard (*Alliaria petiolata*), Giant Hogweed (*Heracleum mantegazzianum*), European Swallow-wort (*Cynanchum rossicum*), Black Swallow-wort (*Cynanchum louiseae*), Dame's Rocket (*Hesperis matronalis*), Tartarian Honeysuckle (*Lonicera tatarica*), Morrow Honeysuckle (*Lonicera morrowii*), Bella Honeysuckle (*Lonicera x bella*), European Fly-honeysuckle (*Lonicera xylosteum*), Periwinkle (*Vinca minor*), Oriental Bittersweet (*Celastrus orbiculatus*), Common Reed (*Phragmites australis* ssp. *australis*) and Purple Loosestrife (*Lythrum salicaria*).

Forest patches that sustained extensive canopy damage in the December 2013 ice storm now have increased light reaching the forest floor. Invasive species present in these patches may increase dramatically over the next several years, in response to increased light levels. It is recommended that invasive species in these patches of damaged forest be removed (while it is still relatively easy) before they become more abundant and impact the character of the forest vegetation.

The Bruce Trail and its access side trails run through the length of this natural area, along with some re-routed sections. For the most part ongoing disturbance is light from these trails. Part of the trail runs along historically opened road allowances (based on debris from a derelict car and the width of some cuts through earth banks) that have now grown back in. The Bruce Trail route is well-marked but its impact on the ground where it travels over bedrock is faint. In a few spots where the trail runs through some small wet meadows or in valley bottoms, trail-related disturbance is more visible and moderate in extent, although still localized. The trail skirts one small area of erosion and switchbacks up the opposite slope so does not appear to be exacerbating erosion or damage to vegetation.

A few communities near Mississauga Road, Winston Churchill Boulevard, Olde Base Line and the brickworks have light to moderate noise. Mississauga Road and Olde Base Line are fairly busy for rural roads.

Disturbance due to tree disease and death is light and varies from being occasional to widespread. In the forest communities, this disturbance stems mainly from Butternut Canker and Beech Bark Disease. In wetland communities, tree death tends to be due to change in water levels and saturation of soils.

Disturbance from wind-throw is mostly light in several scattered forest and wetland communities. The shallow soils and porous/cracked rock that allows easy passage of water, it is expected that trees are more susceptible to wind-throw than in other locations. In one community of this natural area, an initial small area of wind-throw seems to have increased in size once wind gets into the opening.

There is light to moderate, and localized to widespread disturbance from browsing, scattered across many communities at this site. Beaver activity also causes some disturbance in a shallow wetland near the northwest side of the area. This area has a lot of vernal pooling on the escarpment terraces and water levels vary considerably on these terraces.

Parts of the forest in this natural area was heavily damaged by a December 2013 ice storm. Assessment of the extent of damage and mitigation of public safety issues arising from the storm damage were conducted throughout 2014. It is expected that the full extent of damage may take several years to manifest.

## **Ecological Features and Functions**

This natural area is in the Lake Simcoe - Rideau Ecoregion (6E).

The northwest half of this natural area is included in the provincially-significant Caledon Mountain Slope Forest LS-ANSI and the Caledon Mountain ESA. Wetlands at this site are part of the Caledon Mountain Wetland Complex.

With forest communities greater than 4 hectares and wetlands over 0.5 hectares in size, this natural area has the potential to support and sustain biodiversity, healthy ecosystem functions and to provide long-term resilience for the natural system. The riparian areas present provide transitional zones between terrestrial and aquatic habitats, helping to maintain the quality of the streams, and providing movement corridors for plants and wildlife.

By containing a relatively high number of habitat types, this natural area has the potential for high biodiversity function, particularly for species that require more than one habitat type for their life needs. This natural area contains four regionally rare vegetation communities and a regionally rare vegetation inclusion, and thus has the potential to support additional biodiversity above and beyond that found in common community types.

This natural area has excellent connectivity with other nearby large natural areas along the escarpment corridor. At the north end of the area there is extensive linkage with escarpment natural habitat across Olde Base Line Road and Mississauga Road and at the south end there is extensive connectivity with large natural areas of the escarpment across Winston Churchill Boulevard. All three of these roads are periodically moderately busy. There is also good linkage with a large natural area to the northwest, across Ballinafad Road/Rockside Road. This road is a very quiet rural road, gravel and narrow, and is thus a minimal barrier to wildlife movement. The Winston Churchill – Ballinafad natural area also has narrower linkage to the southeast, through the village of Terra Cotta and across King Road, with the natural vegetation along the Credit River valley. The relatively close proximity of other areas of natural habitat creates above-average potential for wildlife movement between natural areas, species dispersal and recovery from disturbance, creating additional resilience for the ecosystem.

As a part of the provincially legislated Niagara Escarpment Plan, this area contributes to connectivity between major provincial corridors, and allows for migration of species across large areas of the province. The Credit River runs near this area and thus supports the connectivity function of the Credit River and its tributaries by providing a natural habitat corridor and facilitating the cross-regional movement of wildlife along this corridor, between major provincial protected areas.

A data-sensitive species is present in this natural area.

This area contains four regionally rare vegetation types (plus a fifth as an inclusion).

This natural area supports 12 Species At Risk (two plant species, four bird species, one butterfly species, one frog species, one turtle species, three bat species), 13 provincially rare species (nine plant species, one butterfly species, one turtle species, two bat species) and 158 regionally rare plant species.

The large amount of interior forest habitat at this site supports 11 species of area-sensitive forest interior birds.

The area also supports three grassland bird species, two species of colonial-nesting birds, two waterfowl species, two species of wetland-nesting birds and two species of raptors.

Wetlands at this site support amphibian breeding.

Turtles were observed at this site and thus the area may support turtle breeding.

Based on the above features, this area should be evaluated to determine if significant wildlife habitat is present in accordance with the Provincial Policy Statement, Region of Peel Official Plan, and area municipal Official Plan.

This natural area contains cavity trees.

## **Opportunities**

The forest at this site contains occasional clearings. Planting of the clearings with native trees using those species found in the adjacent forest will help to reduce fragmentation and “edge” habitat, improving the shape and size of the forest patch and protecting the integrity of interior forest habitat.

Allowing the plantations at Winston Churchill – Ballinafad to naturalize and develop more complex vegetation structure is encouraged, as this promotes biodiversity.

Any recreational development of trails should be designed to avoid sensitive areas and sensitive species. It should also use methods that minimize impact to soils and tree roots and should discourage trail users from straying off the designated path.

Invasive species could be mapped and monitored, with monitoring done particularly around the edges of this natural area and along trails, which often are the first places where invasive species take hold. Invasive species controls might be considered to prevent their intrusion into the interior of this natural area which would be disruptive to the ecosystem. The European Swallow-wort and Black Swallow-wort (Dog-strangling Vine species) at this site should be removed as soon as possible. It spreads rapidly both vegetatively and by wind-borne seeds and quickly dominates native vegetation. Dog-strangling Vine is best controlled before populations expand and before the seeds can spread to other areas.

Ash species are a major component of several treed communities at this site, so these are expected to be severely affected by Emerald Ash Borer over the coming years. As ash trees are killed by the insects, gaps in the canopy will open up and could provide opportunities for the increase of invasive species. Thus, invasive species control and if possible, removal, in the ash-dominated community should be a priority. Ash trees along the public trails on CVC properties in this natural area may be considered to present a public health hazard and may be removed. Thus the importance of invasive species control along the trails is emphasized.

Groundwater seepage areas should be mapped in detail over this area and any trail development should avoid these fragile areas.

Several Species At Risk were found in this natural area and detailed assessments of their populations and habitat conditions are recommended in order to identify stewardship or restoration actions that may help to retain or enhance the habitat for these species. The health of Butternut trees present at this site could be assessed by a Butternut Assessor to determine whether any are candidates for inclusion in the Butternut recovery program.

There is a record of Grasshopper Sparrow from this natural area, observed in 1991, which is out of date. As this species is now a Species At Risk as well as a species indicative in part of Significant



Wildlife Habitat, it is recommended that the location of the historical record be field-checked to determine whether the species still occurs here.

This area is known to have a large diversity of vascular plant and bird species. Data on other groups is lacking. Targeted inventories for butterflies, dragonflies/damselflies, mammals and amphibians are expected to be productive, given the overall biological richness of this area. Given suitable roosting and foraging habitat at this site, bat inventories may be productive.

Since some of the forest communities at this site are mature, they could be checked for old growth characteristics. Old growth forest is a special feature that is uncommon in the study area.

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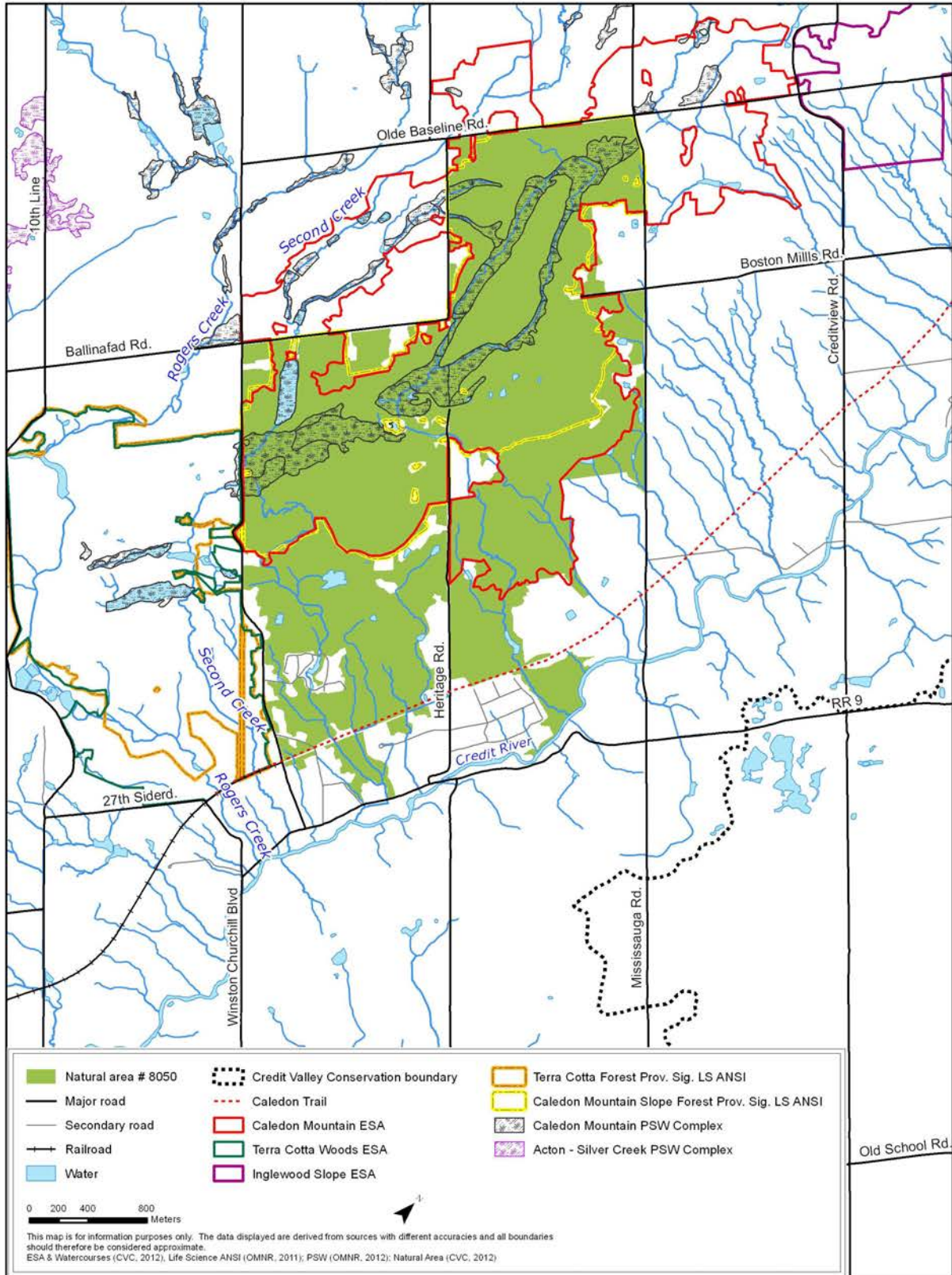
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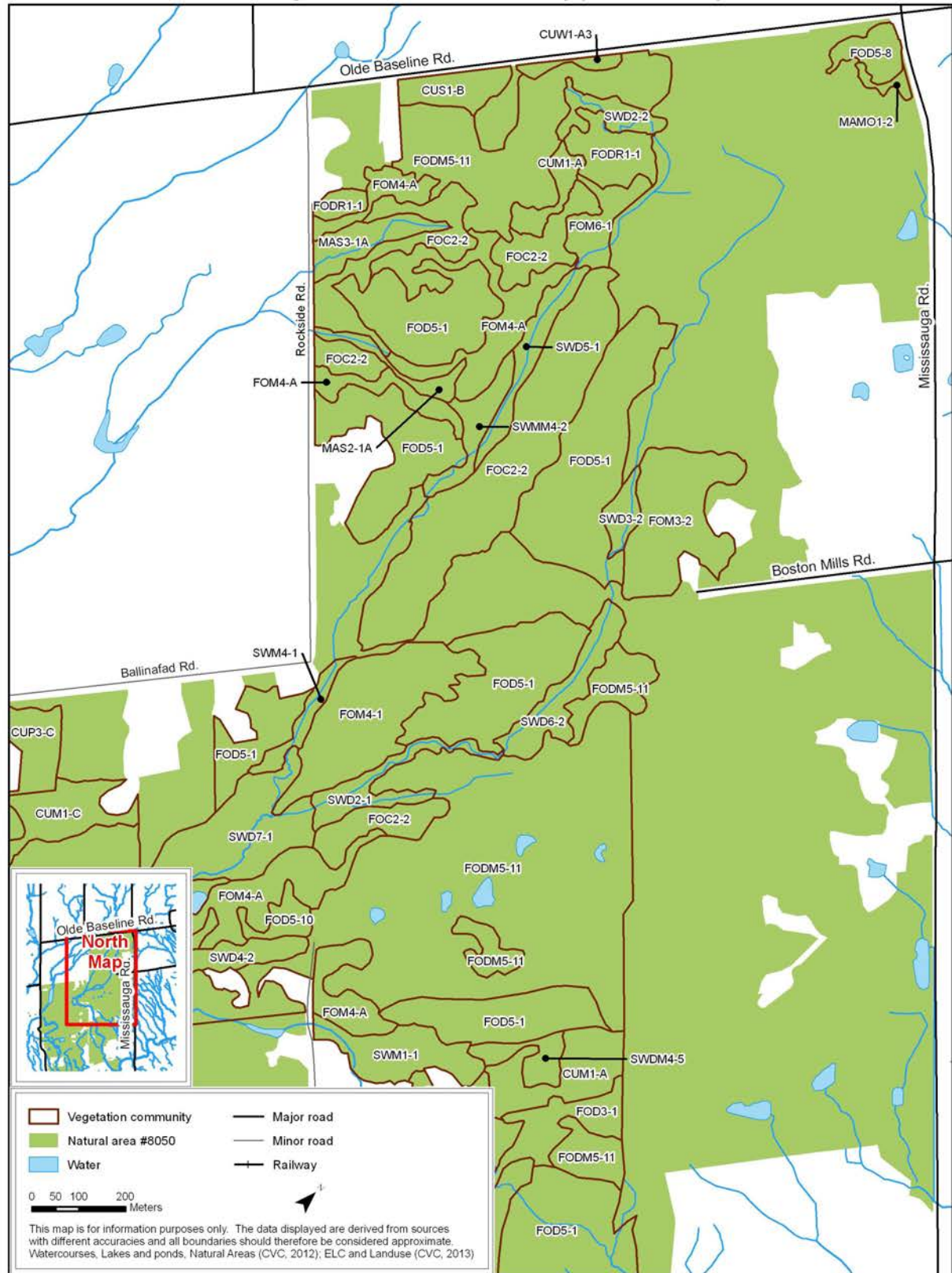
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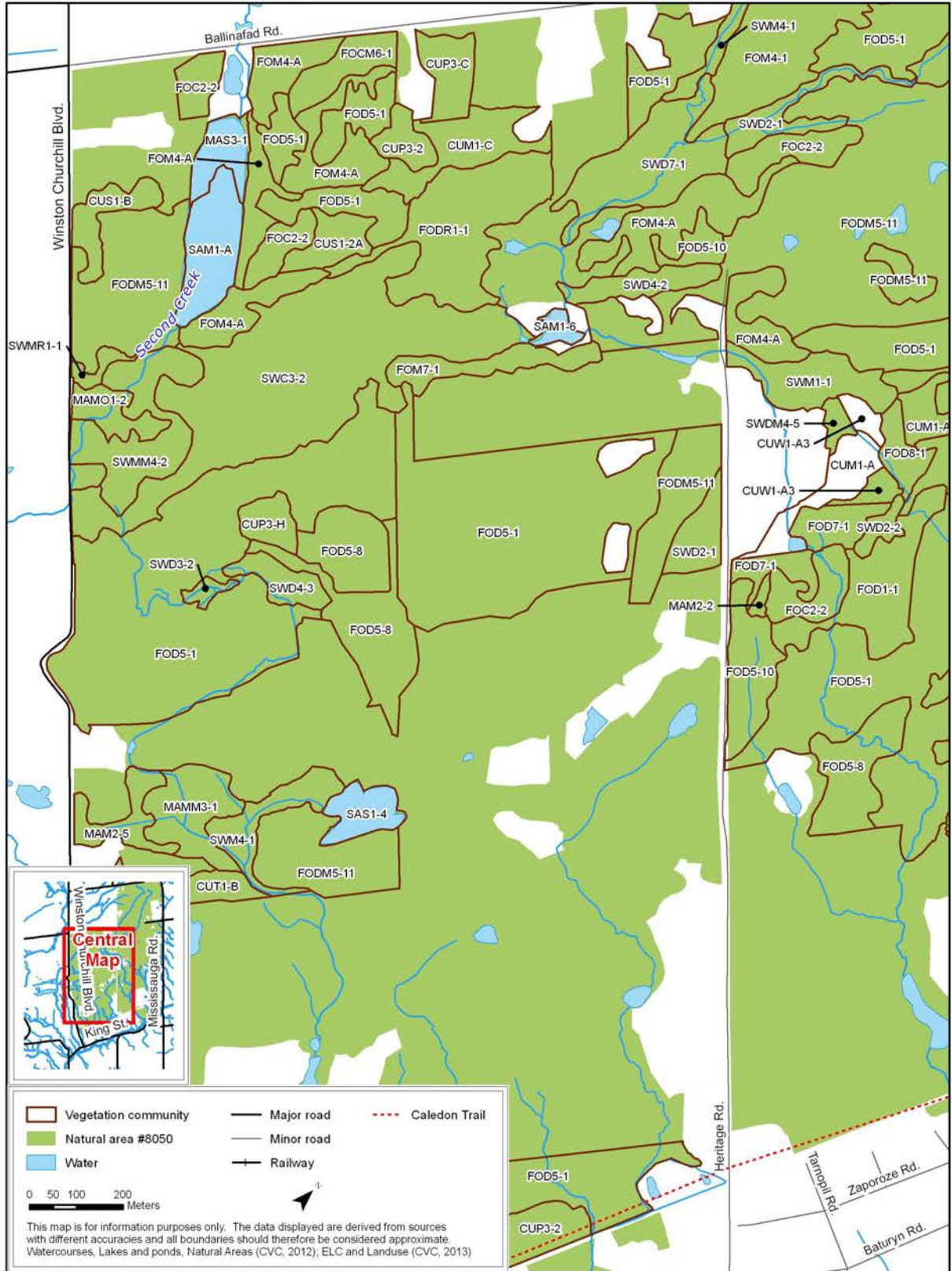
Winston Churchill - Ballinafad Context Map (NAI Area #8050)



Winston Churchill - Ballinafad Vegetation Communities North Map (NAI Area #8050)



Winston Churchill - Ballinafad Vegetation Communities Central Map (NAI Area #8050)



Winston Churchill - Ballinafad Vegetation Communities South Map (NAI Area #8050)

