December 1, 2021

Vale Canada Limited, Port Colborne Community Action Plan (PCCAP)

Natural Heritage Inventory and Woodlot Health Assessment

Prepared for

Vale Canada Limited

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Frontispiece: photo of western marsh communities on the site (foreground) and swamp communities (background). Photo credit: Pauline Catling

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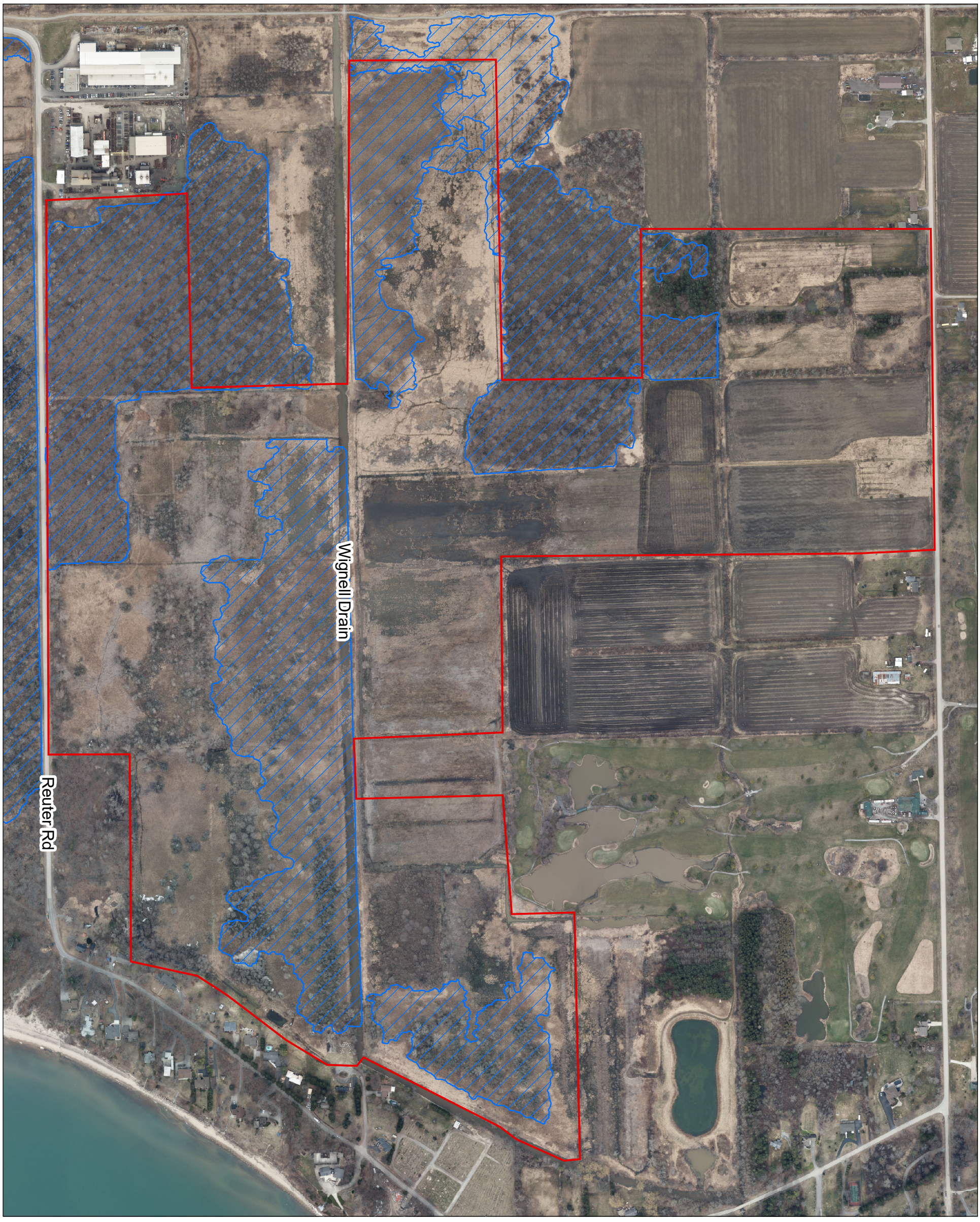
Vale Canada Limited, Port Colborne Community Action Plan (PCCAP): Natural Heritage Inventory and Woodlot Health Assessment

1. Introduction

North-South Environmental Inc. (NSE) was retained in 2021 to undertake a natural heritage inventory and woodlot health assessment on lands owned by Vale Canada Limited (the "lands" or the "site"), adjacent to and east of the Port Colborne Refinery in the City of Port Colborne, Ontario. This study focused on lands owned by Vale Canada Limited (formerly Vale Inco, CVRD Inco and Inco Limited), which have remained undeveloped since their acquisition in the 20th century (**Figure 1**). The lands contain forests and wetlands in various stages of ecological succession. These communities have been the focus of ongoing monitoring for soil contaminants (e.g., nickel), but have never been the subject of a full biodiversity inventory or been assessed for significant ecological features.

The purpose of the current project was to undertake a three-season reconnaissance inventory of plants and wildlife on undeveloped Vale lands in Port Colborne and provide a preliminary assessment of woodlot health and significant ecological features from an ecosystem perspective. This report is intended to inform the ongoing Community-Based Risk Assessment – Natural Environment Ecological Risk Assessment (CBRA-NE-ERA).

One constraint has been mapped on the site in the past: a Provincially Significant Wetland (PSW) as mapped by the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF). The mapped extent of this wetland is shown in **Figure 1**. The wetland is a complex consisting of several individual patches, which occur both on the refinery site proper and on the subject site. Constraints related to PSWs are discussed in **Section 4.2**.



Legend

- Approximate Subject Property
- Provincially Significant Wetland (PSW)

Figure 1 | Port Colborne : Study Area

Project Number	Date:	N
21-1198	2021-11-30	

0 100 200 300 400 500 Meters

Data Provided by: North South Environmental Inc.
Imagery: First Base Solutions

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There is the potential that the site supports habitat for Species at Risk. Sixteen significant species have been documented for the 1 km^2 squares encompassing the site (**Appendix 1**). Habitat for most of these species is present on the site.

2. Methods

2.1. Site Visits

NSE staff visited the study area on 11 occasions in 2021 to perform field investigations (see **Table 1**). Locations of field surveys are shown in **Figure 2**.

Field investigations consisted of:

- Vegetation community assessment using the Ecological Land Classification (ELC) system for southern Ontario (Lee et al., 1998);
- Spring, summer, and fall vegetation inventories;
- Woodland health surveys;
- Amphibian breeding surveys at nine survey locations following the Marsh Monitoring Program (MMP) protocol, with additional surveys to accommodate timing windows for Fowler's Toad (*Anaxyrus fowleri*).
- Breeding bird surveys, with 10-minute point counts at seven survey points (shown in **Figure 2**), in all major vegetation types following the Environment Canada Forest Bird Monitoring protocol, as well as area-searches with breeding evidence assessed according to the Atlas of the Breeding Birds of Ontario (OBBA) protocol;
- Marsh Bird Monitoring surveys, conducted at selected locations (**Figure 2**) in areas where standing water was present, scoped to include calls for three species: Least Bittern, Virginia Rail and Sora, for which habitat was present;
- In addition to call count surveys for amphibians using the MMP protocol, a Wildlife Acoustics SM3 recorder ("froglogger") was installed at three locations in the study area in an effort to record Fowler's Toad and other species. Amphibian calls were sampled by listening to calls logged between dusk and one hour after dusk (i.e. not all recordings were screened). Amphibian call count and froglogger locations are shown in **Figure 2.**

Table 1. Summary of site visits: timing, purpose, and staff

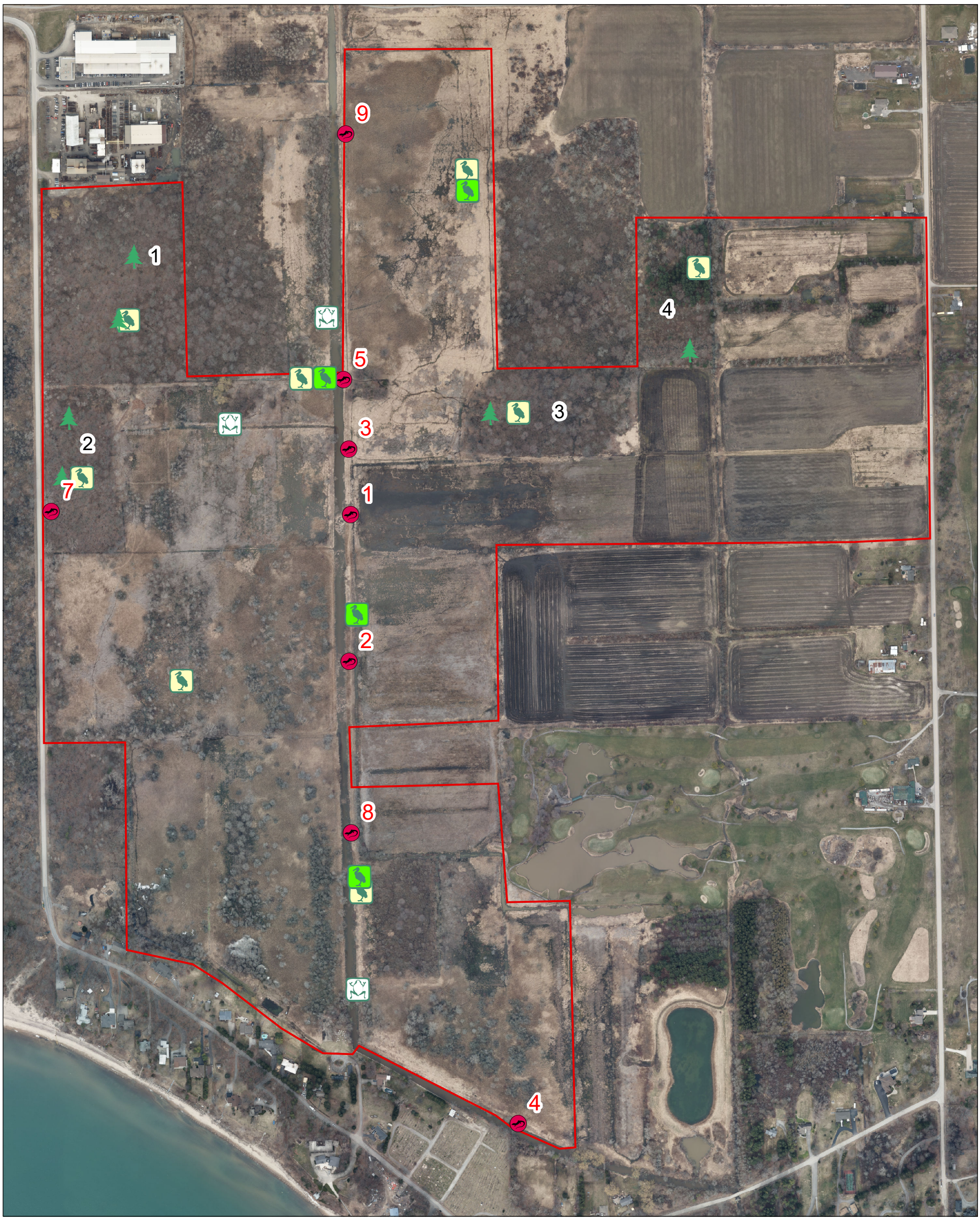
Date	Purpose	NSE Staff
April 1st, 2021	Project startup meeting SM3 installation	Will Van Hemessen
April 8th, 2021	Amphibian Survey #1 Relocation of SM3	Pauline Catling, Devin Bettencourt, Will Van Hemessen
April 23rd, 2021	Spring Vegetation Inventory	Will Van Hemessen

Date	Purpose	NSE Staff
May 13th, 2021	Amphibian Survey #2	Pauline Catling
May 23rd, 2021	Breeding Bird Survey #1 and additional Spring Flora	Sarah Mainguy
May 25th, 2021	Breeding Bird Survey #1 and additional Spring Flora	Sarah Mainguy
May 26th, 2021	Amphibian Survey #3	Pauline Catling, Devin Bettencourt
June 13th, 2021	Amphibian Survey #4	Pauline Catling
July 5th, 2021	Breeding Bird Survey #2	Sarah Mainguy
July 29th, 2021	Summer Flora and Woodland Health Survey	Jessica Consiglio, Devin Bettencourt
Sept 17th, 2021	Fall Flora	Jessica Consiglio

The conservation status of plants and wildlife identified in the study area was determined using the NHIC's most recent species checklists (2021) and the Checklist of the Vascular Plants of Ontario's Carolinian Zone (Oldham 2017).

2.2. Tree Health – Preliminary Reconnaissance Methodology

NSE conducted a preliminary reconnaissance of tree health focusing on four mature treed communities within the study area: two that occurred in the western part of the site just east of Reuter Road, and two that occurred on the eastern part of the site (locations shown in **Figure 2**). The woodlots surveyed in this study correspond with mature woodlots that were the focus of the CBRA NE-ERA study. Woodlots 16-19 in the CBRA NE-ERA correspond, generally with SWD 2-2 (woodlot 16), SWD 1-3 (woodlots 17 and 18), and SWD 3-3 (woodlot 19). Sparsely treed communities within the southwestern part of the study area were not surveyed as they were meadow marsh / thicket swamps succeeding to treed swamps, resulting in a community of young, immature trees. Tree health was assessed by undertaking detailed assessments of trees in six 0.05 ha sampling plots (i.e., two plots 12m in radius in each of the two primary woodland features in the study area, and one plot in each of the two eastern woodlots) and extrapolating the results to the entire unit.



Legend

- Approximate Subject Property
- Marsh Bird Monitoring Station
- Bird Point Count Station
- Tree Health Sampling Station
- Amphibian Point Count Station
- Automated Detector Station
- Woodlot Health Survey Unit

Figure 2 | Port Colborne : Survey Stations

Project Number	Date:	N
21-1198	2021-10-19	

0 100 200 300 400 500 Meters

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Within each plot, all trees larger than 10 cm in diameter were inventoried and an assessment of their overall condition was given using the following classes:

Class 1 Excellent Condition, No Risk Trees
Sound, thrifty, full crowned trees of natural shape with no dead limbs in the top of the crown and no significant evidence of decline.

Class 2 Good Condition, Low Risk Trees
Full to medium crowned trees of natural shape with a live crown ratio ≥40% that exhibit no more than minor dead wood (e.g. up to 10% secondary branches only and mainly in the lower crown) and no more than one moderate trunk defect or indicator of decline.

Class 3 Fair Condition, Medium Risk Trees
Full to small crowned trees with a live crown ratio ≥25% that exhibit no more than moderate dead wood (e.g. 11 to 35% secondary branches mostly) and no more than two moderate trunk defects or indicators of decline.

Class 4 Poor Condition, High Risk Trees
Medium to very small crowned trees (e.g. live crown ratio < 25%) that exhibit one or more of the following conditions.
a) Trees with significant foliage of poor colour and less than normal size.
b) Trees with significant crown dieback (e.g. > 35% dead wood in primary limbs).
c) Trees with major trunk defects or decay (e.g. one extensive problem, or 3 or more distinct but moderate decline indicators).

Class 5 Very Poor Condition, Very High Risk Trees
Dying trees with very little live crown.

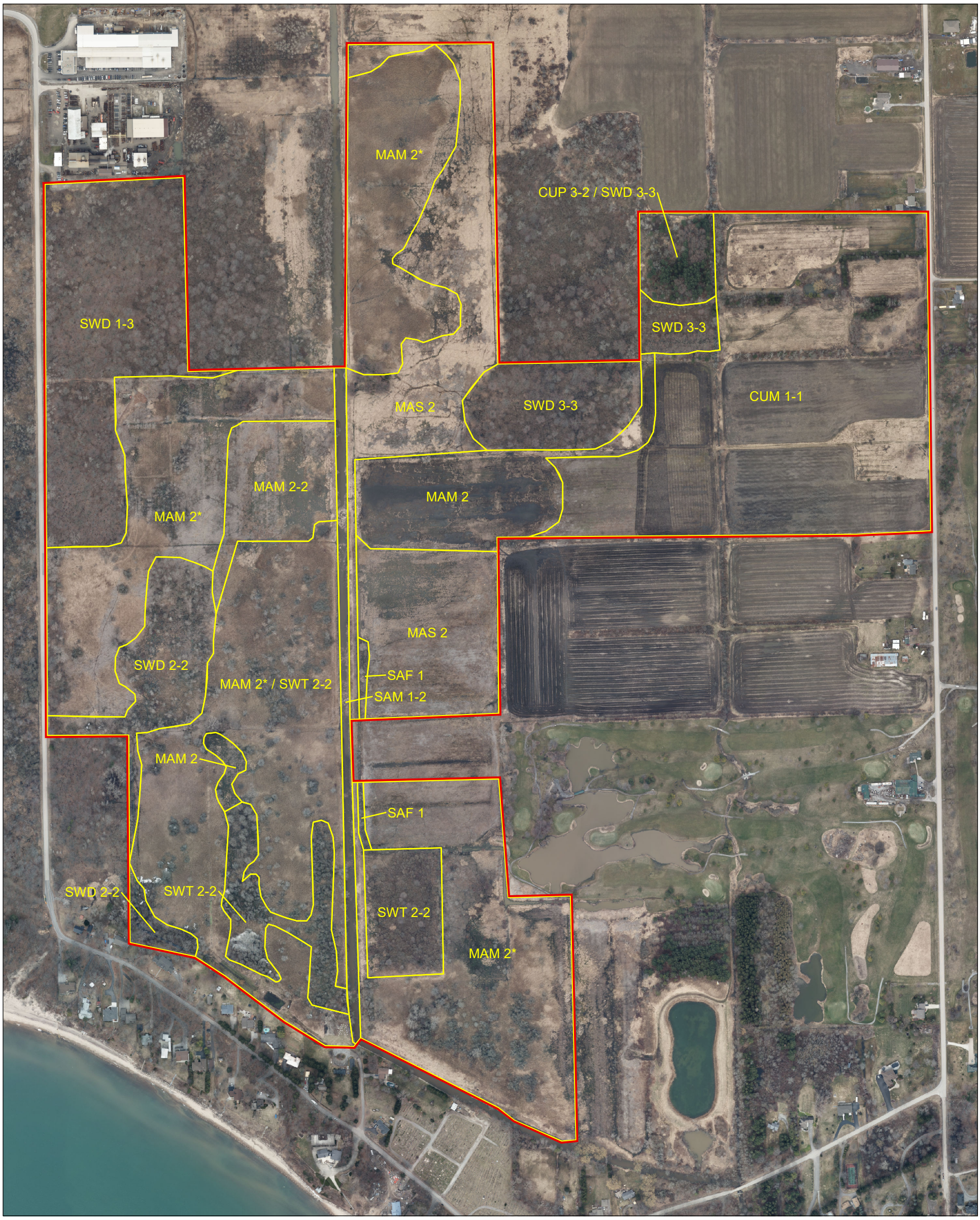
Class 6 Dead or Almost Dead, Very High Risk Trees
Dead snags or trees with no live crown that are expected to die very soon.

3. Natural Heritage Inventory Results

3.1. Vegetation

3.1.1. Vegetation Communities

Three broad vegetation community series were delineated in the study area, including swamp, meadow and marsh communities (see **Figure 3 and Table 2** below). A total of 12 vegetation types (finer delineations of community series) were documented.



Legend

- Approximate Subject Property
- Ecological Land Classification

CUM 1-1: Dry - Moist Old Field Meadow Type
CUP 3-2: White Pine Coniferous Plantation Type
MAM 2: Mineral Meadow Marsh Ecosite
MAM 2*: Phragmites Dominated Mineral Meadow Marsh Type
MAM 2-2: Reed-canary Grass Mineral Meadow Marsh Type
MAS 2: Mineral Shallow Marsh Ecosite
SAF 1: Floating-leaved Shallow Aquastic Ecosite
SAM 1-2: Duckweed Mixed Shallow Aquatic Type
SWD 1-3: Pin Oak Mineral Deciduous Swamp Type
SWD 2-2: Green Ash Mineral Deciduous Swamp Type
SWD 3-3: Swamp Maple Mineral Deciduous Swamp Type
SWT 2-2: Willow Mineral Thicket Swamp Type

Figure 3 | Port Colborne : Ecological Land Classification

Project Number	Date:	N
21-1198	2021-10-19	

0 100 200 300 400 500 Meters

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Table 2. Vegetation communities

Vegetation Community	Area (ha)	Description
Pin Oak Mineral Deciduous Swamp (SWD 1-3)	8.07	This community is located on the west side of the property along Reuter Rd. The canopy is dominated by Red Oak (*Quercus rubra*), Pin Oak (*Quercus palustris*) and Freeman's Maple (*Acer freemanii*). The understory is dominated by Northern Spicebush (*Lindera benzoin*), and the ground layer is dominated by Virginia creeper (*Parthenocissus quinquefolia*) followed by Wild Lily-of-the-valley (*Maianthemum canadense*).
Green Ash Mineral Deciduous Swamp (SWD 2-2)	3.52	This community is located on the west side of the property. The canopy is dominated by Trembling Aspen (*Populus tremuloides*), followed by Red Ash (*Fraxinus pennsylvanica*), and then Peach-leaved Willow (*Salix amygdaloides*). The sub-canopy is dominated by Manitoba Maple (*Acer negundo*), the understory is dominated by Common Reed (Phragmites australis), and the ground layer is dominated by Spotted Jewelweed (*Impatiens capensis*), Jack-in-the-pulpit (*Arisaema triphyllum)* and Garlic Mustard (*Alliaria petiolate*).
Swamp Maple Mineral Deciduous Swamp (SWD 3-3)	3.56	There are two sections within the subject property listed as SWD 3-3 communities, both on the northeastern portion of the property. Canopy is mainly dominated by Red Oak (*Quercus rubra*) and Silver Maple (*Acer saccharinum*), the sub-canopy is dominated by Bitternut Hickory (*Carya cordiformis*), the understory is dominated by Northern Spicebush (*Lindera benzoin*). The ground layer is dominated by Garlic Mustard (*Alliaria petiolata*), Spotted Jewelweed (*Impatiens capensis*), and Virginia Creeper (*Parthenocissus quinquefolia*).
Swamp Maple Mineral Deciduous Swamp (SWD 3-3) / White Pine Coniferous Plantation (CUP3-2)	1.32	The community is located within the northeast section of the subject property. The emergent layer includes the planted Norway Spruce (*Picea abies*) and Eastern White Pine (*Pinus strobus),* followed by rare Silver Maple (*Acer saccharinum*). The understory has an abundance of Northern Spicebush (*Lindera benzoin)* and the occasional

Vegetation Community	Area (ha)	Description
		Allegheny Blackberry (*Rubus allegheniensis*) and Black Raspberry (*Rubus occidentalis*). The ground layer has the occasional Dame's Rocket (*Hesperis matronalis*).
Willow Mineral Thicket Swamp (SWT 2-2)	4.11	This community is located within the southern portion of the subject property, both east and west of the canal. The canopy is dominated by Bebb's Willow (*Salix bebbiana*), dead Willow sp. (*Salix sp*.), and Pussy Willow (*Salix discolor*). There is no sub-canopy. The understory is dominated by Common Reed (*Phragmites australis*), and Bebb's Willow (*Salix bebbiana*), the ground layer is dominated by Rice Cut Grass (*Leersia oryzoides*) followed by Common Reed (*Phragmites australis*) and *Carex spp*.
Duckweed Mixed Shallow Aquatic (SAM1-2)	8.07	This community represents the canal that runs across the subject property north to south. The understory is dominated by Flowering-rush (*Butomus umbellatus*) followed by Broad-leaved Arrowhead (*Sagittaria latifolia*), the surface of the water is dominated by Small Duckweed (*Lemna minor*).
Floating-leaved Shallow Aquatic (SAF 1)	0.23	This community is located in the southern half of the subject property in a smaller canal east of the main canal. It is dominated by a variety of species, with Small Duckweed being present during periods when standing water is present, later supplanted by a variety of emergent wetland species.
Mineral Meadow Marsh (MAM 2)	4.53	There are two sections within the subject property listed as MAM 2 community. One is located just east of the canal and the other is a small area located within the southwestern portion of the subject property. The community located just east of the canal is dominated by an understory of Bulrush spp. (*Scirpus spp.)*, followed by Common Reed (*Phragmites australis*), and Broad-leaved Cattail (*Typha latifolia*). The ground layer is dominated by Rice Cutgrass (*Leersia oryzoides*), followed by Reed Canary grass (*Phalaris arundinacea*) and Bulrush spp. (*Scirpus spp.).* The small area located within the southwestern portion of the subject property is dominated by and understory of Common Reed

Vegetation Community	Area (ha)	Description
		(*Phragmites australis*) and Broad-leaved Cattail (*Typha latifolia*). The ground layer is dominated by Rice Cutgrass (*Leersia oryzoides*) followed by Smartweed spp. (*Persicaria spp.)*
Reed-canary Grass Mineral Meadow Marsh (MAM 2-2)	2.69	This community is located just west of the canal near the northern property boundary. It is dominated by Common Reed (*Phragmites australis*) followed by Common Wooly Bulrush (*Scirpus cyperinus*) and Rice Cutgrass (*Leersia oryzoides*).
Mineral Meadow Marsh (phragmites dominated) (MAM 2*)	23.24	This community is scattered across the western and central areas of the subject property. The community is dominated by dense Common Reed (*Phragmites australis*).
Mineral Shallow Marsh (MAS 2)	11.13	There are two sections within the property that are considered MAS 2 communities. The first is located east of the canal within the northern section of the property, the second is also east of the canal further south. The northern MAS 2 community has a sub-canopy dominated by Bebb's Willow (*Salix bebbiana*). The understory is dominated by Reed Canary Grass (*Phalaris arundinacae*) followed by European Stinging Nettle (*Urtica dioica).* The ground layer is dominated by Reed Canary Grass (*Phalaris arundinacae*). The southern MAS 2 community has an understory dominated by Broad-leaved Cattail (*Typha latifolia*) followed by Common Reed (*Phragmites australis*). The ground layer is dominated by Rice Cutgrass (*Leersia oryzoides*).
Dry-Moist Old Field Meadow (CUM1-1)	17.45	This community is located within the most eastern section of the subject property. The understory is dominated by Common Teasel (*Dipsacus fullonum*) and Tall Goldenrod (*Solidago altissima*). The ground layer is dominated by grass spp. followed by Wild Carrot (*Daucus* carota) and aster spp. (*Symphyotrichum spp.).*

The site encompasses a large natural mosaic of diverse vegetation communities (94 ha), unusual in formerly agricultural areas. The largest community in total area is the Shallow Marsh/Meadow

Marsh/Aquatic Marsh (MAS/MAM/SA), which has a total area of 56 ha. The total Deciduous Swamp and Thicket Swamp area is 19 ha, and the total Cultural Meadow area is 17.5 ha.

3.1.2. Significant Vegetation Communities

The study area contains provincially and nationally rare Pin Oak (*Quercus palustris*) swamp communities (SWD1-3). These types of wetlands (shown in **Figure 4**) are restricted to a narrow region of Ontario's Carolinian Zone, including Niagara Region. The Pin Oak swamps in the study area contain healthy, mature Pin Oaks and other oaks and also support at least one rare plant species (White Moss, see **Section 3.1.4**).

3.1.3. Flora Inventory and Vegetation Quality

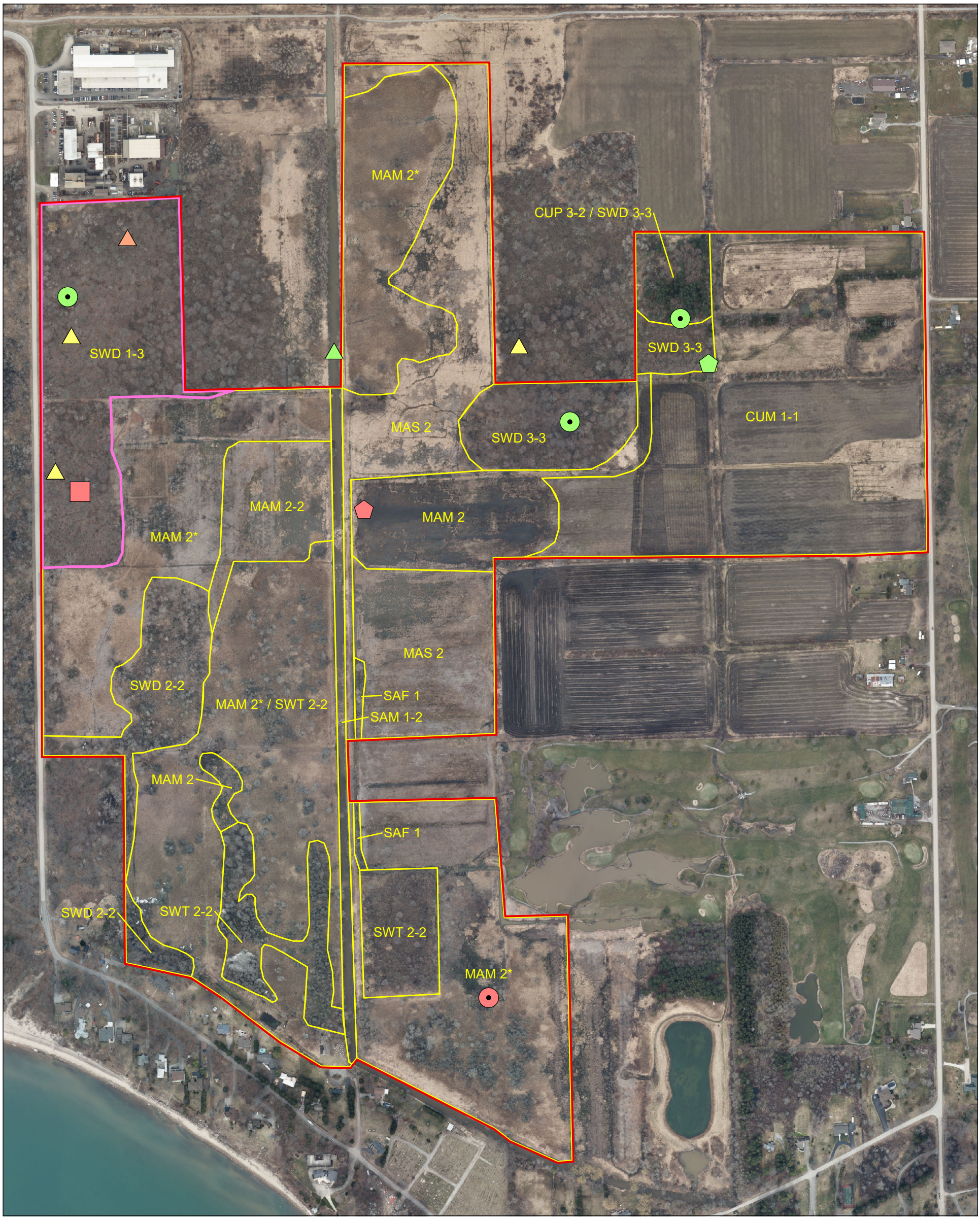
A total of 157 flora species have been identified within the study area (see **Appendix 2**). Most of the plant species (73%) identified in the study area are native to Ontario and the majority of these are considered "Secure" (S5) or "Apparently Secure" (S4) in the province (i.e., they are common to uncommon and not of conservation concern). One provincially rare species and 4 regionally rare species were identified (see **Section 3.1.4**). The proportion of native species in the study area is relatively high compared to other areas of high agricultural disturbance in the province. As a comparison, the flora of Ontario as a whole is comprised of approximately 63% native species and 37% non-native species (Kaiser 1983).

Swamp communities on the site were generally of high vegetation quality, supporting a larger proportion of native species, many of which are habitat specialists with conservative habitat requirements. Marsh communities were dominated by species with generalist habitat requirements, indicating tolerance of a wide variety of habitat conditions. Large areas of marsh are dominated by the invasive non-native species Common Reed (Phragmites australis ssp. australis). This robust species is known to out-compete most native marsh species.

3.1.4. Significant Flora Species

One provincially rare species was identified in the study area: White Pincushion Moss (*Leucobryum albidum*) (S1). White Pincushion Moss was found growing on soil in the southern part of SWD 1-3. but could potentially be present elsewhere in swamp communities in the study area. The location for this species is shown in **Figure 4**.

Three regionally rare species (species rare in Niagara Region) were identified: River Bulrush (*Bulboschoenus fluviatilis*) and False Waterpepper (*Persicaria hydropiperoides*), which were both found in shallow marsh communities in the study area, and Limestone Bittercress (*Cardamine douglassii*) found in the deciduous swamp communities in the study area.



Legend

- Approximate Subject Property
- Ecological Land Classification
- Significant Vegetation Community

Endangered Species

- Endangered Bat Species
- Fowler's Toad (location approximate)

Species of Special Concern

- Eastern Wood-pewee
- Monarch
- Wood Thrush

Threatened Species

- Barn Swallow (foraging only)
- Bobolink

Provincially Signficant Species

- Leucobryum albidum

Figure 4 | Port Colborne : Significant Species and Vegetation Communities

Project Number	Date:	N
21-1198	2021-10-19	

0 100 200 300 400 500 Meters

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3.1.5. Tree Health

The health of four forest units within the study area was assessed using the methodology in **Section 2.2.** A score of 1 indicates the highest quality, and a score of 6 indicates the lowest quality. A summary table of species composition and overall condition of each assessed woodland can be seen in **Table 4** below. Detailed results of the tree health preliminary reconnaissance can be found in **Appendix 3**.

The western woodland (SWD Unit 1 and SWD Unit 2, shown on Figure 2) is located on the east side of Reuter Road and measures 8.1 ha in area. Overall, this woodland was assessed to be in good to excellent condition, with a mean condition class of 1.48. The southern part of this western woodland (Unit 2) was assessed to be in good to excellent condition, with a mean condition class of 1.97. SWD Unit 3 is located east of the canal on the northern portion of the study area. This woodland (2.8 ha on the site, an extension of a larger woodland to the north) was assessed to be in fair to good condition, with a mean condition class of 2.98. SWD Unit 4 is located on the eastern portion of the study area and measures 0.79 ha (it is an extension of a larger woodland to the north). This woodland was assessed to be in fair to good condition, with a mean condition class of 2.42.

Table 3. Species composition and overall condition of each assessed woodland

Species	Count	Condition Class (mean)
Woodland - SWD (1)		
Freeman's Maple *Acer x freemanii*	6	1.5
Bur Oak *Quercus macrocarpa*	1	1
Yellow Birch *Betula alleghaniensis*	8	1.63
Red Oak *Quercus rubra*	1	2
Red Maple *Acer rubrum*	2	1.5
White Oak *Quercus alba*	1	1
Shagbark hickory *Carya ovata*	1	1
Horse Chestnut *Aesculus hippocastanum*	1	1
Woodland - SWD (2)		

Species	Count	Condition Class (mean)
Freeman's Maple *Acer x freemanii*	7	1.86
Red Maple *Acer rubrum*	2	2.5
American Basswood *Tilia americana*	1	2
Maple sp. *Acer sp.*	2	1.5
Woodland - SWD (3)		
Red oak *Quercus rubra*	3	1.33
Horse Chestnut *Aesculus hippocastanum*	1	6
Freeman's Maple *Acer x freemanii*	5	1.6
Woodland - SWD (4)		
Silver Maple *Acer saccharinum*	12	2.42

3.2. Wildlife

3.2.1. Amphibians

There was abundant standing water on the site during early spring visits. It was dispersed throughout marsh communities as broad, shallow pools. Shallow "fishless" pools are particularly important for breeding amphibians if they remain until early June or July, when amphibian larvae transform. Shallow standing water (less than 1 m deep) was present in large areas of marsh among Common Reed and other emergent species. However, most of the standing water outside the canals had dried up by the time of the breeding bird surveys in late May, and all standing water in marsh communities (apart from the Wignell Drain) had dried up by the second survey in early July.

Deeper water (over 1 m deep) was noted in the large agricultural drain (Wignell Drain) that runs north to south through the site (shown in **Figure 1**). Standing water was observed in the canal during all field visits. A smaller parallel canal also supported standing water at least until the September field visits. Flooded areas were present on the northeastern part of the site and in the southeast portion, and locally in other parts of the site.

Eight amphibian species were noted on the site during amphibian surveys and in Froglogger recordings. Locations of all species are shown in **Figure 5**. These include Spring Peeper (*Pseudacris crucifer)*, American Toad (*Anaxyrus americanus*), Northern Leopard Frog (*Lithobates pipiens*), Wood Frog (*Lithobates sylvaticus*), Chorus Frog (*Pseudacris triseriata*), Green Frog (*Lithobates clamitans*), American Bullfrog (*Lithobates catesbeianus*), and the endangered Fowler's Toad (*Anaxyrus fowleri*) (see **Appendix 4** for results of amphibian surveys and frogglogger).

A ninth species, Pickerel Frog (*Lithobates palustris*), was tentatively identified from a Froglogger recording, but due to high machinery noise in the background, the identification was not certain.

3.2.1.1. Significant Amphibian Species

One significant amphibian species was noted in the marsh community on the southern part of the site: Fowler's Toad. This species will be discussed further in **Section 4.1.1**.

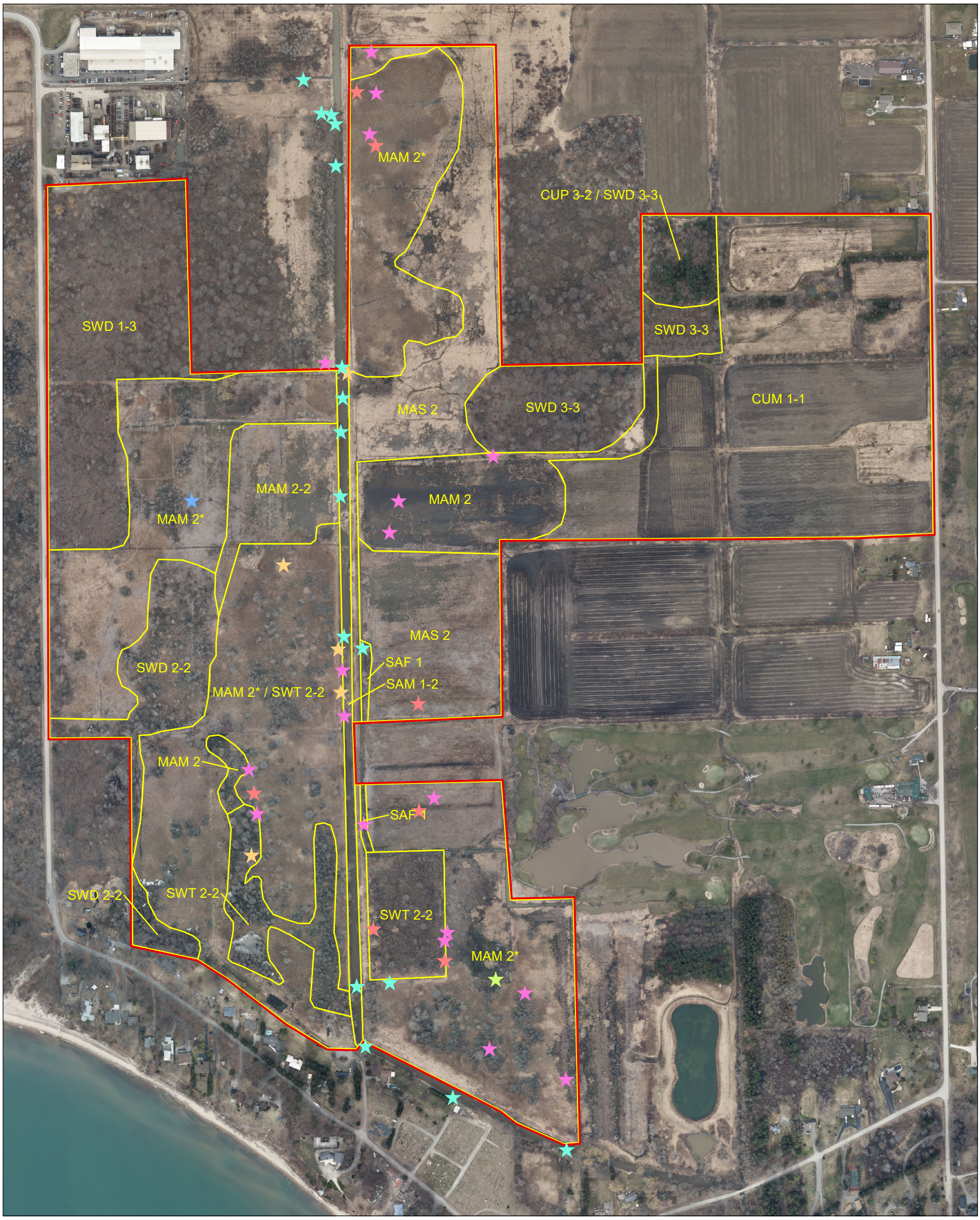
3.2.2. Birds

A total of 55 bird species were seen in the study area during breeding bird surveys and other field investigations (see bird species list in **Appendix 5**). The majority of these were determined to be possible or probable breeders in various habitats in the study area and three species were confirmed to be breeding in the study area. All of the bird species seen in the study area are native to Ontario and the majority (93%) are common and widespread species in Ontario.

Marsh breeding bird surveys (where calls are played to elicit responses from secretive marsh birds) did not detect additional marsh species that were not detected during breeding bird point counts.

3.2.2.1. Significant Bird Species

Four bird species at risk and species of conservation concern were identified: Barn Swallow (*Hirundo rustica*), Bobolink (*Dolichonyx oryzivorus*), Eastern Wood-pewee (*Contopus virens*) and Wood Thrush (*Hylocichla mustelina*) (see **Sections 4.1.2** and **4.1.3, and Section 4.5**). Their locations are shown in **Figure 4**. All of the vegetation communities in the study area provide breeding habitat for a variety of bird species, but the majority of species were birds of patchy woodland, hedgerow and forest edge, which breed in the study area's deciduous swamp communities and other treed areas. A few marsh-breeding species were recorded, mostly those that also nest in other types of habitat, such as Common Yellowthroat (*Geothlypis trichas*) and Red-winged Blackbird (*Agelaius phoeniceus*). One marsh-obligate species was recorded that is restricted to larger marshes: Marsh Wren (*Cistothorus palustris*), but this species was only heard during the first visit in late May when abundant standing water was present on the site and was likely a late migrant.



Legend

- Approximate Subject Property
- Ecological Land Classification

Species Names

- American Toad
- Western Chorus Frog (Carolinian Population)
- Fowler's Toad
- Green Frog
- Northern Leopard Frog
- Spring Peeper

Figure 5 | Port Colborne : Amphibian Species

Project Number	Date:	N
21-1198	2021-10-19	

0 100 200 300 400 500 Meters

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3.3. Fish and Aquatic Habitat

Fish surveys were not conducted as part of the natural heritage inventory. The agricultural drain (Wignell drain) that runs north to south through the middle of the site (shown on **Figure 1**) is several m above Lake Erie's surface level and has a weir structure controlled by the Niagara Peninsula Conservation Authority (NPCA). The drain would likely classify as fish habitat under the Fisheries Act. Two other smaller drainage ditches, that run parallel to the Wignell Drain, also support standing water that was visible during visits until September, but was observed to dry up during one visit in mid-July (intermittent aquatic habitat). These may be direct or contributing fish habitat, depending on whether they were connected to the Wignell Drain and were capable of supporting aquatic organisms while they contain standing water.

4. Analysis of Significant Features

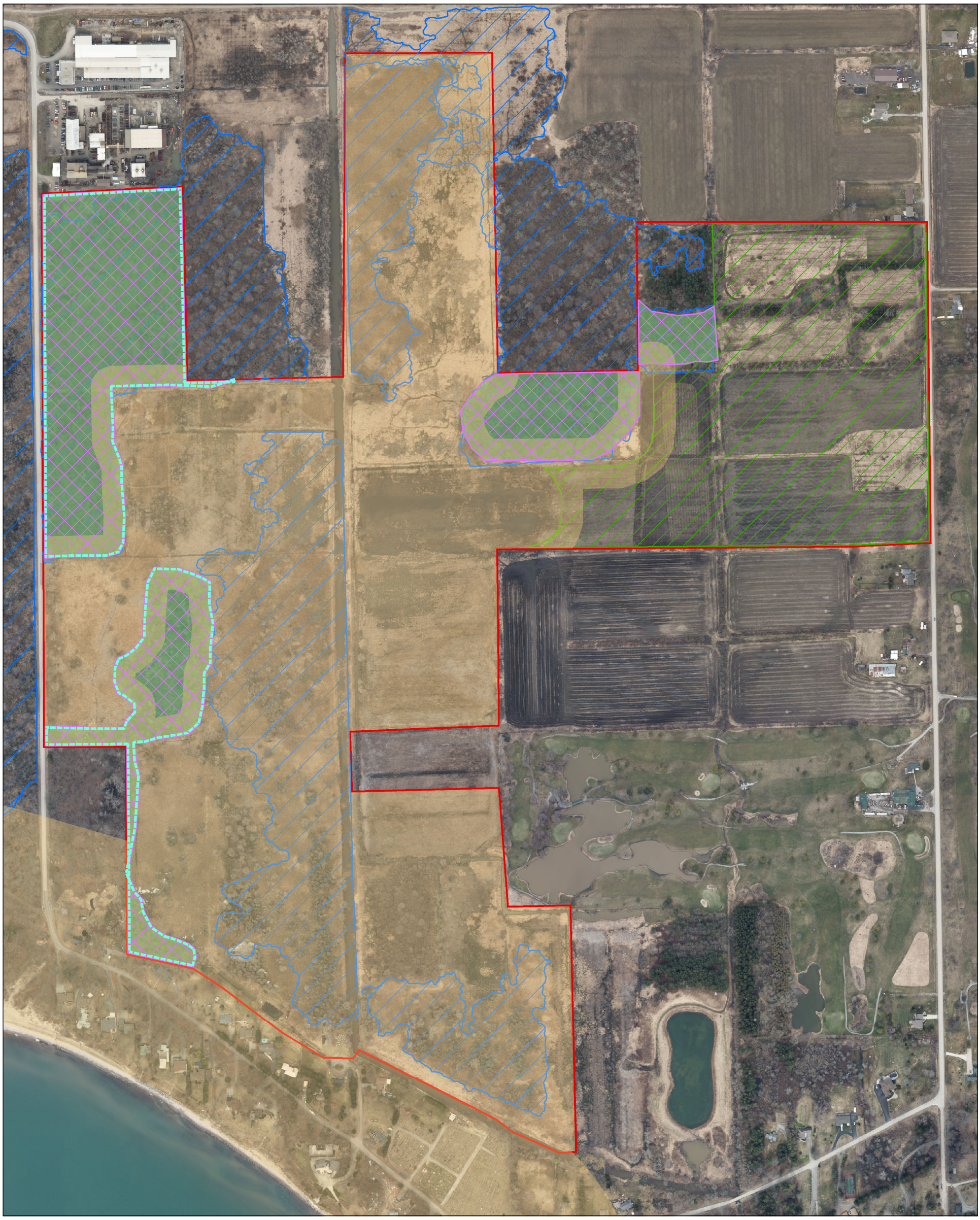
The site meets the qualifications for several significant features, as described in the following sections. Significant features are mapped on **Figure 6**.

4.1. Habitat for Species at Risk

This section discusses species listed as *Endangered* and *Threatened* under the provincial *Endangered Species Act*, which were either directly observed in the study area or were determined through screening to have a high probability of occurring in the study area. The full list of SAR and species of conservation concern with records from the area surrounding the site can be found in **Appendices 1 and 6**.

4.1.1. Fowler's Toad

Fowler's Toads were identified in the southern portion of the study area using a Wildlife Acoustics SM3 acoustic detector ("froglogger"). Additionally, the species was recorded calling within the southern MAM 2 vegetation community on June 13th, 2021 during an amphibian survey. The exact location was uncertain.



Legend

- Approximate Subject Property
- Provincially Significant Wetland
- Potential Habitat for Endangered Bat Species
- Significant Wildlife Habitat
- Habitat for Threatened/Endangered Grassland Bird Species
- Significant Woodlands

Fowler's Toad (Endangered Species):

- Potential Habitat (Preliminary and Approximate)

Not Shown: Significant Wildlife Habitat for Breeding Amphibians

Figure 6 | Port Colborne : Significant Features

Project Number	Date:	N
21-1198	2021-10-19	

0 100 200 300 400 500 Meters

north-south ENVIRONMENTAL

Fowler's Toad is a species restricted to southern Ontario along portions of the north shore of Lake Erie. A Habitat Regulation has been developed for Fowler's Toad in Ontario (shown below is the regulation that applies to areas outside Walsingham Township) that specifies habitat as follows:

- any parts of wetlands, ponds or other bodies of water, including vernal or other temporary pools that are being used for breeding, egg laying or tadpole development as well as the 30 metres around such areas;
- suitable habitat is protected up to a distance of 150 metres up and down the shoreline from known occurrences of Fowler's Toad and up to 300 metres inland from the shoreline;
- the dispersal corridor along the water's edge, where the distance between two occupied areas is less than one kilometre; and
- naturally occurring areas used by Fowler's Toad to migrate between breeding areas, hibernation sites and/or seasonally used beach areas, where at least two such features are within 1 km of each other.

The following caveats apply to the mapping of Fowler's Toad shown on Figure 6:

- Fowler's Toad habitat mapping is approximate, as the exact location for toads heard calling during the amphibian surveys could not be pinpointed (the observations were obtained in the dark, from an observer on the berm and from the froglogger on the southern part of the site, and the distance to the calling site was estimated).
- Fowler's Toad calling sites were noted only at the south end of the site, but it is not known how far north they may extend, for example in wet years, and habitat is contiguous throughout the site;
- Marshes dominated by Phragmites are considered less preferred habitat for Fowlers Toad, and there are Phragmites-dominated wetlands within the mapped areas that are likely not used by the toads;
- The extent of habitat already mapped in this part of Niagara Region has not been incorporated, and there are known breeding sites in the vicinity of the site, which are intensively monitored. For example, from May to July, as part of stewardship activities for this species, Nickel Beach is surveyed for Fowler's Toad once a week: one daytime survey to check for egg masses and water levels at breeding sites and one nighttime survey for population counts and documenting breeding activity. Depending on temperatures, toadlets are known to emerge late July to August (most commonly August). At this time, the existing surveys increased to 2-3 daytime surveys and 2 nighttime surveys until the end of September.

4.1.2. Barn Swallow (*Hirundo rustica*)

Barn Swallows were observed foraging over the study area during field investigations, but they are unlikely to breed in the study area because there are no barns, bridges, culverts or other structures which could support their nests.

4.1.3. Bobolink (Dolichonyx oryzivorus)

A Bobolink was seen in suitable meadow nesting habitat during the breeding season, but was not confirmed to be breeding in the study area, as one individual was only seen once. Most of the site is probably too wet for Bobolinks to successfully nest, but they may attempt to nest in some of the drier meadows. In addition, a high proportion of the vegetation within meadow areas consists of alfalfa (*Medicago sativa*), which is less favourable for grassland bird nesting habitat. Bobolink may also nest off-site but incorporate meadows on the site into their home range.

4.1.4. Endangered Bat Species

Bats have not been listed in existing records that encompass the site, probably because bats were seldom documented prior to their listing as endangered species. Acoustic surveys for bats have not been conducted on the site. However, it is likely that bats form roosts in mature trees throughout the site. Four bat species that hibernate in caves in Ontario are considered endangered because of a fungal disease that infects bats while they are hibernating: Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), Eastern Small-footed Myotis (*Myotis leibii*) and Tricolored Bat (*Perimyotis subflavus*). These bats form roosting colonies in tree cavities and under loose bark. Trees that could provide habitat were observed in all mature treed units. While they are most likely to be found in forest communities, they may also form roosts in individual trees with suitable cavities. Acoustic surveys would be required to confirm the presence of Species at Risk bats on the site.

4.2. Provincially Significant Wetland

The mapped wetland on the site is considered a Provincially Significant Wetland (PSW), part of the Nickel Beach Wetland Complex. Patches of wetland occur throughout the site, as well as on the refinery site to the west of Reuters Road. The Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF) is responsible for mapping and evaluating wetlands in Ontario, and wetland evaluation reports are open file reports, that can be modified at any time. Under the rules of the Ontario Wetland Evaluation System (OWES) that govern complexing, there is the potential for additional wetlands to be added to the PSW (see Section 4.3).

4.3. Other Wetlands

Many areas of wetland on the Vale Canada site are not mapped within the Provincially Significant Wetland complex, likely because wetland mapping was initially conducted using aerial photo interpretation. However, wetlands within 750 m of an existing PSW, especially those in the same sub-

watershed and which exceed 0.5 ha in size, may be mapped as part of the PSW, as wetland data records are considered living documents that can be updated from time to time. Wetlands in different sub-watersheds and wetlands under 0.5 ha in size can also be added to an existing complex under certain circumstances. Wetlands that are not provincially significant can also have important functions on the landscape.

4.4. Significant Woodlands

Significant woodlands include all mature woodlands on the site, as shown in **Figure 6**. To be identified as significant a woodland must meet the definition of ELC "forest" (as per the definition of 'woodland'), and a woodland must meet one or more of the following criteria:

1. Any woodland 2 ha or greater in size;

2. Any woodland 1 ha or greater in size meeting at least one of the following criteria:

    a. Naturally occurring (i.e., not planted) trees (as defined in the species list of Appendix D in the Greenbelt Technical Paper);

    b. 10 or more trees per ha greater than 100 years old or 50 cm or more in diameter;

    c. Any woodland wholly or partially within 30 m of a significant wetland; habitat of an endangered or threatened species; significant woodland;

    d. Any woodland overlapping or abutting one or more of the following features:

        i. Permanent streams or intermittent streams;

        ii. Fish habitat;

        iii. Significant valleylands;

3. Any woodland 0.5 ha or greater in size meeting at least one of the following criteria:

    a. A provincially rare treed vegetation community with an S1, S2 or S3 in its ranking by the MNR's NHIC;

    b. Habitat of a woodland plant species with an S1, S2 or S3 in its ranking or an 8, 9, or 10 in its Southern Ontario Coefficient of Conservatism by the N.H.I.C., consisting of 10 or more individual stems or 100 or more sqm of leaf coverage;

    c. Any woodland overlapping or abutting one or more of the following features:

        i. Significant wildlife habitat; and

ii. Habitat of threatened species and endangered species;

iii. 'Other wetlands'

4. Any woodland of any size overlapping or abutting one or more of the following features:

a. PSWs; and

b. Life Science ANSI

Woodlands that "abut" another feature are considered adjacent when located within 20 m of each other.

4.5. Significant Wildlife Habitat

NSE undertook a review of provincially significant wildlife habitat (SWH) in the study area using the SWH Criteria Schedules for Ecoregion 7E (see **Appendix 6**). Significant Wildlife Habitat is generally indicated by the presence, size and configuration of certain vegetation communities, as well as the presence of certain indicator species. The following types of SWH are present (confirmed SWH) or may be present (candidate SWH) in the study area:

Seasonal Concentration Areas of Animals

- Raptor Wintering Area (candidate): The study area contains a mosaic of forested and open country habitats, which probably provide roosting and foraging habitats for raptors in winter. Winter raptor surveys would be necessary to confirm whether the study area supports a sufficient number of raptors in the winter to qualify as significant.
- Bat Maternity Colony (candidate): Dead and dying ash trees and other large cavity trees in woodlots in the study area could be suitable maternity roosts for bats. Acoustic surveys for bats would be required to determine which bats are present in the area and whether there could be a maternity colony.
- Turtle Wintering Areas (candidate): Some ponds, as well as the Wignell Drain, in the study area are probably deep enough to provide overwintering habitat for turtles. Artificial habitats are not considered SWH for overwintering turtles within the definition of the Ecoregion Schedules, but if they support habitat for Species at Risk turtles, they can be considered SWH for Species of Conservation Concern (e.g. Snapping Turtle), which is discussed below. Additional basking studies would be required to determine if the site supported overwintering turtles.
- Migratory Butterfly Stopover Area (candidate): The study area is within 5 km of Lake Erie and contains habitats larger than 10 ha with abundant nectar plants which butterflies probably feed

on before southward migration. Detailed butterfly use surveys would be required in order to confirm whether the site is a significant stopover area.

- Landbird Migratory Stopover Area (candidate): The study area is within 5 km of Lake Erie and contains woodlots larger than 5 ha. Over 35 bird species were documented in these woodlots during breeding bird surveys, and it is likely that they support over 200 individuals of at least 10 different bird species per day during spring and fall migration. Migratory bird surveys would be required in order to determine if the site is a significant stopover area.

Specialized Habitat for Wildlife

- Turtle Nesting Areas (candidate): Any streambanks or sloped areas of loose sandy soil are potential nesting sites for turtles.

- Amphibian Breeding Habitat (woodland and wetland types): (confirmed): Amphibians were noted breeding in many areas of the site as shown in **Figure 5**, but SWH (individual breeding ponds and adjacent summer and overwintering habitat) was difficult to map because standing water was so dispersed in the spring, and amphibian breeding choruses were widespread. The criteria for woodland and wetland breeding habitat include the presence of standing water, and the presence of two or more indicator species of habitat (not including habitat for endangered or threatened species, which are regulated by the Endangered Species Act. Areas of standing water that had particularly high abundance and diversity of breeding amphibians, and which would likely qualify as SWH, include an off-site area just north of the entrance road, the northernmost part of the site, and the southernmost part of the site.

  Bullfrogs were noted only once on the site, during the second breeding bird survey in July, within the Wignell Drain. This species is considered an indicator of SWH but since only one individual was heard, it is uncertain whether this species was breeding.

Habitat for Species of Conservation Concern

- Shrub/Early-successional Bird Breeding Habitat: Two of the common species associated with this habitat type were determined to be possible breeders in the study area (Black-billed Cuckoo and Willow Flycatcher), but neither of the indicator species which are required to confirm this habitat type (i.e., Brown Thrasher or Clay-coloured Sparrow) were observed in the study area. However, shrubby and early successional habitat on the site were generally associated with wetland habitats and meadows, neither of which are considered habitat for these species.

- Habitat for Provincially Rare Species (confirmed): The deciduous swamp in the western portion of the study area is habitat for provincially rare (S1) White Moss. White Moss grows on soil,

rotting logs and bases of trees and could potentially occur elsewhere in swamp communities in the study area.

- Habitat for Species of Special Concern: Monarch, Eastern Wood-pewee and Wood Thrush (confirmed): Monarch (butterfly) was observed throughout open meadows on the site. Milkweed, which is required for Monarch larvae to develop into adults, was present in meadows and swamp edges throughout the site. Forests in the study area are habitat for Eastern Wood-pewee and Wood Thrush, which are Special Concern species listed under Ontario's *Endangered Species Act*.

- Marsh Breeding Bird Habitat (Candidate): One species considered an indicator of marsh breeding bird habitat was heard on the site: Marsh Wren. Other indicator species are cryptic and may have escaped detection, despite marsh bird playback surveys.

5. Summary of Policy Applicable to Significant Natural Features

Table 5 provides a brief summary of legislation and provincial, regional and municipal policies that apply to significant natural features described in **Section 4.** As shown by preliminary mapping in **Figure 6**, the site is composed of a mosaic of significant features within which proposals for site alteration would be constrained by various degrees.

Table 4. Examples of Legislation and Policy that Apply to Significant Features at the Vale Canada Site, Port Colborne

Significant Feature	Protection	Examples of Applicable Legislation, Policy or Guidance
Provincially Significant Wetland	Development not permitted Infrastructure may be permitted if EA conducted and alternatives considered	• Provincial Policy Statement • Region of Niagara Official Plan • Port Colborne Official Plan • Niagara Peninsula Conservation Authority Ontario Regulation 155/06
Habitat of Threatened and Endangered Species	Development not permitted except in accordance with provincial Endangered Species Act permitting procedures, requiring consultation with MECP	• Federal Species at Risk Act (applies to migratory bird Species at Risk) • Endangered Species Act, 2007 • Provincial, Regional and Municipal policies in accordance with Endangered Species Act
Significant Woodlands	Development not permitted unless it can be demonstrated that	• Provincial Policy Statement • Region of Niagara Official Plan

Significant Feature	Protection	Examples of Applicable Legislation, Policy or Guidance
	the development will not result in negative impacts to the feature or its functions	• Port Colborne Official Plan
Significant Wildlife Habitat	Development not permitted unless it can be demonstrated that the development will not result in negative impacts to the feature or its functions	• Provincial Policy Statement • Region of Niagara Official Plan • Port Colborne Official Plan
Non-Provincially Significant Wetlands	May be complexed in with PSW following further evaluation if they are within 750 m of PSW Non-significant wetlands are protected by municipal policies	• Ontario Ministry of Natural Resources Wetland Evaluation manual • Region of Niagara Official Plan
Fish Habitat	Proposed development requires review by Department of Fisheries and Oceans	• Federal Fisheries Act • Provincial Policies in accordance with Federal Fisheries Act

6. Conclusions and Recommendations

The Vale-owned lands adjacent to the currently operating refinery site, site is vegetated with three broad vegetation communities: mature deciduous swamp (treed wetlands), marsh, and meadow. A channel (agricultural drain) through the middle of the site supports aquatic communities. Swamp communities on the site are dominated by tree and shrub species characteristic of Carolinian habitat in Ontario, with some areas that support rare vegetation communities. A provincially rare moss species occurs within the swamp community on the west part of the site, just east of Reuter Road. Swamp communities are generally in good to excellent health.

Marsh communities are less diverse, and generally dominated by adaptable wetland species of sedges and forbs, with non-native grasses. Some areas of marsh are succeeding to deciduous swamp, but these are largely dominated by Green Ash, which is dying because of Emerald Ash Borer. Large areas of marsh are dominated by Common Reed, an invasive non-native species that out-competes other marsh species, and can lead to a reduction in diversity and reduction in habitat value for wildlife, especially breeding birds, reptiles and amphibians. Dense Common Reed would likely make the marshes impassible to turtles and would also make the marshes more unsuitable for breeding amphibians, particularly Fowlers Toad.

The Wignell agricultural drain through the center of the site may support fish habitat. The site supports a diverse wildlife assemblage. There is a high diversity and abundance of breeding amphibians in spring due to the presence of abundant shallow standing water, with some permanent water habitat in the Wignell Drain. Breeding birds include mainly songbirds characteristic of small patches of forest, thicket and hedgerow, with a few songbirds of open wetlands and meadows.

The site supports several significant features, which preliminary mapping indicates cover all of the site: provincially significant wetlands and other wetlands, habitat for the federally and provincially threatened Fowler's Toad, possible habitat for federal and provincial grassland bird species, Significant Woodlands and Significant Wildlife Habitat. The following recommendations are provided:

- Minimal site alteration should be undertaken, in accordance with provincial, regional and municipal policies.
- The extent of Fowler's Toad breeding habitat on the site should be determined more precisely, and a management plan developed for protection and enhancement of Fowler's Toad habitat that would include restoration of breeding and non-breeding habitat. Local experts on Fowler's Toad should be consulted to determine how restoration can benefit the Nickel Beach population as a whole.
- A road ecology study should be completed (in consultation with local experts) to determine if there is benefit in installing wildlife crossing areas between the property on the west side of Reuter Road and the study area. This connectivity could help prevent Fowler's Toad mortality if they are crossing that way from breeding/overwintering habitats to the beach. Road mortality studies would be needed to determine locations of crossing and recommend tunnel locations.
- Restoration of marsh communities is recommended, with a priority for managing marsh areas dominated by Common Reed toward a more diverse community structure.
- Restoration of areas succeeding to deciduous swamp is recommended, by planting a higher diversity of longer-lived tree species such as Silver Maple and Pin Oak.

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APPENDIX 1 | Significant Species: Existing Records in 1 km Squares Encompassing the site

Table A.6. Species at Risk and Species of Conservation Concern Screening

Species	Source[1]	Status[2]	Habitat Description	Presence of Habitat in Study Area
PLANTS				
American Chestnut *Castanea dentata*	NHIC	SARA – Endangered ESA – Endangered NHIC -	Moist to well drained forests on sand, occasionally heavy soils (MNR, 2000).	ABSENT – Not found in any of the woodlots in the study area during vegetation surveys. Soils in the study area are generally too wet and clayey to support American Chestnut.
Bush's Goosefoot *Chenopodium berlandieri* var. *bushianum*	NHIC	SARA – n/a ESA – n/a NHIC -	Disturbed open areas, often riparian (MNR, 2000).	CANDIDATE – A species with an affinity for disturbance which often does not persist for
Butternut *Juglans cinerea*	NHIC	SARA – Endangered ESA – Endangered NHIC -	A wide range of soil types in hardwood or mixed forest (Environment Canada, 2010).	CANDIDATE – No Butternuts were found in the study area during field investigations, but most of the study area contains suitable habitat for this species and it is possible that Butternut could still be found at this location.
White Moss *Leucobryum albidum*	NSE	SARA – n/a ESA – n/a NHIC – S1	Moist humus, sandy soil, rotting logs and stumps, tree bases, hardwood trees, pine and palms, forests, bogs, and swamps; low to moderate elevations (Flora of North America)	PRESENT – this moss species was identified in the SWD unit just east of Reuter Road
Common Hoptree *Ptelea trifoliata*	NHIC	SARA – Special Concern ESA – Special Concern NHIC -	Shorelines and other dry sites (MNR, 2000).	ABSENT – Occurs on beaches and dunes along Lake Erie to the south of the study area but does not occur in the study area.
Shumard Oak *Quercus shumardii*	NHIC	SARA – Special Concern ESA – Special Concern NHIC -	Mesic and mesic -hydric sites on clay and clay-loam soils with poor drainage (MNR, 2000).	CANDIDATE – Woodlots in the study area are typical of this species' habitat in Ontario. Several oaks were checked during field investigations and no Shumard oaks were found, but because of the large number of oak trees in the study area it is still possible that Shumard Oak could be found at this location.
BIRDS				
Bald Eagle *Haliaeetus leucocephalus*	NHIC	SARA – Not at Risk ESA – Special Concern NHIC -	Require large continuous area of deciduous or mixed woods around large lakes, rivers; require area of 255 ha for nesting, shelter, feeding, roosting; prefer open woods with 30 to 50% canopy cover; nest in tall trees 50 to 200 m from shore; require tall, dead, partially dead trees within 400 m of nest for perching; sensitive to toxic chemicals (MNR, 2000).	ABSENT – There is at least one known Bald Eagle nest outside of the study area closer to Port Colborne harbour, but no nests were found in the study area and no Bald Eagles were seen during field investigations.
Barn Swallow *Hirundo rustica*	OBBA eBird	SARA – Threatened ESA – Threatened NHIC – S4B	Farmlands or rural areas; cliffs, caves, rock niches; buildings or other manmade structures for nesting; open country near body of water (MNR, 2000).	ABSENT – Barn Swallows were seen foraging over the study area during field investigations, but there are not suitable barns, bridges, culverts or other structures in the study area where Barn Swallows could nest.
Bobolink *Dolichonyx oryzivorus*	NHIC OBBA eBird	SARA – Threatened ESA – Threatened NHIC – S4B	Large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes; requires tracts of grassland >50 ha (MNR, 2000).	CANDIDATE – One Bobolink was seen during breeding bird surveys and determined to be a possible breeder in the study area. Cultural meadow communities are candidate nesting habitat for Bobolink.

Species	Source[1]	Status[2]	Habitat Description	Presence of Habitat in Study Area
Eastern Meadowlark *Sturnella magna*	NHIC	SARA - Threatened ESA - Threatened NHIC - S4B, S3N	Open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees; old orchards with adjacent, open grassy areas >10 ha in size (MNR, 2000).	CANDIDATE – Cultural meadow communities in the study area are candidate nesting habitat for Eastern Meadowlark.
Eastern Wood-pewee *Contopus virens*	OBBA eBird	SARA – Special Concern ESA – Special Concern NHIC – S4B	Open, deciduous, mixed or coniferous forest; predominated by oak with little understory; forest clearings, edges; farm woodlots, parks (MNR, 2000).	CONFIRMED – Woodland and forest communities in the study area are breeding habitat for Eastern Wood-pewee.
Wood Thrush *Hylocichla mustelina*	OBBA eBird	SARA – Threatened ESA – Special Concern NHIC – S4B	Carolinian and Great Lakes-St. Lawrence forest zones; undisturbed moist mature deciduous or mixed forest with deciduous sapling growth; near pond or swamp; hardwood forest edges; must have some trees higher than 12 m (MNR, 2000).	CONFIRMED – Woodland and forest communities in the study area are breeding habitat for Wood Thrush.
REPTILES AND AMPHIBIANS				
Fowler's Toad *Anaxyrus fowleri*	NHIC	SARA – Endangered ESA – Endangered NHIC -	Restricted in Ontario to shores of Lake Erie; requires sandy soils for burrowing to escape sun; hibernates during winter in burrows >1m deep in sand; suitable areas are along shorelines, river valleys or beaches that provide adequate insect supply; requires shallow water for breeding (MNR, 2000).	CONFIRMED – Fowler's Toads were recorded calling within the southeast MAM 2 vegetation community both on the Wildlife Acoustics SM3 recorder ("froglogger") in June 2021, and during the amphibian survey on June 13th, 2021.
Snapping Turtle *Chelydra serpentina*	NHIC	SARA - Special Concern ESA - Special Concern COSEWIC - Special Concern NHIC - S4	Permanent, semi-permanent freshwater; marshes, swamps or bogs; rivers and streams with soft, muddy banks or bottoms; often uses soft soil or clean dry sand on south-facing slopes for nest sites; may nest at some distance from water; often hibernate together in groups in mud under water; home range size ~28 ha (MNR, 2000).	CANDIDATE – No snapping turtles were observed in the study area during field investigations but there are ponds, watercourses and marshes in the study area which may be suitable habitat for foraging, breeding and overwintering. Sandy and gravelly slopes in the study area (e.g., creekbanks, borrow pits, old fill piles) may be suitable nesting sites for Snapping Turtle and other turtles.
INSECTS				
Monarch *Danaus plexippus*	NSE	SARA – Special Concern ESA – Special Concern NHIC – S2N, S5B	Breeding habitat is confined to where milkweed grows (the sole food of the caterpillars). This includes meadows, roadsides, ditches, open wetlands, dry sandy areas, grasslands, riverbanks, arid valleys and south-facing hillsides. Adult butterflies nectar on a wide variety of flowers including goldenrods, asters and milkweeds (Environment Canada, 2014).	CONFIRMED – Monarchs were seen on several occasions throughout the study area. Milkweed occurs in meadow and marsh communities in the study area and could support Monarch larvae. The entire study area may be a significant migratory butterfly stopover site due to its proximity to Lake Erie and extensive open country habitats containing nectar plants.

[1]Source of species report: NHIC = Natural Heritage Information Centre data; NSE field work = identified in the study area by NSE

[2]Conservation Status: SARA = Status under federal Species at Risk Act; ESA = Status under provincial Endangered Species Act; COSEWIC = The Committee on the Status of Endangered Wildlife in Canada; NHIC = Provincial conservation status (SX = Extirpated, SH = Historical, S1 = Critically Imperiled, S2 = Imperiled, S3 = Vulnerable).

[3]Probability that the species presently occurs in the study area based on available habitat.

APPENDIX 2 | Flora Species List

Table A.1. Plant species recorded in the Vale Canada Limited Port Colborne Refinery study area

Family	Scientific Name	Common Name	Introduced	S Rank	Niagara (2017)	SARO	SARA	CUM	MAS / MAM	SWD (1)	SWD (2)	SWD (3)	SWD (4)	SWD (5)
Sapindaceae	*Acer negundo*	Manitoba Maple	No	S5	X						x			
Sapindaceae	*Acer rubrum*	Red Maple	No	S5	X					x		x		
Sapindaceae	*Acer saccharinum*	Silver Maple	No	S5	X					x			x	x
Sapindaceae	*Acer x freemanii*	Freeman's Maple	No	SNA	HYB					x		x	x	x
Ranunculaceae	*Actaea pachypoda*	White Baneberry	No	S5	C					x				
Ranunculaceae	*Actaea rubra*	White-fruited Red Baneberry	No	S5	C					x				
Sapindaceae	*Aesculus hippocastanum*	Horse Chestnut	Yes	SNA	IU					x				
Asteraceae	*Ageratina altissima*	Common White Snakeroot	No	S5	C									x
Poaceae	*Agrostis gigantea*	Redtop	Yes	SNA	IC				x					
Poaceae	*Agrostis stolonifera*	Creeping Bentgrass	Yes	SNA	IC					x				
Alismataceae	*Alisma triviale*	Northern Water-plantain	No	S5	X				x					
Brassicaceae	*Alliaria petiolata*	Garlic Mustard	Yes	SE5	IC				x	x	x	x	x	x
Asteraceae	*Ambrosia trifida*	Great Ragweed	No	S5	C			x	x	x	x		x	x
Asteraceae	*Ambrosia x helenae*	Hybrid Ragweed	No	SNA					x					
Asteraceae	*Arctium minus*	Common Burdock	Yes	SNA	IC									x
Araceae	*Arisaema triphyllum*	Jack-in-the-pulpit	No	S5	C					x			x	
Asteraceae	*Artemisia vulgaris*	Common Wormwood	Yes	SNA	IU				x					
Apocynaceae	*Asclepias incarnata*	Swamp Milkweed	No	S5	C				x					
Apocynaceae	*Asclepias syriaca*	Common Milkweed	No	S5	C				x					
Athyriaceae	*Athyrium filix-femina*	Common Lady Fern	No	S5	C					x		x		
Athyriaceae	*Athyrium angustum*	Northeastern Lady Fern	No	S5						x			x	
Betulaceae	*Betula alleghaniensis*	Yellow Birch	No	S5	C					x			x	
Urticaceae	*Boehmeria cylindrica*	Small-spike No Nettle	No	S5	C					x			x	x
Cyperaceae	*Bolboschoenus fluviatilis*	River Bulrush	No	S4S5	R				x					
Poaceae	*Bromus inermis*	Smooth Brome	Yes	SNA	IC			x					x	
Butomaceae	*Butomus umbellatus*	Flowering-rush	Yes	SNA	IU				x					
Poaceae	*Calamagrostis canadensis*	Bluejoint Reedgrass	No	S5	C				x					
Convolvulaceae	*Calystegia sepium*	Hedge False Bindweed	No	S5	C				x					
Brassicaceae	*Cardamine douglassii*	Purple Cress	No	S4	R								x	
Asteraceae	*Carduus nutans*	Nodding Thistle	Yes	SNA	IR				x					
Cyperaceae	*Carex granularis*	Limestone Meadow Sedge	No	S5	C			x						
Cyperaceae	*Carex hirsutella*	Hairy Green Sedge	No	S3	R					x				
Cyperaceae	*Carex lupulina*	Hop Sedge	No	S5	C			x	x		x			
Cyperaceae	*Carex stipata*	Awl-fruited Sedge	No	S5	C				x		x			
Cyperaceae	*Carex stricta*	Tussock Sedge	No	S5	U				x					
Cyperaceae	*Carex tribuloides*	Blunt Broom Sedge	No	S4	U				x		x			
Cyperaceae	*Carex vulpinoidea*	Fox Sedge	No	S5	C				x		x			

Family	Scientific Name	Common Name	Introduced	S Rank	Niagara (2017)	SARO	SARA	CUM	MAS / MAM	SWD (1)	SWD (2)	SWD (3)	SWD (4)	SWD (5)
Juglandaceae	*Carya cordiformis*	Bitternut Hickory	No	S5	C								x	
Juglandaceae	*Carya ovata*	Shagbark Hickory	No	S5	C					x				
Papaveraceae	*Chelidonium majus*	Greater Celadine	Yes	SNA	IC								x	
Plantaginaceae	*Chelone glabra*	White Turtlehead	No	S5	C				x					
Onagraceae	*Circaea canadensis*	Canada Enchanter's Nightshade	No	S5	C					x				x
Ranunculaceae	*Clematis virginiana*	Virginia Clematis	No	S5	U					x				
Convolvulaceae	*Cuscuta gronovii*	Swamp Dodder	No	S5	C						x		x	
Apiaceae	*Daucus carota*	Wild Carrot	Yes	SNA	IC				x	x				
Caryophyllaceae	*Dianthus armeria*	Deptford Pink	Yes	SE5	IC					x				
Caprifoliaceae	*Dipsacus fullonum*	Common Teasel	Yes	SNA	IC			x	x					
Brassicaceae	*Draba verna*	Spring Draba	Yes	SNA	IC					x				
Rosaceae	*Dryas integrifolia*	Entire-leaved Mountain Avens	No	S4						x				
Dryopteridaceae	*Dryopteris carthusiana*	Spinulose Wood Fern	No	S5	C					x				
Dryopteridaceae	*Dryopteris cristata*	Crested Wood Fern	No	S5	U				x					x
Dryopteridaceae	*Dryopteris intermedia*	Intermediate Wood Fern	No	S5	C								x	
Poaceae	*Echinochloa muricata*	Rough Barnyard Grass	No	S5					x					
Poaceae	*Elymus repens*	Quackgrass	Yes	SNA	IC				x					
Equisetaceae	*Equisetum arvense*	Field Horsetail	No	S5	C				x	x				
Asteraceae	*Erigeron annuus*	Annual Fleabane	No	S5	C				x	x				
Celastraceae	*Euonymus obovatus*	Running Strawberry-bush	No	S4	C							x		
Asteraceae	*Eupatorium perfoliatum*	Common Boneset	No	S5	C				x					
Asteraceae	*Euthamia graminifolia*	Grass-leaved Goldenrod	No	S5	C				x					
Fagaceae	*Fagus grandifolia*	American Beech	No	S4	C					x				
Oleaceae	*Fraxinus pennsylvanica*	Red Ash	No	S4	C				x		x		x	
Rubiaceae	*Galium aparine*	Common Bedstraw	No	S5	C			x					x	
Rubiaceae	*Galium mollugo*	Smooth Bedstraw	Yes	SNA	IC				x					
Rosaceae	*Geum canadense*	Canada Avens	No	S5	C						x			x
Poaceae	*Glyceria striata*	Fowl Mannagrass	No	S5	C				x		x		x	x
Brassicaceae	*Hesperis matronalis*	Dame's Rocket	Yes	SNA	IX				x	x				x
Balsaminaceae	*Impatiens capensis*	Spotted Jewelweed	No	S5	C				x	x	x		x	x
Juncaceae	*Juncus effusus subsp. solutus*	Soft Rush	No	S5					x		x			
Asteraceae	*Lactuca serriola*	Prickly Lettuce	Yes	SNA	IC					x				x
Lamiaceae	*Lamium purpureum*	Purple Dead-nettle	Yes	SNA	IR					x				
Urticaceae	*Laportea canadensis*	Canada Wood Nettle	No	S5	C						x			
Leucobryaceae	*Leucobryum albidum*	White Moss	No	S1										
Poaceae	*Leersia oryzoides*	Rice Cutgrass	No	S5	C				x					
Araceae	*Lemna minor*	Small Duckweed	No	S5?	C				x		x			

Family	Scientific Name	Common Name	Introduced	S Rank	Niagara (2017)	SARO	SARA	CUM	MAS / MAM	SWD (1)	SWD (2)	SWD (3)	SWD (4)	SWD (5)
Asteraceae	*Leucanthemum vulgare*	Oxeye Daisy	Yes	SNA	IC			x						
Plantaginaceae	*Linaria vulgaris*	Butter-and-eggs	Yes	SNA	IC				x					
Lauraceae	*Lindera benzoin*	Northern Spicebush	No	S4	C					x		x	x	x
Campanulaceae	*Lobelia inflata*	Indian Tobacco	No	S5	C				x				x	
Caprifoliaceae	*Lonicera tatarica*	Tartarian Honeysuckle	Yes	SNA	IC									x
Fabaceae	*Lotus corniculatus*	Garden Bird's-foot Trefoil	Yes	SNA	IC				x					
Lamiaceae	*Lycopus uniflorus*	Northern Water-horehound	No	S5	C						x			
Primulaceae	*Lysimachia nummularia*	Creeping Yellow Loosestrife	Yes	SNA	IC			x	x	x			x	x
Lythraceae	*Lythrum salicaria*	Purple Loosestrife	Yes	SNA	IC				x					
Asparagaceae	*Maianthemum canadense*	Wild Lily-of-the-valley	No	S5	C					x		x		
Asparagaceae	*Maianthemum racemosum*	Large No Solomon's Seal	No	S5	C								x	
Fabaceae	*Medicago sativa subsp. sativa*	Alfalfa	Yes	SE5	IC			x						
Menispermaceae	*Menispermum canadense*	Canada Moonseed	No	S4	U									x
Onocleaceae	*Onoclea sensibilis*	Sensitive Fern	No	S5	C				x	x		x	x	
Osmundaceae	*Osmunda spectabilis*	American Royal Fern	No	S5						x		x		
Osmundaceae	*Osmundastrum cinnamomeum*	Cinnamon Fern	No	S5	C					x		x		
Oxalidaceae	*Oxalis stricta*	European Wood-sorrel	No	S5	C				x				x	x
Vitaceae	*Parthenocissus quinquefolia*	Virginia Creeper	No	S4?	U					x			x	
Vitaceae	*Parthenocissus vitacea*	Thicket Creeper	No	S5	C					x		x	x	
Polygonaceae	*Persicaria amphibia*	Water Smartweed	No	S5	U				x					
Polygonaceae	*Persicaria hydropiper*	Marshpepper Smartweed	Yes	SNA	IC				x					
Polygonaceae	*Persicaria hydropiperoides*	False Waterpepper	No	S5	R				x					
Polygonaceae	*Persicaria sagittata*	Arrow-leaved Smartweed	No	S4S5	C				x					
Polygonaceae	*Persicaria virginiana*	Virginia Smartweed	No	S4	C								x	x
Poaceae	*Phalaris arundinacea*	Reed Canary Grass	No	S5	C				x		x			
Poaceae	*Phleum pratense*	Common Timothy	Yes	SE5	IC				x	x				
Poaceae	*Phragmites australis*	Common Reed	No	S4?SE5	R/IC			x	x		x			
Phytolaccaceae	*Phytolacca americana*	American Pokeweed	No	S4	C					x				
Pinaceae	*Picea abies*	Norway Spruce	Yes	SNA	IC									x
Urticaceae	*Pilea pumila*	Canada Clearweed	No	S5	C				x	x	x		x	x
Pinaceae	*Pinus strobus*	Eastern White Pine	No	S5	C									x
Plantaginaceae	*Plantago lanceolata*	English Plantain	Yes	SNA	IC					x				
Poaceae	*Poa compressa*	Canada Bluegrass	Yes	SNA	IC			x						
Poaceae	*Poa palustris*	Fowl Bluegrass	No	S5	C				x					
Poaceae	*Poa pratensis*	Kentucky Bluegrass	Yes	SE5	IC			x	x					
Salicaceae	*Populus tremuloides*	Trembling Aspen	No	S5	C						x			
Lamiaceae	*Prunella vulgaris*	Common Self-heal	No	S5									x	
Rosaceae	*Prunus avium*	Sweet Cherry	Yes	SNA	IC					x				x
Rosaceae	*Prunus serotina*	Black Cherry	No	S5	C					x				

Family	Scientific Name	Common Name	Introduced	S Rank	Niagara (2017)	SARO	SARA	CUM	MAS / MAM	SWD (1)	SWD (2)	SWD (3)	SWD (4)	SWD (5)
Rosaceae	*Prunus virginiana*	Chokecherry	No	S5	C								x	x
Fagaceae	*Quercus alba*	White Oak	No	S5	C					x				
Fagaceae	*Quercus macrocarpa*	Bur Oak	No	S5	U					x				
Fagaceae	*Quercus palustris*	Pin Oak	No	S4	C					x		x	x	
Fagaceae	*Quercus rubra*	Northern Red Oak	No	S5	C					x		x	x	
Rosaceae	*Rubus allegheniensis*	Allegheny Blackberry	No	SNA	C									x
Rosaceae	*Rubus occidentalis*	Black Raspberry	No	S5	C				x					x
Polygonaceae	*Rumex crispus*	Curled Dock	Yes	SNA	IC						x			
Alismataceae	*Sagittaria latifolia*	Broad-leaved Arrowhead	No	S5	C				x					
Salicaceae	*Salix amygdaloides*	Peach-leaved Willow	No	S5	C						x			
Salicaceae	*Salix bebbiana*	Bebb's Willow	No	S5	C				x					
Salicaceae	*Salix discolor*	Pussy Willow	No	S5	C				x					
Salicaceae	*Salix petiolaris*	Meadow Willow	No	S5	U				x					
Adoxaceae	*Sambucus canadensis*	Black Elderberry	No	S5	C				x					
Apiaceae	*Sanicula marilandica*	Maryland Sanicle	No	S5	C									x
Caryophyllaceae	*Saponaria officinalis*	Bouncing-bet	Yes	SNA	IC					x				
Cyperaceae	*Schoenoplectus tabernaemontani*	Soft-stemmed Bulrush	No	S5	C				x					
Cyperaceae	*Scirpus atrocinctus*	Black-girdled Bulrush	No	S5					x					
Cyperaceae	*Scirpus cyperinus*	Common Wooly Bulrush	No	S5	C				x		x			
Solanaceae	*Solanum dulcamara*	Bittersweet Nightshade	Yes	SNA	IC					x				
Asteraceae	*Solidago altissima*	Tall Goldenrod	No	S5	C				x	x			x	
Asteraceae	*Solidago canadensis*	Canada Goldenrod	No	S5				x						
Asteraceae	*Solidago rugosa*	Rough-stemmed Goldenrod	No	S5	C					x			x	x
Typhaceae	*Sparganium eurycarpum*	Broad-fruited Burreed	No	S5	C				x					
Rosaceae	*Spiraea alba*	White Meadowsweet	No	S5	C				x					
Caryophyllaceae	*Stellaria graminea*	Grass-leaved Starwort	Yes	SNA	IU			x						
Caryophyllaceae	*Stellaria media*	Common Chickweed	Yes	SNA	IC				x					
Asteraceae	*Symphyotrichum ericoides*	White Heath Aster	No	S5	C				x					
Asteraceae	*Symphyotrichum lanceolatum*	White Panicled Aster	No	S5	C			x	x		x		x	x
Asteraceae	*Symphyotrichum novae-angliae*	New England Aster	No	S5	C				x					
Asteraceae	*Symphyotrichum pilosum*	Old Field Aster	No	S5						x				
Asteraceae	*Taraxacum officinale*	Common Dandelion	Yes	SNA	IC			x						x
Asteraceae	*Taraxacum palustre*	Marsh Dandelion	Yes	SNA	IR				x					
Malvaceae	*Tilia americana*	American Basswood	No	S5	C							x		
Fabaceae	*Trifolium pratense*	Red Clover	Yes	SNA	IX				x					
Melanthiaceae	*Trillium erectum*	Red Trillium	No	S5	C								x	
Asteraceae	*Tussilago farfara*	Coltsfoot	Yes	SNA	IC				x					
Typhaceae	*Typha latifolia*	Broad-leaved Cattail	No	S5	C				x					

Family	Scientific Name	Common Name	Introduced	S Rank	Niagara (2017)	SARO	SARA	CUM	MAS / MAM	SWD (1)	SWD (2)	SWD (3)	SWD (4)	SWD (5)
Urticaceae	*Urtica dioica*	Stinging Nettle	No	S5					x		x		x	
Urticaceae	*Urtica dioica subsp. dioica*	European Stinging Nettle	Yes	SE2	IR				x					x
Verbenaceae	*Verbena hastata*	Blue Vervain	No	S5	C				x					
Verbenaceae	*Verbena urticifolia*	White Vervain	No	S5	C				x		x			
Violaceae	*Viola sororia*	Woolly Blue Violet	No	S5	C				x	x				
Vitaceae	*Vitis riparia*	Riverbank Grape	No	S5	C			x		x				

APPENDIX 3 | Woodlot Health Assessment

SWD Unit Number	Scientific Name	Common Name	D.B.H.	Tree Class	Tree Class	Trunk Integrity	Crown Structure	Crown Vigour
1	*Acer x freemanii*	Freeman's maple	46	1	Excellent condition			
1	*Acer x freemanii*	Freeman's maple	22.5	1	Excellent condition	Split stem, weak crotch		Moderate dead wood
1	*Acer x freemanii*	Freeman's maple	49.5	2	Good condition	Burl, seam or cracks		Disease, moderate dead wood
1	*Acer x freemanii*	Freeman's maple	12.5	1	Excellent condition		Broken or severed primary	Moderate dead wood
1	*Quercus macrocarpa*	Bur oak	82.5	1	Excellent condition			
1	*Betula alleghaniensis*	Yellow birch	19	2	Good condition	Root damage or decay		Moderate dead wood
1	*Acer x freemanii*	Freeman's maple	106	3	Fair condition	Split steam, weak crotch, seam or cracks, upper stem holes decay	Broken or severed primary	Moderate dead wood
1	*Quercus rubra*	Red oak	111	2	Good condition	Seam or cracks, burl, split stem, weak crotch	Adventitious branching	Disease, moderate dead wood
1	*Betula alleghaniensis*	Yellow birch	16.4	1	Excellent condition			
1	*Betula alleghaniensis*	Yellow birch	56	2	Good condition	Root damage or decay, cankers		
1	*Betula alleghaniensis*	Yellow birch	33	1	Excellent condition			Moderate dead wood
1	*Betula alleghaniensis*	Yellow birch	33	2	Good condition	Seam or cracks	Broken or severed primary	Moderate dead wood
1	*Acer rubrum*	Red maple	42.6	2	Good condition	Burl, seam or cracks	Broken or severed primary	
1	*Betula alleghaniensis*	Yellow birch	17	1	Excellent condition			Moderate dead wood
1	*Acer x freemanii*	Freeman's maple	15	1	Excellent condition	Seam or cracks		Moderate dead wood
1	*Betula alleghaniensis*	Yellow birch	32	2	Good condition	Split stem, weak crotch		
1	*Betula alleghaniensis*	Yellow birch	27	2	Good condition	Seam or cracks	Broken or severed primary	Moderate dead wood
1	*Acer rubrum*	Red maple	46.47	1	Excellent condition			
1	*Quercus alba*	White oak	43.1	1	Excellent condition	Burl		
1	*Carya ovata*	Shagbark hickory	10.3	1	Excellent condition			Moderate dead wood
1	*Aesculus hippocastanum*	Horse chesnut	12.1	1	Excellent condition			
2	*Acer rubrum*	Red maple	70.3	3	Fair condition	Seam or cracks, burl, cankers	Adventitious branching	Disease
2	*Acer x freemanii*	Freeman's maple	21.2	2	Good condition	Burl		Moderate dead wood
2	*Acer x freemanii*	Freeman's maple	61.2	1	Excellent condition	Seam or cracks		Moderate dead wood

SWD Unit Number	Scientific Name	Common Name	D.B.H.	Tree Class	Tree Class	Trunk Integrity	Crown Structure	Crown Vigour
2	*Acer x freemanii*	Freeman's maple	60	1	Excellent condition			Disease, moderate dead wood
2	*Acer x freemanii*	Freeman's maple	31.8	1	Excellent condition	Seam or cracks		
2	*Tilia americana*	American Basswood	62	2	Good condition	Split stem, weak crotch, excessive lean of 30° to 45°	Adventitious branching	Insect defoliators species
2	*Acer x freemanii*	Freeman's maple	35.6	1	Excellent condition			
2	*Acer x freemanii*	Freeman's maple	37	5	Very poor condition			
2	*Acer x freemanii*	Freeman's maple	51	2	Good condition	Cankers,seam or cracks		
2	*Acer rubrum*	Red maple	35	2	Good condition	Seam or cracks	Broken or severed primary	Moderate dead wood
2	*Acer sp.*	Maple sp.	69.1	1	Excellent condition	Split stem, weak crotch,Seam or cracks		Moderate dead wood
2	*Acer sp.*	Maple sp.	35	2	Good condition			Disease, moderate dead wood, insect defoliators species
3	*Quercus rubra*	Red oak	180	1	Excellent condition	Split stem, weak crotch, seam or cracks, cankers		
3	*Aesculus hippocastanum*	Horse chesnut	N/A	6	Dead			
3	*Acer x freemanii*	Freeman's maple	21	1	Excellent condition			
3	*Quercus rubra*	Red oak	130	2	Good condition	Split stem, weak crotch, excessive lean of 30° to 45°		Moderate dead wood
3	*Acer x freemanii*	Freeman's maple	62	1	Excellent condition	Split stem, weak crotch		Moderate dead wood
3	*Acer x freemanii*	Freeman's maple	61	2	Good condition	Cankers, split stem, weak crotch		Insect defoliators species
3	*Quercus rubra*	Red oak	168	1	Excellent condition	Split stem, weak crotch		Moderate dead wood
3	*Acer x freemanii*	Freeman's maple	103	2	Good condition	Root damage or decay,Split stem, weak crotch,Seam or cracks		Disease
3	*Acer x freemanii*	Freeman's maple	107	2	Good condition	Root damage or decay,c_cankers		Disease
4	*Acer saccharinum*	Silver maple	180	3	Fair condition	Split stem, weak crotch,Seam or cracks	Broken or severed primary	Moderate dead wood
4	*Acer saccharinum*	Silver maple	45	2	Good condition	Seam or cracks		Disease, moderate dead wood
4	*Acer saccharinum*	Silver maple	65	2	Good condition	Seam or cracks		Moderate dead wood
4	*Acer saccharinum*	Silver maple	140	3	Fair condition	Split stem, weak crotch, excessive lean of 30° to 45°,Seam or cracks		Disease
4	*Acer saccharinum*	Silver maple	55	2	Good condition	Seam or cracks		Disease, moderate dead wood
4	*Acer saccharinum*	Silver maple	72	2	Good condition			Disease, moderate dead wood
4	*Acer saccharinum*	Silver maple	30	2	Good condition			Disease
4	*Acer saccharinum*	Silver maple	34	4	Poor condition	Excessive lean of 30° to 45°		Disease, moderate dead wood
4	*Acer saccharinum*	Silver maple	22	2	Good condition	Excessive lean of 30° to 45°		Disease
4	*Acer saccharinum*	Silver maple	80	2	Good condition	Excessive lean of 30° to 45°		Disease
4	*Acer saccharinum*	Silver maple	60	2	Good condition	Seam or cracks		Disease

SWD Unit Number	Scientific Name	Common Name	D.B.H.	Tree Class	Tree Class	Trunk Integrity	Crown Structure	Crown Vigour
4	*Acer saccharinum*	Silver maple	90	3	Fair condition	Split stem, weak crotch, cankers		Disease, moderate dead wood

APPENDIX 4 | Amphibian Monitoring Station Results

Survey No.	Scientific Name	Common Name	Station No.	Calling Distance (m)	Calling Code	No. of Individuals
1	*Pseudacris crucifer*	Spring Peeper	Station 2	Within 100m	3	
1	*Pseudacris crucifer*	Spring Peeper	Station 2	Within 100m	3	
1	*Anaxyrus americanus*	American Toad	Station 2	Within 100m	3	
1	*Lithobates pipiens*	Northern Leopard Frog	Station 2	Within 100m	1	1
1	*Pseudacris crucifer*	Spring Peeper	Station 2	Within 50m	3	
1	*Lithobates pipiens*	Northern Leopard Frog	Station 2	Within 50m	1	3
1	*Pseudacris crucifer*	Spring Peeper	Station 2	Within 100m	1	1
1	*Pseudacris crucifer*	Spring Peeper	Station 3	Within 100m	3	
1	*Pseudacris crucifer*	Spring Peeper	Station 3	Within 100m	3	
1	*Lithobates pipiens*	Northern Leopard Frog	Station 3	Within 50m	2	2
1	*Pseudacris crucifer*	Spring Peeper	Station 3	Within 50m	2	3
1	*Pseudacris crucifer*	Spring Peeper	Station 3	Within 50m	2	2
1	*Pseudacris crucifer*	Spring Peeper	Station 3	Within 50m	1	1
1	*Pseudacris crucifer*	Spring Peeper	Station 4	Within 100m	3	
1	*Pseudacris crucifer*	Spring Peeper	Station 4	Within 100m	3	
1	*Pseudacris crucifer*	Spring Peeper	Station 4	Within 100m	3	
1	*Lithobates pipiens*	Northern Leopard Frog	Station 4	Within 50m	1	2
1	*Lithobates pipiens*	Northern Leopard Frog	Station 4	Within 50m	1	1
1	*Anaxyrus americanus*	American Toad	Station 4	Within 100m	3	
1	*Lithobates pipiens*	Northern Leopard Frog	Station 4	Within 50m	2	2
1	*Anaxyrus americanus*	American Toad	Station 4	Within 50m	3	
1	*Pseudacris crucifer*	Spring Peeper	Station 4	Within 100m	3	

Survey No.	Scientific Name	Common Name	Station No.	Calling Distance (m)	Calling Code	No. of Individuals
1	*Pseudacris crucifer*	Spring Peeper	Station 4	Within 100m	2	2
1	*Lithobates pipiens*	Northern Leopard Frog	Station 4	Within 100m	1	1
1	*Lithobates sylvaticus*	Wood Frog	Station 5	Within 50m	2	2
1	*Lithobates pipiens*	Northern Leopard Frog	Station 5	Within 50m	1	1
1	*Pseudacris crucifer*	Spring Peeper	Station 5	Within 50m	3	
1	*Lithobates pipiens*	Northern Leopard Frog	Station 5	Within 50m	1	1
1	*Lithobates pipiens*	Northern Leopard Frog	Station 5	Within 50m	1	1
1	*Pseudacris crucifer*	Spring Peeper	Station 5	Within 100m	3	
1	*Pseudacris crucifer*	Spring Peeper	Station 5	Within 100m	3	
2	*Pseudacris crucifer*	Spring Peeper	Station 4	Within 100m	2	5
2	*Pseudacris crucifer*	Spring Peeper	Station 4	Within 100m	2	2
2	*Pseudacris crucifer*	Spring Peeper	Station 4	Outside 100m	2	1
2	*Pseudacris crucifer*	Spring Peeper	Station 8	Within 50m	1	1
2	*Pseudacris crucifer*	Spring Peeper	Station 8	Within 100m	2	3
2	*Pseudacris crucifer*	Spring Peeper	Station 8	Outside 100m	2	5
2	*Pseudacris triseriata*	Chorus Frog	Station 8	Outside 100m	1	1
2	*Pseudacris crucifer*	Spring Peeper	Station 8	Outside 100m	3	
2	*Anaxyrus americanus*	American Toad	Station 8	Outside 100m	1	1
2	*Pseudacris triseriata*	Chorus Frog	Station 2	Within 50m	1	1
2	*Anaxyrus americanus*	American Toad	Station 2	Outside 100m	1	1
2	*Pseudacris triseriata*	Chorus Frog	Station 2	Within 50m	1	1
2	*Pseudacris crucifer*	Spring Peeper	Station 2	Within 100m	2	2

Survey No.	Scientific Name	Common Name	Station No.	Calling Distance (m)	Calling Code	No. of Individuals
2	*Pseudacris crucifer*	Spring Peeper	Station 2	Within 50m	1	1
2	*Pseudacris crucifer*	Spring Peeper	Station 1	Within 100m	1	1
2	*Pseudacris crucifer*	Spring Peeper	Station 1	Within 50m	2	3
2	*Lithobates pipiens*	Northern Leopard Frog	Station 1	Outside 100m	1	1
2	*Pseudacris triseriata*	Chorus Frog	Station 1	Within 100m	1	1
2	*Pseudacris crucifer*	Spring Peeper	Station 3	Within 100m	1	2
2	*Pseudacris triseriata*	Chorus Frog	Station 5	Within 100m	1	1
2	*Pseudacris crucifer*	Spring Peeper	Station 9	Within 100m	2	4
2	*Anaxyrus americanus*	American Toad	Station 9	Within 100m	1	1
2	*Pseudacris crucifer*	Spring Peeper	Station 9	Within 50m	1	2
2	*Anaxyrus americanus*	American Toad	Station 9	Within 50m	1	1
2	*Pseudacris crucifer*	Spring Peeper	Station 9	Outside 100m	2	3
3	*Pseudacris crucifer*	Spring Peeper	Station 4	Outside 100m	1	3
3	*Anaxyrus americanus*	American Toad	Station 8	Outside 100m	1	1
3	*Anaxyrus americanus*	American Toad	Station 8	Outside 100m	1	1
3	*Pseudacris crucifer*	Spring Peeper	Station 8	Outside 100m	1	1
3	*Anaxyrus americanus*	American Toad	Station 8	Outside 100m	1	1
3	*Pseudacris crucifer*	Spring Peeper	Station 5	Within 100m	1	1
3	*Lithobates clamitans*	Green Frog	Station 9	Outside 100m	2	3
4	*Lithobates clamitans*	Green Frog	Station 4	Within 50m	1	1
4	*Lithobates clamitans*	Green Frog	Station 4	Within 50m	1	1
4	*Anaxyrus fowleri*	Fowler's Toad	Station 4	Outside 100m	1	2

Survey No.	Scientific Name	Common Name	Station No.	Calling Distance (m)	Calling Code	No. of Individuals
4	*Lithobates clamitans*	Green Frog	Station 4	Outside 100m	1	3
4	*Lithobates clamitans*	Green Frog	Station 8	Outside 100m	2	4
4	*Lithobates clamitans*	Green Frog	Station 8	Outside 100m	1	1
4	*Lithobates clamitans*	Green Frog	Station 2	Within 50m	1	1
4	*Lithobates clamitans*	Green Frog	Station 2	Within 50m	1	1
4	*Lithobates clamitans*	Green Frog	Station 1	Within 50m	1	2
4	*Lithobates clamitans*	Green Frog	Station 3	Within 50m	2	3
4	*Lithobates clamitans*	Green Frog	Station 5	Within 50m	1	2
4	*Lithobates clamitans*	Green Frog	Station 5	Within 50m	1	1
4	*Lithobates clamitans*	Green Frog	Station 9	Within 100m	1	1
4	*Lithobates clamitans*	Green Frog	Station 9	Within 50m	1	1
4	*Lithobates clamitans*	Green Frog	Station 9	Within 100m	1	1
4	*Lithobates clamitans*	Green Frog	Station 9	Outside 100m	2	3

APPENDIX 5 | Bird Species List

Scientific Name	Common Name	G Rank	S Rank	COSEWIC Status	SARA	SARO	Area Sensitive	CUM	MAS/MAM	SWD
Empidonax alnorum	Alder Flycatcher	G5	S5B				Yes	PO	PO	
Anas rubripes	American Black Duck	G5	S4				No		PO	
Spinus tristis	American Goldfinch	G5	S5B				No			PR
Setophaga ruticilla	American Redstart	G5	S5B				Yes			PO
Turdus migratorius	American Robin	G5	S5B				No		PR	PR
Icterus galbula	Baltimore Oriole	G5	S4B				No			C
Hirundo rustica	Barn Swallow	G5	S5B	THR	THR	THR	No	PO	O	
Coccyzus erythropthalmus	Black-billed Cuckoo	G5	S5B				No			PO
Poecile atricapillus	Black-capped Chickadee	G5	S5				No	PO	PR	PO
Cyanocitta cristata	Blue Jay	G5	S5				No			PR
Polioptila caerulea	Blue-gray Gnatcatcher	G5	S4B				Yes			PO
Dolichonyx oryzivorus	Bobolink	G5	S4B	THR	THR	THR	Yes	PO		
Molothrus ater	Brown-headed Cowbird	G5	S4B				No	PR	PR	PO
Thryothorus ludovicianus	Carolina Wren	G5	S4				No			PO
Quiscalus quiscula	Common Grackle	G5	S5B				No			PO
Corvus corax	Common Raven	G5	S5				No			PO
Geothlypis trichas	Common Yellowthroat	G5	S5B				No	PO	PR	PR
Picoides pubescens	Downy Woodpecker	G5	S5				No			PO
Sialia sialis	Eastern Bluebird	G5	S5B	NAR		NAR	No	PR	PO	
Tyrannus tyrannus	Eastern Kingbird	G5	S4B				No		PO	PO
Contopus virens	Eastern Wood-pewee	G5	S4B	SC	SC	SC	No		PO	PR
Dumetella carolinensis	Gray Catbird	G5	S4B				No	PO	PR	PR
Ardea herodias	Great Blue Heron	G5	S4				No		PR	
Myiarchus crinitus	Great Crested Flycatcher	G5	S4B				No			PR
Picoides villosus	Hairy Woodpecker	G5	S5				Yes			C
Troglodytes aedon	House Wren	G5	S5B				No	PO	PO	PR
Passerina cyanea	Indigo Bunting	G5	S4B				No			PR
Charadrius vociferus	Killdeer	G5	S5B, S5N				No		PO	
Anas platyrhynchos	Mallard	G5	S5				No		C	
Cistothorus palustris	Marsh Wren	G5	S4B				No		PO	
Zenaida macroura	Mourning Dove	G5	S5				No			PO
Cardinalis cardinalis	Northern Cardinal	G5	S5				No	PO	PO	PR
Colaptes auratus	Northern Flicker	G5	S4B				No			PO
Icterus spurius	Orchard Oriole	G5	S4B				No	PO		
Melanerpes carolinus	Red-bellied Woodpecker	G5	S4				No			PO
Sitta canadensis	Red-breasted Nuthatch	G5	S5				Yes			PO

Scientific Name	Common Name	G Rank	S Rank	COSEWIC Status	SARA	SARO	Area Sensitive	CUM	MAS/MAM	SWD
Vireo olivaceus	Red-eyed Vireo	G5	S5B				No			PR
Buteo jamaicensis	Red-tailed Hawk	G5	S5	NAR		NAR	No			PO
Agelaius phoeniceus	Red-winged Blackbird	G5	S4				No	PR	PO	PO
Larus delawarensis	Ring-billed Gull	G5	S5B, S4N				No			O
Pheucticus ludovicianus	Rose-breasted Grosbeak	G5	S4B				No		PO	PR
Passerculus sandwichensis	Savannah Sparrow	G5	S4B				Yes	PO		
Melospiza melodia	Song Sparrow	G5	S5B				No	PR	PO	PR
Actitis macularius	Spotted Sandpiper	G5	S5				No		PO	
Melospiza georgiana	Swamp Sparrow	G5	S5B				No		PR	
Tachycineta bicolor	Tree Swallow	G5	S4B				No	PR	PO	PO
Baeolophus bicolor	Tufted Titmouse	G5	S4				Yes			PO
Cathartes aura	Turkey Vulture	G5	S5B				No		O	
Vireo gilvus	Warbling Vireo	G5	S5B				No	PO	PO	PO
Sitta carolinensis	White-breasted Nuthatch	G5	S5				Yes			PO
Meleagris gallopavo	Wild Turkey	G5	S5				No	PO		
Empidonax traillii	Willow Flycatcher	G5	S5B				No		PO	
Aix sponsa	Wood Duck	G5	S5				No		O	
Hylocichla mustelina	Wood Thrush	G4	S4B	THR	THR	SC	No			PR
Setophaga petechia	Yellow Warbler	G5	S5B				No	PR	PR	PR

APPENDIX 6 | Significant Wildlife Habitat Screening

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
SEASONAL CONCENTRATION AREAS OF ANIMALS					
Waterfowl Stopover and Staging Areas (Terrestrial) Rationale – Habitat important to migrating waterfowl.	American Black Duck Northern Pintail Gadwall Blue-winged Teal Green-winged Teal American Wigeon Northern Shoveler Tundra Swan	CUM1 CUT1 Plus, evidence of annual spring flooding from meltwater or run-off within these Ecosites. Fields with seasonal flooding and waste grains in the Long Point, Rondeau, Lake St. Clair, Grand Bend and Point Pelee areas may be important to Tundra Swans.	CRITERIA • Fields with sheet water during Spring (mid-March to May) • Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl • Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available INFORMATION SOURCES • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities • Sites documented through waterfowl planning processes (e.g., EHJV implementation plan) • Field Naturalist Clubs • Ducks Unlimited Canada • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • Any mixed species aggregations of 100 or more individuals required • The flooded field ecosite habitat plus a 100-300 m radius, dependent on local site conditions and adjacent land use is the significant wildlife habitat • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates) SWH MIST Index #7 provides development effects and mitigation measures.	ABSENT- Some extensive areas of spring sheet water were seen in the study area, but large numbers of migrating waterfowl were not observed.
Waterfowl Stopover and Staging Areas (Aquatic) Rationale – Important for local and migrant waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only one of a few in the eco-district.	Canada Goose Cackling Goose Snow Goose American Black Duck Northern Pintail Northern Shoveler American Wigeon Gadwall Green-winged Teal Blue-winged Teal Hooded Merganser Common Merganser Lesser Scaup Greater Scaup Long-tailed Duck Surf Scoter White-winged Scoter Black Scoter Ring-necked duck Common Goldeneye Bufflehead	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	CRITERIA • Ponds, marshes, lakes, bays, coastal inlets and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify • These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water). INFORMATION SOURCES • Environment Canada • Naturalist clubs often are aware of staging/stopover areas. • OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging.	Studies carried out and verified presence of: • Aggregations of 100 or more of listed species for 7 days, results in >700 waterfowl use days • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH • The combined area of the ELC ecosites and a 100 m radius area is the SWH • Wetland area and shorelines associated with sites identified within the SWHTG Appendix K are significant wildlife habitat. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from	ABSENT – There are some small ponds and other waterbodies in the study area but these were observed to support large numbers of migrating waterfowl.

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
	Redhead Ruddy Duck Red-breasted Merganser Brant Canvasback Ruddy Duck		• Sites documented through waterfowl planning processes (e.g., EHJV implementation plan) • Ducks Unlimited projects • Element occurrence specification by Nature Serve: http://www.natureserve.org • NHIC Waterfowl Concentration Area	past surveys with species numbers and dates recorded). SWH MIST Index #7 provides development effects and mitigation measures.	
Shorebird Migratory Stopover Areas Rationale – High quality shorebird stopover habitat is extremely rare and typically has a long history of use.	Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	CRITERIA • Shorelines of lakes, rivers and wetlands, including beach area, bars and seasonally flooded, muddy and unvegetated shoreline habitats • Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October • Sewage treatment ponds and storm water ponds do not qualify as SWH. INFORMATION SOURCES • Western hemisphere shorebird reserve network • Canadian Wildlife Service (CWS) Ontario Shorebird Survey • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • NHIC Shorebird Migratory Concentration Area	Studies confirming: • Presence of 3 or more of listed species and >1000 shorebird use days during spring or fall migration period (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period) • Whimbrel stop briefly (<24 hours) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100 m radius area • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" SWH MIST Index #8 provides development effects and mitigation measures.	ABSENT- Marshes in the study area are dominated by Phragmites and are not suitable for shorebird stopover and foraging. There are no extensive mudflats in the study area.
Raptor Wintering Area Rationale – Sites used by multiple species, a high number of individuals and used annually are most significant.	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl SPECIAL CONCERN Short-eared Owl Bald Eagle	HAWKS/OWLS: Combination of ELC Community Series; need to have present one Community Series from each land class; Forest: FOD, FOM, FOC. Upland: CUM, CUT, CUS, CUW. BALD EAGLE Forest Community Series: FOD, FOM, FOC, SWD, SWM or SWC on shoreline areas adjacent to	CRITERIA • The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors • Raptor wintering (hawk/owl) sites need to be >20 ha with a combination of forest and upland • Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15 ha) with adjacent woodlands • Field area of the habitat is to be wind swept with limited snow depth or accumulation.	Studies confirm the sue of these habitats by: • One or more Short-eared Owls OR one of more Bald Eagles OR at least 10 individuals and two of the listed hawk/owl species • To be significant a site must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birds. • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area	CANDIDATE – The study area contains a mosaic of forested and open country habitats which probably provide roosting and foraging habitat for raptors in winter. Winter raptor surveys were not completed for this study.

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
		large rivers or adjacent to lakes with open water (hunting area).	• Eagle sites have open water and large trees and snags available for roosting INFORMATION SOURCES • OMNRF Ecologist or Biologist • Naturalist clubs • NHIC Raptor Winter Concentration Area • Data from Bird Studies Canada • Results of Christmas Bird Counts • Reports and other information available from Conservation Authorities	• Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" SWH MIST Index #10 and #11 provides development effects and mitigation measures.	
Bat Hibernacula Rationale – Bat hibernacula are rare habitats in all Ontario landscapes.	Big Brown Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR3 CCA1 CCA2 (Note: buildings are not considered SWH)	CRITERIA • Hibernacula may be found in caves, mine shafts, underground foundations and Karsts • Active mine sites should not be considered as SWH • The locations of Bat Hibernacula are relatively poorly known. INFORMATION SOURCES • OMNRF for possible locations and contact for local experts • NHIC Bat Hibernaculum • Ministry of Northern Development and Mines for location of mine shafts. • Clubs that explore caves (e.g., Sierra Club) University Biology Departments with bat experts.	• All sites with confirmed hibernating bats are SWH • The area includes 200 m radius around the entrance of the hibernaculum for most development types and 1000 m for wind farms • Studies are to be conducted during the peak swarming period (August to September). Surveys should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects" SWH MIST Index #1 provides development effects and mitigation measures.	ABSENT – There are no suitable mines, caves or other features in the study area which could function as bat hibernacula.
Bat Maternity Colonies Rationale – Known locations of forested bat maternity colonies are extremely rare in all Ontario landscapes.	Big Brown Bat Silver-haired Bat	Maternity colonies considered SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD, FOM, SWD, SWM	CRITERIA • Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). • Maternity roosts are not found in caves and mines in Ontario • Maternity colonies located in Mature deciduous or mixed forest stands with >10/ha large diameter (>25 cm diameter at breast height) wildlife trees • Female bats prefer wildlife trees (snags) in early stages if decay, class 1-3 or class 1 or 2	• Maternity colonies with confirmed use by: o >10 Big Brown Bats o >5 adult female Silver-haired Bats • The area of habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies • Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects"	CANDIDATE – Dead and dying ash trees and other large cavity trees in woodlots in the study area could be suitable maternity roosts. A snag density survey was not completed for this study.

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
			• Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred INFORMATION SOURCES • OMNRF for possible locations and contact for local experts • University Biology Departments with bat experts.	SWH MIST Index #12 provides the development effects and mitigation measures.	
Turtle Wintering Areas Rationale – Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	SPECIAL CONCERN Midland Painted Turtle Northern Map Turtle Snapping Turtle	Snapping and Midland Painted Turtles: SW, MA, OA and SA; FEO and BOO. Northern Map Turtle: Open water areas such as deeper rivers or streams and lakes with current can also be used as overwintering habitat.	CRITERIA • For most turtles, wintering areas are in the same general areas as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. • Overwintering sites are permanent water bodies, large wetlands and bots or fens with adequate dissolved oxygen. • Manmade ponds such as sewage lagoons or storm water ponds should not be considered SWH. INFORMATION SOURCES • EIS studies carried out by conservation authorities. • Field naturalist clubs. • OMNRF ecologist or biologist • NHIC	• Presence of five overwintering Midland Painted Turtles is significant. • One or more Northern Map Turtle or Snapping Turtle overwintering within a wetland is significant. • The mapped ELC ecosite area with the overwintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are overwintering is the SWH. • Overwintering areas may be identified by searching for congregations (basking areas) of turtles on warm, sunny days during the fall (September to October) or spring (March to May). Congregation of turtles is more common where wintering areas are limited and therefore significant. SWH MIST Index #28 provides development effects and mitigation measures for turtle wintering habitat.	CANDIDATE – Ponds and deep watercourses in the study area are probably deep enough to provide overwintering habitat for turtles.
Reptile Hibernaculum Rationale – Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	SNAKES Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake Milksnake SPECIAL CONCERN Eastern Ribbonsnake	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice, Cave, and Alvar sites may be directly related to these habitats. Observations or congregations of snakes on sunny warm days in the spring or fall is a good indicator.	CRITERIA • For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The existence of features that go below frost line, such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. • Areas of broken and fissured rock are particularly valuable since they provide	Studies confirming: • Presence of snake hibernacula used by a minimum of five individuals of a snake species OR individuals of two or more snake species. • Congregations of a minimum of five individuals of a snake species OR individuals of two or more snake spp. near potential hibernacula (e.g., foundation or rocky slope) on sunny warm days in Spring (April/May) and Fall (September/October)	ABSENT - No suitable sites for hibernation (e.g., rock piles, rock crevices, etc.) were found in the study area and no congregations of snakes were observed during spring field investigations.

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
			access to subterranean sites below the frost line • Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. INFORMATION SOURCES • In spring, local residents or landowners may have observed the emergence of snakes on their property (e.g., old dug wells). • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs • University herpetologists • NHIC	• NOTE: If there are Special Concern Species present, then site is SWH • NOTE: Sites for hibernation possess specific habitat parameters (e.g., temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population (i.e., strong hibernation site fidelity). Other critical life processes (e.g., mating) often take place in close proximity to hibernacula. • The feature in which the hibernacula is located plus a 30 m radius area is the SWH SWH MIS Index #13 provides development effects and mitigation measures for snake hibernacula.	
Colonially-Nesting Bird Breeding Habitat (Bank and Cliff) Rationale – Historical use and number of nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow populations are declining in Ontario.	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles Cliff faces, bridge abutments, silos, barns. Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	CRITERIA • Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. • Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation. INFORMATION SOURCES • Reports and other information available from Conservation Authorities • Ontario Breeding Bird Atlas • Bird Studies Canada *NatureCounts* http://www.birdscanada.org/birdmon • Field naturalist clubs	Studies confirming: • Presence of 1 or more nesting sites with 8 or more Cliff Swallow pairs and/or rough-winged swallow pairs during the breeding season. • A colony identified as SWH will include a 50 m radius habitat area from the peripheral nests • Field surveys to observe and count swallow nests are to be completed during the breeding season. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" SWH MIST Index #4 provides development effects and mitigation measures.	ABSENT - No cliff faces, bridge abutments, silos, barns, eroding banks, sandy hills, sand piles, borrow pits or steep slopes occur in the study area.
Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs) Rationale – Large colonies are important to local bird populations, typically sites are	Great Blue Heron Black-crowned Night-Heron Great Egret Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3	CRITERIA • Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15 m from ground, near the top of the tree.	Studies confirming: • Presence of 2 or more active nests of Great Blue Heron or other listed species. • The habitat extends from the edge of the colony and a minimum 300 m radius or extent of the Forest Ecosite containing	ABSENT – No heron nests were observed in the study area.

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
only known colony in area and are used annually.		SWD4 SWD5 SWD6 SWD7 FET1	INFORMATION SOURCES • Ontario Breeding Bird Atlas colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNRF). • NHIC Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries. • Reports and other information available from Conservation Authorities. • MNRF District Offices • Field Naturalist Clubs.	the colony or any island <15 ha with a colony is the SWH • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells SWH MIST Index #5 provides development effects and mitigation measures.	
Colonially-Nesting Bird Breeding Habitat (Ground) Rationale – Colonies are important to local bird populations, typically sites are only known colony in area and are used annually.	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1:50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1–6 MAS1–3 CUM CUT CUS	CRITERIA • Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. INFORMATION SOURCES • Ontario Breeding Bird Atlas, rare/colonial species records. • Canadian Wildlife Service • Reports and other information available from Conservation Authorities. • NHIC Colonial Waterbird Nesting Area • MNRF District Offices. Field Naturalist Clubs	Studies confirming: • Presence of >25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern • Presence of 5 or more pairs for Brewer's Blackbird • Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant • The edge of the colony and a minimum 150 m radius area of habitat, or the extent of the ELC ecosites containing the colony or any island <3 ha with a colony is the SWH • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" SWH MIST Index #6 provides development effects and mitigation measures.	ABSENT – There are no suitable rocky or open islands or peninsulas in the study area.
Migratory Butterfly Stopover Areas Rationale – Butterfly stopover areas are extremely rare habitats and are biologically	Painted Lady Red Admiral SPECIAL CONCERN Monarch	Combination of ELC Community Series; need to have present one Community Series from each landclass: Field: CUM, CUT, CUS	CRITERIA • A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Erie or Lake Ontario	Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration (August/October). MUD is based on the number of days the site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of	CANDIDATE – The study area is within 5 km of Lake Erie and contains abundant nectar plants which Monarch butterflies and other migratory butterflies could feed on. Butterfly use surveys would need to be

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
important for butterfly species that migrate south for the winter.		Forest: FOC, FOD, FOM, CUP Anecdotally, a candidate site for butterfly stopover will have a history of butterflies being observed.	• The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south • The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat • Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes INFORMATION SOURCES • MNRF District Offices • NHIC • Agriculture Canada in Ottawa may have list of butterfly experts. • Field Naturalist Clubs • Toronto Entomologists Association	butterflies can range from 100-500/day, significant variation can occur between years and multiple years of sampling should occur • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD. • MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant. SWH MIST Index #16 provides development effects and mitigation measures.	completed to confirm the presence of this habitat type.
Landbird Migratory Stopover Areas Rationale – Sites with a high diversity of species as well as high numbers are most significant.	All migratory songbirds Canadian Wildlife Service Ontario website: http://www.ec.gc.ca/nature/default.asp?lang=En&n=421B7A9D-1 All migrant raptor species: Ontario Ministry of Natural Resources: *Fish and Wildlife Conservation Act*, 1997. Schedule 7: Specially Protected Birds (Raptors)	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD	CRITERIA • Woodlots >5 ha in size and within 5 km of Lake Erie and Lake Ontario. If woodlands are rare in an area of shoreline, woodland fragments 2-5 ha can be considered for this habitat • If multiple woodlands are located along the shoreline those woodlands <2 km from Lake Erie and Lake Ontario are more significant • Sites have a variety of habitats: forest, grassland and wetland complexes • The largest sites are more significant • Woodlots and forest fragments are important habitats to migrating birds, these features located along the shore and within 5 km of Lake Erie and Lake Ontario are Candidate SWH. INFORMATION SOURCES • Bird Studies Canada • Ontario Nature • Local birders and field naturalist clubs	Studies confirm: • Use of the habitat by >200 birds/day and with >35 species and with at least 10 bird species recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant • Studies should be completed during spring (March-May) and fall (August-October) migration using standardized assessment techniques. Evaluation to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWH MIST Index #9 provides development effects and mitigation measures.	CANDIDATE – The study area is within 5 km of Lake Erie and contains woodlots >5 ha in size. Over 35 bird species were documented in these features during breeding bird surveys, and it is probable that they support over 200 individuals of at least 10 different bird species per day during spring and fall migration. Migratory bird surveys earlier in the season would be required to confirm the presence of this habitat type.

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
			• Ontario Important Bird Areas (IBA) Program		
Deer Winter Congregation Areas Rationale – Deer movement during winter in the southern areas of Ecoregion 7E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions.	White-tailed Deer	All forested Ecosites with these ELC Community Series: FOC, FOM, FOD, SWC, SWM, SWD Conifer plantations much smaller than 50 ha may also be used.	CRITERIA • Woodlots >100 ha in size or if large woodlots are rare in a planning area, woodlots >50 ha • Deer movement during winter in the southern areas of Ecoregion 7E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands • Large woodlots >100 ha and up to 1,500 ha are known to be used annually by densities of deer that range from 0.1-0.5 deer/ha • Woodlots with high densities of deer due to artificial feeding are not significant. INFORMATION SOURCES • MNRF District Offices • LIO/NRVIS	Studies confirm: • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF • Use of the woodlot by White-tailed Deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRF • Studies should be complete4d during winter (January/February) when >20 cm of snow is on the ground using aerial survey techniques, ground road surveys, or a pellet count deer survey SWH MIST Index #2 provides development effects and mitigation measures	ABSENT – MNRF does not map any deer winter congregation areas in the vicinity of the study area.
RARE VEGETATION COMMUNITIES					
Cliffs and Talus Slopes Rationale – Cliffs and Talus Slopes are extremely rare habitats in Ontario.		Any ELC Ecosite within Community Series: TAO, TAS, TAT, CLO, CLS, CLT A Cliff is vertical to near vertical bedrock >3 m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris.	CRITERIA • Most cliff and talus slopes occur along the Niagara Escarpment INFORMATION SOURCES • The Niagara Escarpment Commission has detailed information on location of these habitats • OMNRF Districts • NHIC has location information available on their website • Field Naturalist Clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes SWH MIST Index #21 provides development effects and mitigation measures	ABSENT – The listed ecosites are not present in the study area.
Sand Barren Rationale – Sand barrens are rare in Ontario and support rare species. Most sand barrens have been lost due to cottage development and forestry.		ELC Ecosites: SBO1, SBS1, SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always <60%	CRITERIA • A sand barren area >0.5 ha in size INFORMATION SOURCES • The Niagara Escarpment Commission has detailed information on location of these habitats • OMNRF Districts • NHIC has location information available on their website • Field Naturalist Clubs	• Confirm any ELC Vegetation Type for Sand Barrens • Site must not be dominated by exotic or introduced species (<50% vegetative cover is exotic species) SWH MIST Index #20 provides development effects and mitigation measures	ABSENT – The listed ecosites are not present in the study area.

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	**Criteria and Information Sources**		
		Sand barrens typically are exposed sand, generally sparsely vegetated and caused by a lack of moisture, periodic fires and erosion. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered but less than 60%.	• Conservation Authorities		
Alvar Rationale – Alvars are extremely rare habitats in Ecoregion 7E.	Five alvar indicator species: *Carex crawei* *Panicum philadelphicum* *Eleocharis compressa* *Scutellaria parvula* *Trichostema brachiatum* These indicator species are very specific to Alvars within Ecoregion 7E	ALO1, ALS1, ALT1, FOC1, FOC2, CUM2, CUS2, CUT2-1, CUW2 An Alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plants. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animal species. Vegetation cover varies from patchy to barren with a less than 60% tree cover	CRITERIA • An Alvar site >0.5 ha in size • Alvar is particularly rare in Ecoregion 7E where the only known sites are found in the western islands of Lake Erie INFORMATION SOURCES • Alvars of Ontario (Federation of Ontario Naturalists, 2000) • Conserving Great Lakes Alvars (Ontario Nature) • OMNRF Districts • NHIC has location information available on their website • Field Naturalist Clubs • Conservation Authorities	• Field studies identify that four of the five alvar indicator species at a Candidate Alvar Site is significant • Site must not be dominated by exotic of introduced species (<50% vegetative cover is exotic species) • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses SWH MIST Index #17 provides development effects and mitigation measures	ABSENT – The listed ecosites are not present in the study area.
Old Growth Forest		Forest Community Series: FOD, FOC, FOM, SWD, SWC, SWM	CRITERIA • Woodland area is >0.5 ha	Field studies will determine:	ABSENT - There are a few large trees in the study area which may be approaching or older than 140 years, but they are isolated

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
Rationale – Due to historic logging practices and land clearance for agriculture, old growth forest is rare in Ecoregion 7E.		Old Growth Forests are characterized by heavy mortality or turnover of canopy trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.	INFORMATION SOURCES • OMNRF Forest Resource Inventory mapping • OMNRF Districts • Field Naturalist Clubs • Conservation Authorities • Sustainable Forestry License (SFL) companies will possibly know locations through field operations • Municipal forestry departments	• If dominant tree species of the forest are >140 years old, then the area containing these trees is SWH • The forested area containing the old growth characteristics will have experienced no recognizable forestry activities (cut stumps will not be present) • The area of forest ecosites combined or an eco-element within an ecosite that contain the old growth characteristics is the SWH • Determine ELC vegetation types for the forest area containing the old growth characteristics SWH MIST Index #23 provides development effects and mitigation measures	and do not occur at sufficient densities for their communities to be considered old growth.
Savannah Rationale – Savannahs are extremely rare habitats in Ontario.		TPS1, TPS2, TPW1, TPW2, CUS2 A Savannah is a tallgrass prairie habitat that has tree cover between 25-60% In Ecoregion 7E, known tallgrass prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario).	CRITERIA • No minimum size to site • Site must be restored or a natural site. Remnant sites such as railway rights-of-way are not considered SWH INFORMATION SOURCES • NHIC has location information available on their website • Field Naturalist Clubs • Conservation Authorities	Field studies confirm: • One or more of the Savannah indicator species listed in Appendix N of the SWHTG should be present. Note: savannah plant species list from Ecoregion 7E should be used. • Area of the ELC Ecosite is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover is exotic species) SWH MIST Index #18 provides development effects and mitigation measures.	ABSENT – The listed ecosites are not present in the study area.
Tallgrass Prairie Rationale – Tallgrass prairies are extremely rare habitats in Ontario		TPO1, TPO2 A tallgrass prairie has ground cover dominated by prairie grasses. An open tallgrass prairie habitat has <25% tree cover. In Ecoregion 7E, known tallgrass prairie and savannah remnants are scattered	CRITERIA • No minimum size to site • Site must be restored or a natural site. Remnant sites such as railway rights-of-way are not considered SWH INFORMATION SOURCES • NHIC has location information available on their website • Field naturalist clubs • Conservation Authorities	Field studies confirm: • One or more of the Prairie indicator species listed in Appendix N of the SWHTG should be present. Note: savannah plant species list from Ecoregion 7E should be used. • Area of the ELC Ecosite is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover is exotic species)	ABSENT – The listed ecosites are not present in the study area.

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
		between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario).		SWH MIST Index #19 provides development effects and mitigation measures.	
Other Rare Vegetation Communities Rationale – Plant communities that often contain rare species which depend on the habitat for survival.		Provincially rare (S1, S2, S3) vegetation communities are listed in Appendix M of the SWHTG (MNRF, 2000). Any ELC Ecosite Code that has a possible ELC Vegetation Type that is provincially rare is candidate SWH. Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	CRITERIA • ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in Appendix M of the Significant Wildlife Habitat Technical Guide (MNRF, 2000). • MNRF/NHIC will have up to date listing for rare vegetation communities. INFORMATION SOURCES • NHIC has location information available on their website • Field Naturalist Clubs • Conservation Authorities	• Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of the SWHTG (MNRF, 2000). • Area of the ELC Vegetation Type polygon is the SWH. SWH MIST Index #37 provides development effects and mitigation measures.	CONFIRMED – Pin Oak Mineral Deciduous Swamp (SWD1-3) is a provincially and nationally rare vegetation community.
SPECIALIZED HABITAT FOR WILDLIFE					
Waterfowl Nesting Area Rationale – Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SWT1, SWT2, SWD1, SWD2, SWD3, SWD4 Note: Includes adjacency to Provincially Significant Wetlands	CRITERIA • A waterfowl nesting area extends 120 m from a wetland (>0.5 ha) or a wetland (>0.5 ha) and any small wetlands (0.5 ha) within 120 m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur • Upland areas should be at least 120 m wide so that predators such as raccoons, skunks and foxes have difficulty finding nests • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40 cm diameter at breast height) in woodlands for cavity nest sites. INFORMATION SOURCES • Ducks Unlimited staff may know the locations of particularly productive nesting sites • MNRF Wetland Evaluations for indication of significant waterfowl nesting habitat	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, OR presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April-June). Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • A field study confirming waterfowl nesting habitat will determine boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m from the wetland and will provide enough habitat for waterfowl to successfully nest SWH MIST Index #25 provides development effects and mitigation measures.	ABSENT – American Black Duck was determined to be a possible breeder in the study area but not in sufficient numbers for the habitat to be significant.

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
			• Reports and other information available from Conservation Authorities		
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat Rationale – Nest sites are fairly uncommon in Ecoregion 7E and are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.	Osprey SPECIAL CONCERN Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands.	CRITERIA • Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. • Nests located on man-made objects are not to be included as SWH (e.g., telephone poles and constructed nesting platforms) INFORMATION SOURCES • NHIC compiles all known nesting sites for Bald Eagles in Ontario • MNRF values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat • Nature Counts, Ontario Nest Records Scheme data. • OMNRF District. • Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented • Reports and other information available from Conservation Authorities. • Field naturalist clubs	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the SWH, maintaining undisturbed shorelines with large trees within this area is important • For a Bald Eagle the active nest and a 400-800 m radius around the nest is the SWH. Area of the habitat from 400-800 m is dependent on sight lines from the nest to the development and inclusion of perching and foraging habitat • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for >3 years or suspected of not being used for >5 years before being considered not significant. • Observational studies to determine nest site use, perching sites and foraging areas need to be done from early March to mid-August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" SWH MIST Index #26 provides development effects and mitigation measures	ABSENT - No Ospreys or Bald Eagles were observed in the study area. There is an active nest closer to Port Colborne harbour but the significant habitat around the nest does not extend into the study area.
Woodland Raptor Nesting Habitat Rationale – Nest sites for these species are rarely identified; these area sensitive habitats are often used annually by these species.	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3.	CRITERIA • All natural or conifer plantation woodland/forest stands >30 ha with >4 ha of interior habitat. Interior habitat determined with a 200 m buffer. • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests, within tops or crotches of trees. Species such as	Studies confirm: • Presence of one or more active nests from species list is considered significant • Red-shouldered Hawk and Northern Goshawk – A 400 m radius around the nest or 28 ha area of habitat is the SWH. The 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest.	ABSENT - None of the indicator species were observed in the study area.

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
			Cooper's Hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest INFORMATION SOURCES • OMNRF Districts. • Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada • Reports and other information available from Conservation Authorities.	• Barred Owl – A 200m radius around the nest is the SWH • Broad-winged Hawk and Coopers Hawk – A 100m radius around the nest is the SWH • Sharp-Shinned Hawk – A 50 m radius around the nest is the SWH • Conduct field investigations from early March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. SWH MIST Index #27 provides development effects and mitigation measures	
Turtle Nesting Areas Rationale – These habitats are rare and when identified will often be the only breeding site for local populations of turtles.	SPECIAL CONCERN Midland Painted Turtle Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100 m) or within the following ELC Ecosites: MAS1, MAS2, MAS3, SAS1, SAM1, SAF1, BOO1, FEO1	CRITERIA • Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and is located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes and rivers are most frequently used. INFORMATION SOURCES • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Reptile and Amphibian Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them. • NHIC • Field naturalist clubs.	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles. • One or more Northern Map Turtles or Snapping Turtles nesting is a SWH. • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30 to 100 m around the nesting area dependent on slope, riparian vegetation and adjacent land use is the SWH. • Travel routes from wetland to nesting area are to be considered within the SWH as part of the 30 to 100 m area of habitat. • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. SWH MIST Index #28 provides development effects and mitigation measures for turtle nesting habitat.	ABSENT - The berm adjacent to the canal may provide limited nesting areas; however, dense Common Reed is present on the berm and this would likely preclude nesting.

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
Seeps and Springs Rationale – Seeps/springs are typical of headwater areas and are often at the source of coldwater streams.	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamanders	Seeps and springs are areas where groundwater comes to the surface. Often, they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps and/or springs.	CRITERIA • Any forested area (with <25% meadow/field/ pasture) within the headwaters of a stream or river system • Seeps and springs are important feeding and drinking areas. Especially in the winter will support a variety of plant and animal species. INFORMATION SOURCES • Topographical Map. • Thermography. • Hydrological surveys conducted by Conservation Authorities and MECP. • Field Naturalists Clubs and landowners. • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped	Field studies confirm: • Presence of a site with 2 or more seeps and/or springs should be considered SWH. • The area of an ELC forest ecosite or an ecoelement within ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat SWH MIST Index #30 provides development effects and mitigation measures	ABSENT - No seeps or springs were found in the study area.
Amphibian Breeding Habitat (Woodland) Rationale – These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations.	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	All Ecosites associated with these ELC Community Series: FOC, FOM, FOD, SWC, SWM, SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians.	CRITERIA • Presence of a wetland, pond or woodland pool (including vernal pools) >500 m^2 (about 25 m diameter) within or adjacent (within 120 m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat. INFORMATION SOURCES • Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF Districts and wetland evaluations • Field Naturalist clubs • CSW Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or egg masses) or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands • The habitat is the wetland area plus a 230 m radius of woodland area. If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat. SWH MIST Index #14 provides development effects and mitigation measures	CONFIRMED – There are sufficient numbers of Gray Treefrogs and Spring Peepers for woodland and wetland features on the subject property to qualify as SWH. Both species had Call Level Codes of 3 at multiple stations (Station 3, 4, 7, 8 and 9). Spring Peeper was heard at all stations. However, exact locations were difficult to map.
Amphibian Breeding Habitat (Wetland)	Eastern Newt American Toad	ELC Community Classes SW, MA, FE, BO, OA and SA.	CRITERIA	Studies confirm:	CONFIRMED - Call count surveys at the constructed ponds on the subject property

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
Rationale – Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within central Ontario landscapes.	Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	Typically, these wetland ecosites will be isolated (>120 m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g., Bullfrog) may be adjacent to woodlands.	• Wetlands >500 m^2 (about 25 m diameter), supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators • Bullfrogs require permanent water bodies with abundant emergent vegetation. INFORMATION SOURCES • Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019) • CWS Amphibian Road Surveys and Backyard Amphibian Call Count. • OMNRF Districts and wetland evaluations. • Reports and other information available from Conservation Authorities	• Presence of breeding population of 1 or more of the listed newt/salamander species OR 2 or more of the listed frog or toad species with at least 20 individuals (adults or eggs masses) OR 2 or more of the listed frog/toad species with Call Level Codes of 3 OR Wetland with confirmed breeding American Bullfrogs is significant • The ELC ecosite wetland area and the shoreline are the SWH • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. • If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. SWH MIST Index #15 provides development effects and mitigation measures.	recorded American Toad, Green Frog and American Bullfrog in sufficient numbers to qualify as SWH, though the exact locations of ponds that would qualify as SWH was difficult to determine. The presence of American Bullfrog makes the central canal and shoreline SWH.
Woodland Area-Sensitive Bird Breeding Habitat Rationale – Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area sensitive interior forest songbirds.	Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren Pileated Woodpecker SPECIAL CONCERN Canada Warbler	All Ecosites associated with these ELC Community Series: FOC, FOM, FOD, SWC, SWM, SWD	CRITERIA • Habitats where interior forest breeding birds are breeding, typically large mature (>60 years old) forest stands or woodlots >30 ha • Interior forest habitat is at least 200 m from forest edge habitat INFORMATION SOURCES • Local birder clubs. • CWS for the location of forest bird monitoring. • Bird Studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to determine what forests were of greatest value to interior species • Reports and other information available from Conservation Authorities.	Studies confirm: • Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. • Note: any site with breeding Canada Warblers is to be considered SWH • Conduct field investigations in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" SWH MIST Index #34 provides development effects and mitigation measures	ABSENT – There is no interior forest habitat in the study area. One indicator species was observed – Red-breasted Nuthatch – but it was determined to be only a possible breeder in the study area.
HABITAT FOR SPECIES OF CONSERVATION CONCERN					

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
Marsh Breeding Bird Habitat Rationale – Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Gallinule American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Green Heron Trumpeter Swan SPECIAL CONCERN Black Tern Yellow Rail	MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAM1, SAF1, FEO1, BOO1 Green Heron: all SW, MA and CUM1 sites	CRITERIA • Nesting occurs in wetlands. • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water INFORMATION SOURCES • OMNRF District and wetland evaluations. • Field Naturalist clubs • NHIC Records. • Reports and other information available from Conservation Authorities. • Ontario Breeding Bird Atlas	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or breeding by any combination of 4 or more of the listed species • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" SWH MIST Index #35 provides development effects and mitigation measures	ABSENT – One indicator species (Marsh Wren) was determined to be a possible breeder in the study area, but none were observed in the second survey so breeding was not confirmed. Most of the marsh communities in the study area have been invaded by Phragmites and are no longer suitable breeding habitat for many marsh birds.
Open Country Bird Breeding Habitat Rationale – This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow SPECIAL CONCERN Short-eared Owl	CUM1, CUM2	CRITERIA • Large grassland areas (includes natural and cultural fields and meadows) >30 ha • Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e., no row cropping or intensive hay or livestock pasturing in the last 5 years) • Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. • The indicator bird species are area sensitive requiring larger grassland areas than the common grassland species INFORMATION SOURCES • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • EIS Reports and other information available from Conservation Authorities	Field studies confirm: • Presence of nesting or breeding of 2 or more of the listed species • A field with 1 or more breeding Short-eared Owls is to be considered SWH • The area of SWH is the contiguous ELC ecosite field areas • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" SWH MIST Index #32 provides development effects and mitigation measures	ABSENT – One indicator species (Savannah Sparrow) was determined to be a possible breeder in the study area, but no other indicator species were observed.

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
Shrub/Early Successional Bird Breeding Habitat Rationale – This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records.	INDICATOR SPECIES Brown Thrasher Clay-coloured Sparrow COMMON SPECIES Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher SPECIAL CONCERN Golden-winged Warbler	CUT1, CUT2, CUS1, CUS2, CUW1, CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species	CRITERIA • Large field areas succeeding to shrub and thicket habitats >10 ha in size • Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e., no row-cropping, haying or live-stock pasturing in the last 5 years) • Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species • Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands INFORMATION SOURCES • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • Reports and other information available from Conservation Authorities	Field studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species • A habitat with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat • The area of the SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" SWH MIST Index #33 provides development effects and mitigation measures	CANDIDATE – Two of the common species were determined to be possible breeders in the study area (Black-billed Cuckoo and Willow Flycatcher), but neither of the indicator species were observed in the study area.
Terrestrial Crayfish Rationale – Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare.	Chimney or Digger Crayfish Devil Crayfish or Meadow Crayfish	MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, MAS1, MAS2, MAS3, SWD, SWT, SWM CUM1 with inclusions of above meadow marsh ecosites can be used by terrestrial crayfish	CRITERIA • Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish • Constructs burrows in marshes, mudflats, meadows, the ground can't be too moist. Can often be found far from water • Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually, the soil is not too moist so that the tunnel is well-formed. INFORMATION SOURCES Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF, March, 1998	Studies confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites • Area of ELC ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH • Surveys should be done April to August in temporary or permanent water. Note the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult SWH MIST Index #36 provides development effects and mitigation measures	ABSENT - No chimneys or other evidence of terrestrial crayfish were observed in the study area.
Special Concern and Rare Wildlife Species	All Special Concern and Provincially Rare (S1, S2, S3, SH) plant and animal species.	All plant and animal element occurrences (EOs) within a 1 km or 10 km grid.	CRITERIA • When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially rare species;	Studies confirm: • Assessment/inventory of the site for the identified special concern or rare species	CONFIRMED - Habitat for the following four species of conservation concern is present in the study area: White Moss,

Habitat Type	Wildlife Species	Candidate SWH		Confirmed SWH Criteria	Occurrence in Study Area
		Ecosites	Criteria and Information Sources		
Rationale – These species are quite rare or have experienced significant population declines in Ontario.	Lists of these species are tracked by the NHIC	Older EOs were recorded prior to GPS being available, therefore location information may lack accuracy.	linking candidate habitat on the site needs to be completed to ELC Ecosites INFORMATION SOURCES • NHIC will have Special Concern and Provincially Rare (S1-S3, SH) species lists with element occurrences data. • NHIC Website "Get Information": http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas • Expert advice should be sought as many of the rare species. Have little information available about their requirements.	needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs be easily mapped and cover an important life stage component for a species (e.g., specific nesting habitat or foraging habitat). SWH MIST Index #37 provides development effects and mitigation measures	Eastern Wood-pewee, Wood Thrush and Monarch.
ANIMAL MOVEMENT CORRIDORS					
Amphibian Movement Corridors Rationale – Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	Corridors may be found in all ecosites associated with water. Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1	CRITERIA • Movement corridors between breeding habitat and summer habitat • Movement corridors must be determined when amphibian breeding habitat is confirmed as SWH (Amphibian Breeding Habitat, Wetland) INFORMATION SOURCES • MNRF District Office. • NHIC • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites • Corridors should consist of native vegetation, with several layers of vegetation. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant • Corridors should have at least 15m of vegetation on both sides of waterway or be up to 200 m wide of woodland habitat and with gaps <20 m • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat SWH MIST Index #40 provides development effects and mitigation measures	CANDIDATE – Because there is extensive amphibian breeding habitat in the study area, there is assumed to be amphibian movement between woodland and wetland features as amphibians move between wintering, breeding and foraging habitats. Specific movement corridors have not been identified.