LGL LIMITED
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Natural Heritage Assessment

MATTAMY SGGC NATURAL HERITAGE ASSESSMENT

for:

MATTAMY HOMES

by:

LGL Limited
environmental research associates

June 2018
LGL FILE TA8713

MATTAMY SGGC

NATURAL HERITAGE ASSESSMENT

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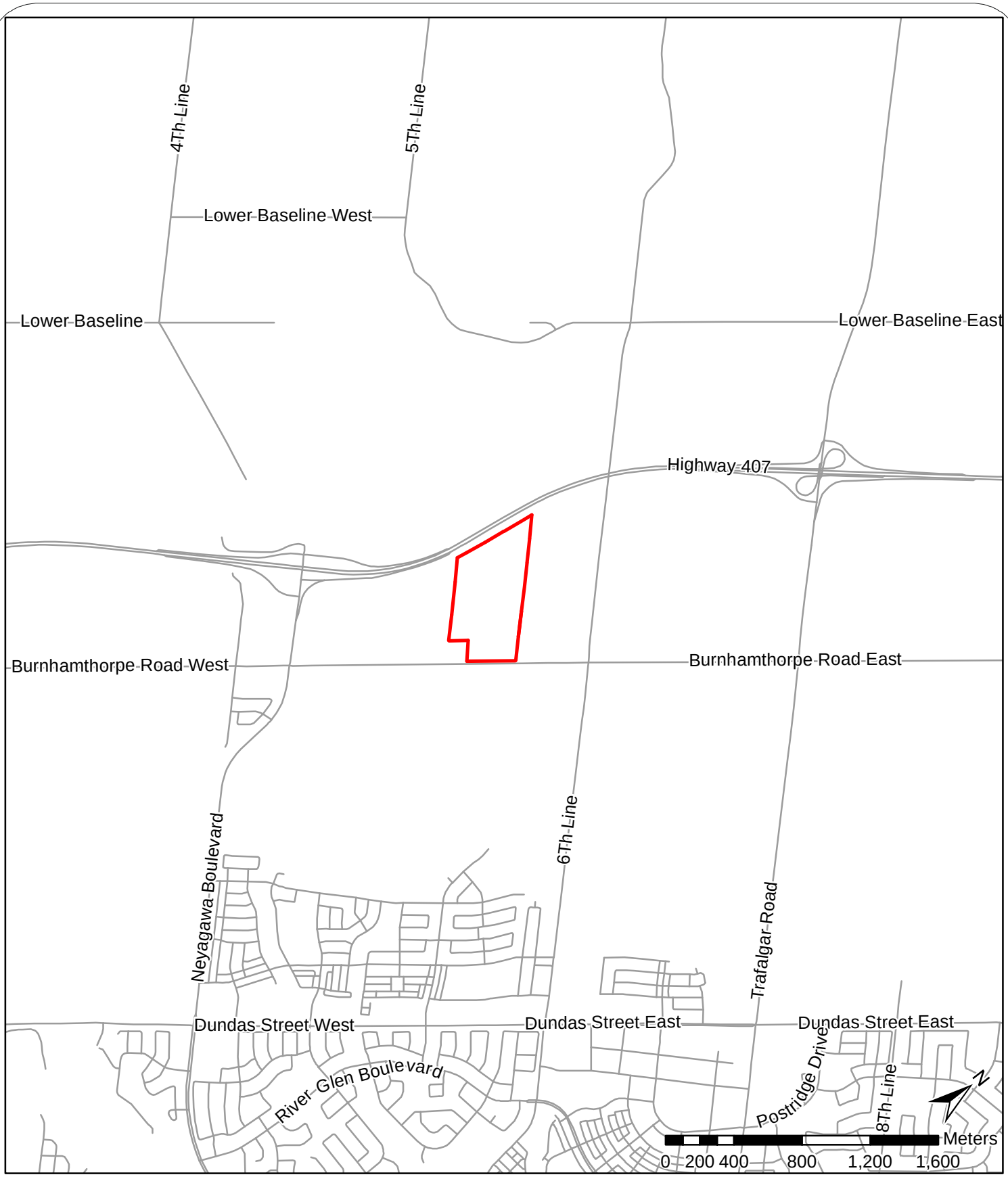
1.0 INTRODUCTION

LGL Limited has been retained by Mattamy Homes to conduct a natural heritage existing conditions study for a site at 145 Burnhamthorpe Road between Neyagawa Boulevard and Sixth Line in the Town of Oakville, Regional Municipality of Halton (Figure 1). This area is referred to in this report as the Subject Property. Site investigations occurred over the growing season of 2017 and included vegetation inventories, habitat assessment, and wildlife inventories.

1.1 SITE DESCRIPTION

The Subject Property is currently utilized extensively for soy bean row cropping. Two woodlots are in proximity to the site; one on the neighbouring property to the east (Core 6) and the other south of Burnhamthorpe Road, east of the site (Core 7). Sixteen Mile Creek valley is located north of the 407 ETR highway and is a large, relatively undisturbed valley system. The Sixteen Mile Creek valley, and associated natural areas, is an important natural heritage feature, but the presence of the 407 ETR limits its influence on the Subject Property. Nearby agricultural areas have been undergoing transition from row cropping to residential development including transportation and watermain infrastructure upgrades.

For the purposes of this study, the term *adjacent lands* conforms with the Provincial Policy Statement, 2014, and is a description of lands contiguous to a specific natural heritage feature or area where it is likely that development or site alteration would have a negative impact on the feature or area.



Mattamy SGGC
Key Map

Study Area

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Project	TA8713	Figure	1
Date	October, 2017	Prepared By	KC
Scale	1:30,000	Verified By	MJO

2.0 DESKTOP REVIEW OF AVAILABLE BACKGROUND INFORMATION

2.1 HALTON REGIONAL OFFICIAL PLAN (2015)

A review of the Halton Regional Official Plan (2015) Map 1G confirms that no Natural Heritage Systems, Key Features or Enhancement Areas, Linkages or Buffers are identified on the Subject Property. However, Key Features are mapped adjacent to the Subject Property and align with the boundary of the Sixteen Mile Creek valley north of the 407 ETR, and Core 6 abutting the eastern boundary of the Subject Property (Appendix A). According to the Regional Official Plan (ROP), Key Features could include significant habitat of endangered or threatened species, significant wetlands, significant coastal wetlands, significant woodlands, significant valleylands, significant wildlife habitat, significant Areas of Natural and Scientific Interest, and fish habitat. ROP Map 1G also identifies enhancement areas of the Key Features, to include linkages, buffers, watercourses within a Conservation Authority Regulation Limit, and wetlands.

2.2 NORTH OAKVILLE CREEKS SUBWATERSHED STUDY (NOCSS) CHARACTERIZATION REPORT TOWN OF OAKVILLE AUGUST 25, 2006

Two Core areas, as identified in NOCSS, are in proximity to the Subject Property; one on the neighbouring property to the east (Core 6) and the other south of Burnhamthorpe Road, east of the Subject Property (Core 7).

2.2.1 NOCSS Core #6 Northwest of Burnhamthorpe Road & Sixth Line

The North Oakville Creeks Subwatershed Study, 2006 (NOCSS), reports that Core #6 is similar in character to Core #7, but is smaller in size. Core #6 covers an area of approximately 4.7 hectares (measured independently with ArcGIS Land Information Ontario) and does not provide any interior habitat. Few forest birds of conservation concern were reported in NOCSS for Core 6. Virtually no wetland bird species were reported in either Core 6 or Core 7. See Photo 1 and 2, documented from the subject property during the course of this SGGC study.

Photo 1. Core 6 in background. Photographer situated approximately 20 metres west of Core 6 viewing east. May 2017.

Photo 2. Core 6 in background, photographer situated approximately in the centre of the Subject Property viewing east. October 2017.

2.2.2 NOCSS Core #7 Southwest of Burnhamthorpe Road & Sixth Line:

This feature covers an area of approximately 12.5 ha and provides a small amount of interior habitat (< 1 ha). It is composed of a variety of upland and wetland habitats including portions of two provincially significant wetlands (PSWs 14 and 15). It is known to support a considerable number of forest birds of conservation concern (NOCSS 2006).

Within the NOCSS and the North Oakville East Secondary Plan (NOESP), both Core 6 and 7 have been recommended for preservation with additional linkage enhancements.

2.2.3 NOCSS Watercourse Mapping

The NOCSS does not have any watercourse mapped within the Subject Property.

2.3 PHYSIOGRAPHY

Physiography of Southern Ontario data has been accessed through Google Earth and provides the following information concerning the Subject Property. Till Moraines with clay to silt-textured till (derived from glaciolacustrine deposits or shale) are present with underlying shale, limestone, dolostone, and siltstone of the Queenston Formation.

2.4 SPECIES AT RISK AND LOCALLY RARE SPECIES

2.4.1 Ministry of Natural Resources Natural Heritage Information Centre/Land Information Ontario

A preliminary review of available data for provincially tracked species was completed through a search of the Ministry of Natural Resources and Forestry's (MNRF's) Natural Heritage Information Centre (NHIC) database (Table 1, Appendix C).

The NHIC database was searched for records of provincially listed species at risk within the Subject Property and a surrounding 4km grid area (Table 1). The most recent record returned was 27 years old; a 1990 record of Eastern Milksnake (*Lampropeltis triangulum*). The Eastern Milksnake has since been delisted to Special Concern and its habitat is not regulated by the Ontario *Endangered Species Act* (ESA), 2007. Northern Bobwhite (*Colinus virginianus*) was recorded in 1904 and while its habitat may be found on the subject property (prefers savannahs and grasslands but includes farm fields), it is likely extirpated from the Halton area.

Table 1 Results from MNRF Natural Heritage Information Centre (NHIC) database.

Common Name	*Scientific Name*	S Rank	SARO	COSEWIC	Last Observation Date
Northern Bobwhite	*Colinus virginianus*	S1	END	END	1904
Eastern Milksnake	*Lampropeltis triangulum*	S3		SC	1990-04-?

Legend

S-Rank (Provincial or Subnational ranks): used by the Natural Heritage Information Centre to set protection priorities for rare species and natural communities. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Ontario.

S1-critically imperiled; typically 1 to 5 extant occurrences

S2-imperiled; typically 6 to 20 extant occurrences.

S3-vulnerable; typically 21 to 80 extant occurrences.

S4-apparently secure; uncommon but not rare; some cause for long-term concern; usually >80 extant occurrences.

SARO Status – Species at Risk in Ontario

END-Endangered; a species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's ESA.

EXP-Extirpated; a species that no longer exists in the wild in Ontario but exists elsewhere.

THR-Threatened; a species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.

SC-Special Concern; a species with characteristics that make it sensitive to human activities or natural events

COSEWIC – Committee on the Status of Endangered Wildlife in Canada

NAR- not at risk; a wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

THR-threatened; a wildlife species likely to become endangered if limiting factors are not reversed.

END-endangered; a wildlife species facing imminent extirpation or extinction.

EXT-extirpated; a species no longer existing in the wild in Canada but occurring elsewhere.

SC-special concern; a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

2.4.2 Department of Fisheries and Oceans Data

Map 17 of 34 of the Department of Fisheries and Oceans Species at Risk mapping (Appendix B) confirms that no Critical Habitat of aquatic species listed under the federal Species at Risk Act (SARA) as Endangered, Threatened, or Special Concern is found on the Subject Property.

2.4.3 Final EIR/FSS Upper West Morrison Creek Subcatchment UWM1

The Final EIR/FSS for Upper Morrison Creek Subcatchment UWM1 (Stantec 2017) documents the following two species within Core 7 listed provincially as Special Concern:

- Wood Thrush (*Hylocichla mustelina*)
- Eastern Wood-pewee (*Contopus virens*)

2.5 CONSERVATION HALTON REGULATION LIMITS

Conservation Halton's ArcGIS Approximate Regulation Limit mapping confirms that the Subject Property is included in the Regulation Limit associated with the wetland (Core 6) abutting the eastern boundary of the Subject Property (Figure 2).

2.6 OTHER REGULATION AREAS

The Subject Property does not fall within the Greenbelt, Oak Ridges Moraine, or Niagara Escarpment Plan areas.

3.0 SITE INVESTIGATION

3.1 VEGETATION AND VEGETATION COMMUNITIES

3.1.1 Methodology

The extent and composition of vegetation communities were first reviewed through interpretation of aerial imagery and subsequently confirmed in site investigations conducted on May 10th, June 13th, and June 28th 2017. Natural vegetation communities were classified according to the *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (Lee et al. 1998). The objective was to classify the natural vegetation communities and acquire a flora species inventory for the subject lands. Local plant species status was reviewed against *The Vascular Plants of Halton Region* (Crins et. al. 2006). Vascular plant nomenclature follows Newmaster *et al*. (1998) with a few exceptions that have been updated to Newmaster 2008. All of the plant species and vegetation community types observed were screened for provincially and federally listed SAR and species of local significance.

3.1.2 Results

3.1.2.1 Flora

A total of 68 species were observed (Appendix D). Approximately 44% of the species documented are considered non-native or invasive in nature, and the remaining 56% are considered common, native species.

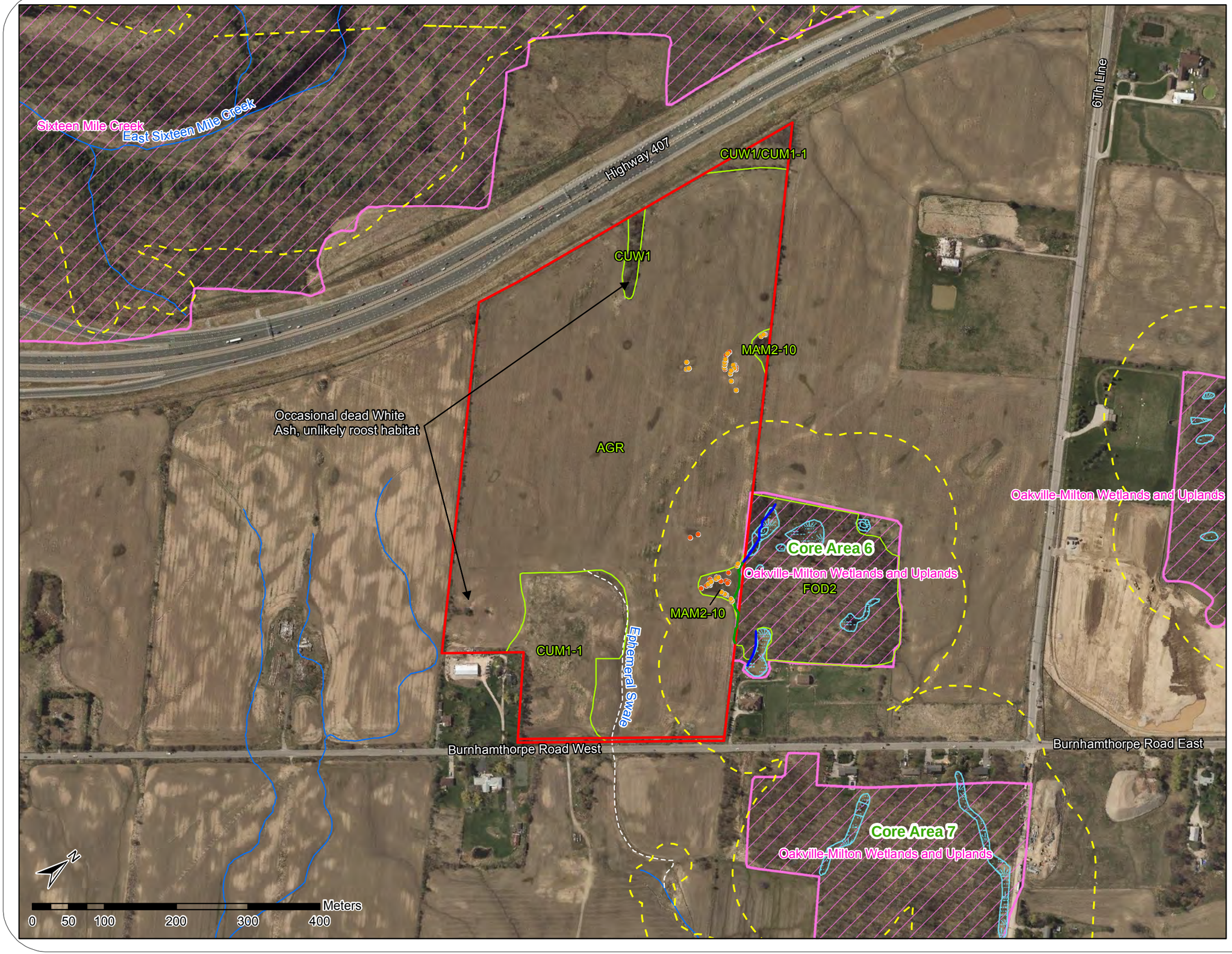
3.1.2.2 Vegetation Communities

Table 2 provides a summary of the vegetation communities documented on the subject property. The site is primarily under agricultural use, and planted with soy during the 2017 season and corn the season prior. None of the natural/cultural communities documented are considered rare or highly sensitive. A fairly sizeable Dry-Fresh Oak-Maple-Hickory Deciduous Forest (FOD2) community (Core 6) exists east of the property (Figure 2). This community was characterized from the SGGC subject property at the west edge of Core 6, as it is within privately owned property and access was not attained. This wooded community appears to also have several small wetland inclusions, some of which have been staked by the agencies as part of the UWMC EIR/FSS (Stonybrook, November 2017).

Several small Forb Mineral Meadow Marsh (MAM2-10) communities were found on the Subject Property. The north edge of the Subject Property borders the 407 ETR right-of-way but is separated by a 6' fence. Two small, fragmented Cultural Woodlands (CUW1) occur in this area, and may be remnants of an abandoned agricultural laneway. The southwest corner of the Subject Property includes a portion of Old Field Cultural Meadow (CUM1-1) with a cattail (*Typha angustifolia*) swale along the northeast edge of the community, and piles of rubble/debris throughout. This CUM1-1 community is bordered by a residential property to the west, which includes a hedgerow of Black Locust (*Robinia pseudoacacia*), Maple (*Acer* spp.), Black Walnut (*Juglans nigra*), and White Pine (*Pinus strobus*) along the driveway and property boundary.

Table 2 Summary of Ecological Land Classification Vegetation Communities.

ELC Code	Vegetation Type	Species Association	Comments
Terrestrial – Natural/Semi-natural			
FOD	DECIDUOUS FOREST		
FOD2	Dry-Fresh Oak-Maple-Hickory Deciduous Forest	**Canopy:** Oak (*Quercus rubra, Quercus macrocarpa*), Red Ash (*Fraxinus pennsylvanica*), Ironwood (*Ostrya virginiana*) **Under storey:** Hawthorn (*Crataegus sp.*), Common Buckthorn (*Rhamnus cathartica*), Pear (*Pyrus communis*) **Ground Cover:** Mayapple (*Podophyllum peltatum*), Trillium (*Trillium grandifolia*), Riverbank Grape (*Vitis riparia*)	• Mid-aged forest community, with indications of cultural (former pasture?) influence. • Surveyed from edge of subject property. • Edges are dominated by Hawthorn, Buckthorn, Pear. • Small wetland pockets occur within, but not surveyed formally.
Terrestrial – Cultural			
CUM	CULTURAL MEADOW		
CUM1-1	Dry-Moist Old Field Cultural Meadow	**Ground Cover:** Common Burdock (*Arctium minus*), Garlic Mustard (*Alliaria petiolata*), Wild Carrot (*Daucus carota*), Ox-eye Daisy (*Leucanthemum vulgare*)	• Cultural community, showing evidence of recent disturbance, rock piles, and debris. • Planted with soy in 2017, however, weedy species still dominate.
CUW	CULTURAL WOODLAND		
CUW1	Mineral Cultural Woodland	**Canopy:** Red Ash, Sugar Maple (*Acer saccharum*), Manitoba Maple (*Acer negundo*) **Under storey:** Red-panicled Dogwood (*Cornus racemosa*), Common Buckthorn, Pear, Hawthorn **Ground Cover:** Riverbank Grape, Reed-canary Grass (*Phalaris arundinaceae*), Garlic Mustard, Poison Ivy (*Toxicodendron radicans ssp. negundo*)	• Several dead-standing Ash trees. • Possibly remnant hedgerows • Small, fragmented communities • Prevalence of introduced species.
Wetland			
MAM	MEADOW MARSH		
MAM2-10	Forb Mineral Meadow Marsh	**Under storey:** Broad-leaved Cattail (*Typha latifolia*) **Ground Cover:** Reed Canary Grass (*Phalaris arundinacea*), Sedges (*Carex* spp.), Purple Loosestrife (*Lythrum salicaria*)	• Likely result of localized topographic drainage from FOD2 community. • Dominated by *Typha sp.*



LEGEND

- Subject Property
- Candidate Life Science ANSI - Provincial Significance (LIO)
- Provincially Significant Wetland (LIO) North Oakville-Milton East Wetland Complex
- Regulation Limit (CH)
- Watercourse (LIO)
- Ephemeral Swale
- Dripline as of July 17, 2008 - NOCSS
- Wetland Limit as of October 25, 2010 - NOCSS
- Terrestrial Crayfish Chimneys – May 8, 2018
- Terrestrial Crayfish Chimneys – June 2, 2018
- ELC Communities Boundary - LGL 2017

FOD2	Dry-Fresh Oak-Maple-Hickory Deciduous Forest
MAM2-10	Forb Mineral Meadow Marsh
CUM1-1	Dry-Moist Old Field Cultural Meadow
CUW1	Mineral Cultural Woodland
AGR	Agricultural

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Existing Conditions

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Project	TA8713	**Figure**	2
Date	June, 2018	**Prepared By:**	KC
Scale	1:5,000	**Verified By:**	MJO

3.1.3 Plant Species at Risk

None of the flora species or vegetation communities documented on site are considered locally rare or uncommon, nor are any regulated under provincial or federal legislation.

3.2 WILDLIFE

3.2.1 Bat Maternal Roost Habitat Screening

3.2.1.1 Methodology

There are currently four bat species listed as Endangered and afforded protection under the provincial *Endangered Species Act, 2007* (ESA): Little Brown Myotis (*Myotis lucifugus*); Northern Myotis (*Myotis septentrionalis*); Eastern Small-footed Bat (*Myotis leibii*); and, Tri-colored Bat (*Perimyotis subflavus*). The MNRF administers the ESA in the province of Ontario. The ESA affords protection for both individuals of these species (subsection 9(1)) and their habitat (subsection 10(1)). Given that species-specific habitat regulations have not yet been developed for SAR bats, habitat is protected according to the general definition provided in the ESA. Specifically, according to section 2(1), the Act protects "an area on which the species depends, directly or indirectly, to carry on its life processes, including processes such as reproduction, rearing, hibernation, migration or feeding". Habitats used for reproduction and rearing (maternal roosting sites) were the focus of LGL's bat habitat screening at the Subject Property.

Of the SAR bats listed above, Little Brown Myotis tends to be the most commonly encountered in treed communities because its population is larger than those of other SAR in the province (MNRF 2017). The MNRF has developed protocols to determine presence/absence of SAR bats which include descriptions of suitable habitat for maternity roosting, as summarized in Table 3. In the case of some SAR bats, maternal roost habitat can include buildings/bridges, rock crevices, caves and other features. The focus of LGL's work was to screen for candidate maternal roosting opportunities in trees to help identify potential constraints.

Table 3 Habitat Descriptions for SAR Bat Maternal Roosting.

Species	Description of Maternal Roost Habitat (MNRF 2017)
Little Brown Myotis	Establishes maternity roosts within tree cavities and under loose or exfoliating bark, especially in wooded areas located near water.
Northern Myotis	Northern Myotis is less frequently encountered relative to Little Brown Myotis but selects similar maternity roost space. Northern Myotis roosts within tree crevices, hollows and under the bark of live and dead trees, particularly when trees are located within a forest gap. Northern Myotis switch roost trees more frequently (every 1-5 days) compared to other SAR bat species.
Eastern Small-footed Bat	Will roost in a variety of habitats, including in or under rocks, in rock outcrops, in buildings, under bridges, or in caves, mines, or hollow trees. These bats often change their roosting locations every day.

Species	Description of Maternal Roost Habitat (MNRF 2017)
Tri-colored Bat	Establishes maternity roosts within live and dead foliage within or below the canopy. Oak is the preferred roost tree species. Maples are also thought to be important for roosting, although maples are selected far less often compared to oaks. Some studies have shown that Tri-colored Bat prefers dead leaves over live leaves, especially if the dead leaves are situated on a live tree i.e., along a broken branch. Other documented roost sites include dogwood leaves, within accumulations of pine needles, in squirrel nests and in tree cavities. Within a forest, the location of maternity roost trees varies from dense woods to more open areas; roosts are rarely found in deep woods. Although Tri-colored Bat switches roosts over the summer, this species has very high site fidelity to particular leaf clusters within a season.

As described in Table 3, three of the four SAR bats use trees with openings, cavities or peeling/sloughing bark in various stages of decay (commonly referred to as snag trees). For Little Brown Myotis and Northern Myotis, snags that meet the criteria below are considered better candidates to host bat roosts:

- tallest in the community;
- exhibits cavities/crevices often originating as cracks, scars, knot holes or woodpecker cavities
- largest diameter at breast height (DBH) >25 cm
- within a cluster of snags
- large amount of loose or peeling bark
- cavity/crevice is high in the tree (>10m from ground)
- tree species provides good cavity habitat (e.g. white pine, maple, aspen, ash, oak)
- species known to be rot resistant (black cherry, black locust)
- snag located in area where canopy has more openness
- snag exhibits early stages of decay (Decay Class 1-3, see Table 4 legend)

The Tri-coloured Bat relies on tree foliage to establish roosts and in particular, clusters of dead or dying leaves in mature maple and oak trees may be preferred (MNRF 2017). Consequently, the focus of the Subject Property bat habitat screening was to locate large DBH snag trees and mature maples and oaks within the proposed disturbance areas to collect information on tree condition as it relates to the habitat descriptions for the four bat species.

3.2.1.2 Results

A pedestrian survey of the Subject Property was conducted on May 10 and October 6, 2017 to locate trees within the property limits which may be considered suitable for bat maternal roosting according to the MNRF habitat descriptions in Table 3.

Trees are quite limited and scattered/isolated throughout the subject property. Several dead White Ash (*Fraxinus americana*) and White Elm (*Ulmus americana*) trees exhibiting diameters (at breast height) greater than 25 centimetres and small areas where sloughing bark could provide shelter for bats were observed, but no cavities were observed. Seven dead trees were observed in total, five of which are situated in a remnant abandoned farm lane bisected by the 407 ETR, with the remaining two located approximately 100 metres north of the existing residences in the southwest corner of the Subject Property.

None of these trees are thought to provide valuable roosting habitat for bats. It is likely that Core 6, Core 7 and the Sixteen Mile Creek valleylands provide higher quality habitat for bats local to the area. Photos 3 and 4 display examples of the few trees observed on the Subject Property. Consultation with MNRF is ongoing this assessment is ongoing (May, 2018), though, recent correspondence regarding the general direction for bat habitat assessments suggests that isolated treed habitats at least 0.5 ha in area and averaging at least 30 metres in width need to be assessed for tree species, size and cavity composition to determine whether acoustic bat surveys should be undertaken. Where the treed habitat is adjacent/contiguous to protected woodland, the relative proportion of unprotected woodland to the overall woodland of similar character would be determined. This suggests that the trees described herein will not require further study.

Photo 3. Dead White Ash the 407 ETR/abandoned farm lane.

Photo 4. Dead White Ash near the southwest corner of the Subject Property.

3.2.2 Wildlife Survey

3.2.2.1 Methodology

Breeding bird and wildlife observations were completed on May 10th, June 13th and June 28th, 2017 by pedestrian survey of the Subject Property in natural areas and where structures with the potential to provide habitat (e.g. barns, bridges, culverts) were noted in proximity to the Subject Property. Wildlife identification was completed through visual and auditory observations as well as indirect incidental observations (i.e. tracks, scat, and scents). In accordance with the Ontario Breeding Bird Atlas Protocol (2001), breeding evidence for each bird species was documented during the wildlife survey. Terrestrial Crayfish 'chimneys' were observed during the 2017 growing season and locations of chimneys were further refined on May 8, and June 2, 2018. Wildlife observations were screened for listing as at risk provincially, federally, or of local concern.

3.2.2.2 Results

A total of 38 wildlife species were documented on, or in the immediate vicinity of, the Subject Property (Appendix E). The majority of the species observed are considered secure and common to the community types found on site. Approximately 76% of the bird species observed are considered migratory and regulated under the *Migratory Birds Convention Act* (MBCA). Two additional species, Blue Jay (*Cyanocitta cristata*) and Red-tailed Hawk (*Buteo jamaicensis*), are protected under the *Fish and Wildlife Conservation Act*. A total of six of the observed bird species are not under any legislative protection; American Crow (*Corvus brachyhrynchos)*, Brown-headed Cowbird (*Molothrus ater*), Common Grackle (*Quiscalus quiscula*), European Starling (*Sturnus vulgaris*), House Sparrow (*Passer domesticus*), and Red-winged Blackbird (*Agelaius phoeniceus*).

Two of the species observed are considered interior species according to the *Significant Wildlife Habitat Technical Guide* (SWHTG, 2000); Pileated Woodpecker (*Dryocopus pileatus*) and Red-eyed Vireo (*Vireo olivaceus*). Bobolink (*Dolichonyx oryzivorus*), Pileated Woodpecker, and Savannah Sparrow (*Passerculus sandwichensis*) are considered Area Sensitive species. No bird species were confirmed to be breeding on the Subject Property; however, probable breeding evidence such as territory establishment, pairs of birds, and agitated behaviour were documented for 13 species.

3.2.3 Amphibian Call Survey

Amphibian call surveys were completed on May 9th, May 31, and June 13, 2017 following the Marsh Monitoring Protocol which establishes the criteria to guide the timing of the investigations. Surveys began at least one half-hour after sunset and ended by midnight during evenings with little wind and minimum night air temperatures of 5°C, 10°C and 17°C for each of the respective surveys. Temperature requirements are in place as part of the survey protocol as amphibian calling intensity is strongly associated with season, time of day, and weather conditions.

Calling amphibians were not heard on the Subject Property, however; Core 6, to the east, supported small calling populations of the following species:

- Spring Peeper (*Pseudacris crucifer*);
- Western Chorus Frog (*Pseudacris triseriata*); and,
- Gray Tree Frog (*Hyla versicolor*).

Appendix F provides detailed information of the Amphibian Call Surveys.

3.2.4 Terrestrial Crayfish Survey

Terrestrial crayfish chimney locations were surveyed with GPS on May 8, and June 2, 2018. Approximately 30 chimneys were observed on each survey, including the MAM2-2 community west of Core 6 and along the perimeters of isolated puddles (Photo 5) in the crop field/northeast portion of the Subject Property (Figure 2). Abundance cannot be determined based on the quantity of chimneys as several tunnels/chimneys may be constructed by one individual. The chimneys, in general, were approximately 5 to 10 centimetres in height, 5 to 10 centimetres diameter at the base with approximate 3 centimetre diameter burrow opening (Photo 6). Given that there are two terrestrial species in Ontario; the Meadow Crayfish (*Cambarus diogenes*) and the Chimney Crayfish (*Fallicambarus fodiens*), these chimneys are expected to be created by Chimney Crayfish as the Subject Property is outside of the reported range (Point Pelee to Wainfleet) of Meadow Crayfish (SWHMiST 2014).

Photo 5. Exemplary puddle where terrestrial crayfish chimney burrows were found.

Photo 6. Terrestrial crayfish chimney burrow.

3.2.5 Wildlife Habitat

The agricultural use of the Subject Property limits the type and richness of species that can or will use the site for breeding purposes. The off-site FOD2 community (Core 6) to the east of the Subject Property represents the highest quality habitat available within reasonable distance to the site. This area provides shelter and nesting opportunities for species that typically breed within densely treed areas, or high in the canopy. The forest community also appears to include small wetland inclusions supporting small populations of frogs.

The remainder of the Subject Property primarily hosts breeding opportunities for ground-nesting and understorey species such as Sparrows, Horned Lark (*Eremophila alpestris*), and Spotted Sandpiper (*Actitis macularius*). Nesting attempts within the AGR and CUM1-1 communities likely have a low success rate due to the intensive farming that is actively occurring. Another potential habitat source in the off-site area are man-made structures such as barns, houses, garages, culverts, etc. With the agricultural nature of the area, species such as American Robin (*Turdus migratorius*), or Barn Swallow (*Hirundo rustica*) may find nesting opportunity within these structures.

Saturated soils and puddled water in some locations provide habitat for terrestrial crayfish, and is considered habitat of Species of Conservation Concern.

3.2.6 Wildlife Species at Risk

Several wildlife species at risk were documented on, or in proximity to, the Subject Property. However, none were confirmed to be breeding within the Subject Property.

Barn Swallows were observed in small numbers, ranging from one to six individuals foraging over the agricultural field. This species is currently listed as a Threatened species under the provincial *Endangered Species Act*, 2007. A general habitat description is available for Barn Swallow and areas within 200m of a nest site are protected. The Barn Swallow were most commonly documented near the southern property limits, with a few observed to the northeast as well. The existing residential properties to the east and west of the Subject Property include multiple structures that could provide nesting opportunities for Barn Swallow; though no active or inactive nests were observed from the property boundary vantage point. Should any active nests be discovered outside the Subject Property, but within 200m, the general habitat regulation area may apply (OMNRF, 2013). As well, the need for additional survey, impact mitigation, and/or monitoring may be triggered.

A single male Bobolink was observed calling while flying over the Subject Property during one of the breeding bird surveys. The Bobolink is a provincially Threatened species. The individual bird did not stop on site, nor is suitable breeding habitat (i.e. grassland) available within, or directly adjacent to, the Subject Property. Given the agricultural nature of the area, it is likely this individual male was passing over in search of suitable habitat.

The Western Chorus Frog (Great Lakes/St. Lawrence Canadian Shield population) is currently listed as a Threatened species under the federal *Species at Risk Act* (SARA). This species was heard calling within the FOD2 community (Core 6) to the east of the Subject Property. It is anticipated that the species is using the small wetland pockets within the forest community. No individuals were heard or observed within the Subject Property, and the wetland pockets that currently exist within the Subject Property are small, fragmented, and subject to a greater degree of disturbance than those within the FOD2 community given the close proximity of active agricultural processes. On private land, prohibitions of SARA apply only to aquatic species listed as endangered, threatened or extirpated in Schedule 1 of SARA; and migratory birds listed in the *Migratory Birds Convention Act, 1994* and also listed as endangered, threatened or extirpated in Schedule 1 of SARA (Species at Risk Public Registry, accessed October 2017). Given that the habitat of the Western Chorus Frog is located off-site, and the Subject Property is privately-owned, there are no issues anticipated currently with regard to compliance under the federal Species at Risk Act.

A single Monarch (*Danaus plexippus*) was documented within the open agricultural field. The Monarch is considered a species of Special Concern under the provincial Endangered Species Act, 2007. Very few Milkweed (*Asclepias* spp.), the preferred food source and host plant for this invertebrate, were documented on the Subject Property and extensive use of the site by this species is not anticipated. In addition, the Subject Property does not meet the criteria for significant habitat of Monarch, and is discussed in Section 4.

3.2.7 Aquatic Habitat Potential

While there were no watercourses mapped on the Subject Property as part of the NOCSS, a ploughed-through and crop-cultivated swale conveys seasonal flow generally through the middle of the Subject Property towards Burnhamthorpe Road (Photo 7) and ultimately to Morrison Creek. There is no potential for fish habitat on the Subject Property as indicated by the terrestrial crops growing within the swale bed.

Photograph 7. Photographer situated approximately 100m north of Burnhamthorpe Road viewing south. March 21, 2018.

4.0 SIGNIFICANT WILDLIFE HABITAT

The Subject Property does not meet the criteria for Significant Wildlife Habitat Ecoregion 7E (OMNR 2000) in that:

- There are no areas considered to provide habitat for seasonal concentrations of animals (winter deer yards, moose late winter habitat, colonial bird nesting sites, waterfowl stopover and staging areas, waterfowl nesting, shorebird migratory stopover areas, landbird migratory stopover areas, raptor winter feeding and roosting areas, wild turkey winter range, turkey vulture summer roosting areas, reptile hibernacula, bat hibernacula, and bullfrog concentration areas). The Sixteen Mile Creek valleyland likely provides important habitat for numerous species, but was not studied as part of this report to due to the disconnection from the Subject Property by the 407 ETR highway.
- Within the Subject Property, there are no rare vegetation communities or specialised habitats for wildlife (e.g. specialised habitat for area-sensitive species, forests providing a high diversity of habitats, old growth, turtle nesting habitat, moose calving habitats, mineral licks, mink, otter, marten denning sites, or cliffs) identified. The SWH criteria for amphibian breeding was considered for Core 6. Although the feature met the criteria in terms of species richness, it did not meet the abundance criteria, and is therefore not identified to function as SWH for amphibian breeding.
- The Subject Property does not provide migratory butterfly stopover areas, as it is not ten hectares in size nor located within five kilometres of Lake Ontario.
- The Subject Property does not provide specific habitats for species of conservation concern. The adjacent Core 6 was host to two interior species according to the *Significant Wildlife Habitat Technical Guide* (SWHTG, 2000); Pileated Woodpecker (*Dryocopus pileatus*) and Red-eyed Vireo (*Vireo olivaceus*), but likely does not meet the criteria of three or more nesting pairs of interior species. In addition, the size criteria for interior forest habitat is not met (interior habitat must be located at least 200m from the forest edge).
- Animal movement corridors are not evident on the Subject Property but are likely present within the Sixteen Mile Creek valley, north of the 407 ETR. Corridors allow animals to travel freely and safely across the landscape by providing cover, shelter from harsh weather conditions, and by minimising encounters with predators and people.

The Subject Property does meet the criteria for Significant Wildlife Habitat Ecoregion 7E (OMNR 2000) in that:

- Terrestrial Crayfish chimneys were observed during the 2017 ELC surveys. Further surveys during May and June, 2018, confirmed approximately 30 chimneys throughout the Subject Property. Significant Wildlife Habitat MiST Index #36 shall be consulted to consider development effects and mitigation measures which may include avoiding the habitat through site selection, limiting vegetation clearing, and avoiding changes to the water balance (Appendix G). Crayfish relocations may also be appropriate, particularly with regard to the crayfish inhabiting the low sensitivity isolated crop field puddles. Opportunities to partner with Conservation Halton should be considered and to explore the possibility of populating local restoration areas (i.e. Glenorchy Restoration Lands) with terrestrial crayfish transplanted from the Subject Property, though, this is largely dependent upon capture success.

5.0 SUMMARY

The Subject Property was assessed on May 9-10, May 31, June 13, June 28, and October 6, 2017 which included three botanical surveys, two breeding bird surveys, three amphibian call surveys, bat roost habitat screening and an aquatic habitat assessment. There are no natural heritage features on the Subject Property, but Core 6, immediately east of the Subject Property, has several sensitivities associated with it. Natural heritage issues pertaining to the Subject Property include:

- Core 6 to the east of the Subject Property may affect the future use of the property. Specifically, development setbacks from the dripline (10m) and wetland limits (30m) as prescribed in NOCSS, will encroach onto the Subject Property;
- As a result of the PSWs near the western edge of Core 6, portions of the Subject Property are regulated by Conservation Halton under Ontario Regulation 162/06 Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses. The overall EIR/FSS will need to maintain flow conveyance from/to Core 6 in a post-development scenario;
- Two of the species observed in Core 6 are considered interior species according to the *Significant Wildlife Habitat Technical Guide* (SWHTG, 2000); Pileated Woodpecker (*Dryocopus pileatus*) and Red-eyed Vireo (*Vireo olivaceus*), while the Bobolink (*Dolichonyx oryzivorus*), Pileated Woodpecker, and Savannah Sparrow (*Passerculus sandwichensis*) are considered area sensitive species. Despite the aforementioned, the criteria for significant wildlife habitat -interior habitat, is not met by Core 6;
- No suitable habitat for provincially regulated species at risk is identified on the Subject Property due to the intensive soy row cropping. The Bobolink was observed passing over the Subject Property. Barn Swallows were also observed flying over the Subject Property, but there was no evidence of breeding occurring within the Subject Property limits;
- The Subject Property does not support fish populations at any time of the year; and,
- Terrestrial crayfish surveys determined that approximately 30 crayfish chimneys were distributed along the eastern portion of the Subject Property and suggests the presence of Significant Wildlife Habitat for a Species of Conservation Concern.

6.0 ADVISORY RECOMMENDATIONS

The following should be considered when determining the future land use of the Subject Property:

- Halton ROP mapped Key Features abutting the east boundary of the property, also coincides with Provincially Significant Wetland (PSW)/Core 6 mapping. Therefore, this Natural Heritage Assessment should be used in the preparation of the Upper West Morrison Creek EIR/FSS Addendum to ensure that no negative impact to Key Features or their ecological functions occurs with future land use. A 30 metre development setback is the provincial and municipal standard in North Oakville for PSWs and the Town of Oakville requires a 10m development setback from the dripline.
- Vegetation removal should ideally be planned for November, when summer and winter-nesting birds, and summer roosting bats do not rely on trees for shelter.
- Mitigation may be required to alleviate impacts on terrestrial crayfish populations and may include avoidance of habitat, or crayfish relocation efforts. Consultation with the Ministry of Natural Resources and Forestry and Conservation Halton is encouraged to elect an appropriate strategy, which may include providing a donor population to other sites currently under restoration efforts (i.e. Glenorchy Restoration Lands west of Sixteen Mile Creek).
- Environmental protection measures, including ESCs are to provide adequate protection to environmental receptors.
- White Ash trees infested by Emerald Ash Borer (EAB) are found on the subject property. Ash tree removal is subject to Canadian Food Inspection Agency (CFIA) Directive D-03-09, which contains the phytosanitary requirements to prevent the entry into, and spread within, Canada of the EAB. The tree removal contractor shall comply with the conditions set by D-03-08 when conducting Ash tree removal. The prohibition includes the movement of Regulated materials (including but not limited to ash wood, bark, chips) from a regulated area. EAB regulated articles moving out of a regulated area must be accompanied by a Movement Certificate issued by the CFIA. Contractor(s) should consult with CFIA Central Region office for specific requirements.
- Pre-development drainage from Core 6 was observed to pass through the subject property (MAM2-2 community) and back to Core 6. Future land use shall consider a water balance to maintain pre-development flow in a post-development scenario. Appropriate stormwater management, including the potential for low impact development measures (i.e., rear yard swales, bioswales, etc.) is encouraged to maintain these post-development flows.

7.0 REFERENCES

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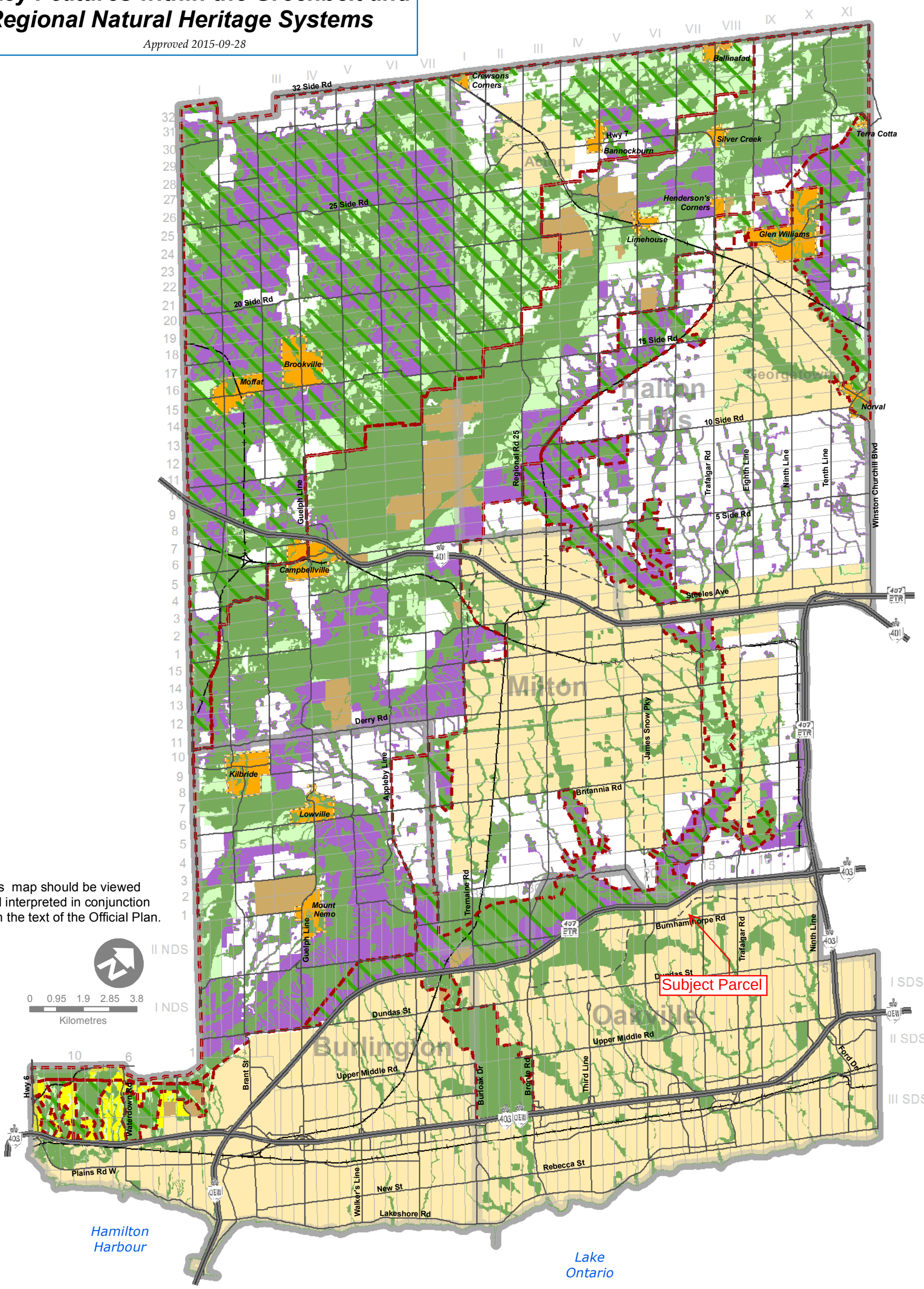
Appendix A

Regional Official Plan – Schedule 1G Key Features within the Greenbelt and Regional Natural Heritage Systems

Map 1G
Key Features within the Greenbelt and Regional Natural Heritage Systems

Approved 2015-09-28



This map should be viewed and interpreted in conjunction with the text of the Official Plan.

Rail Line
Proposed Major Arterial
Major Road
Provincial Freeway
Lot and Concession Line
Municipal Boundary
Greenbelt Plan Boundary

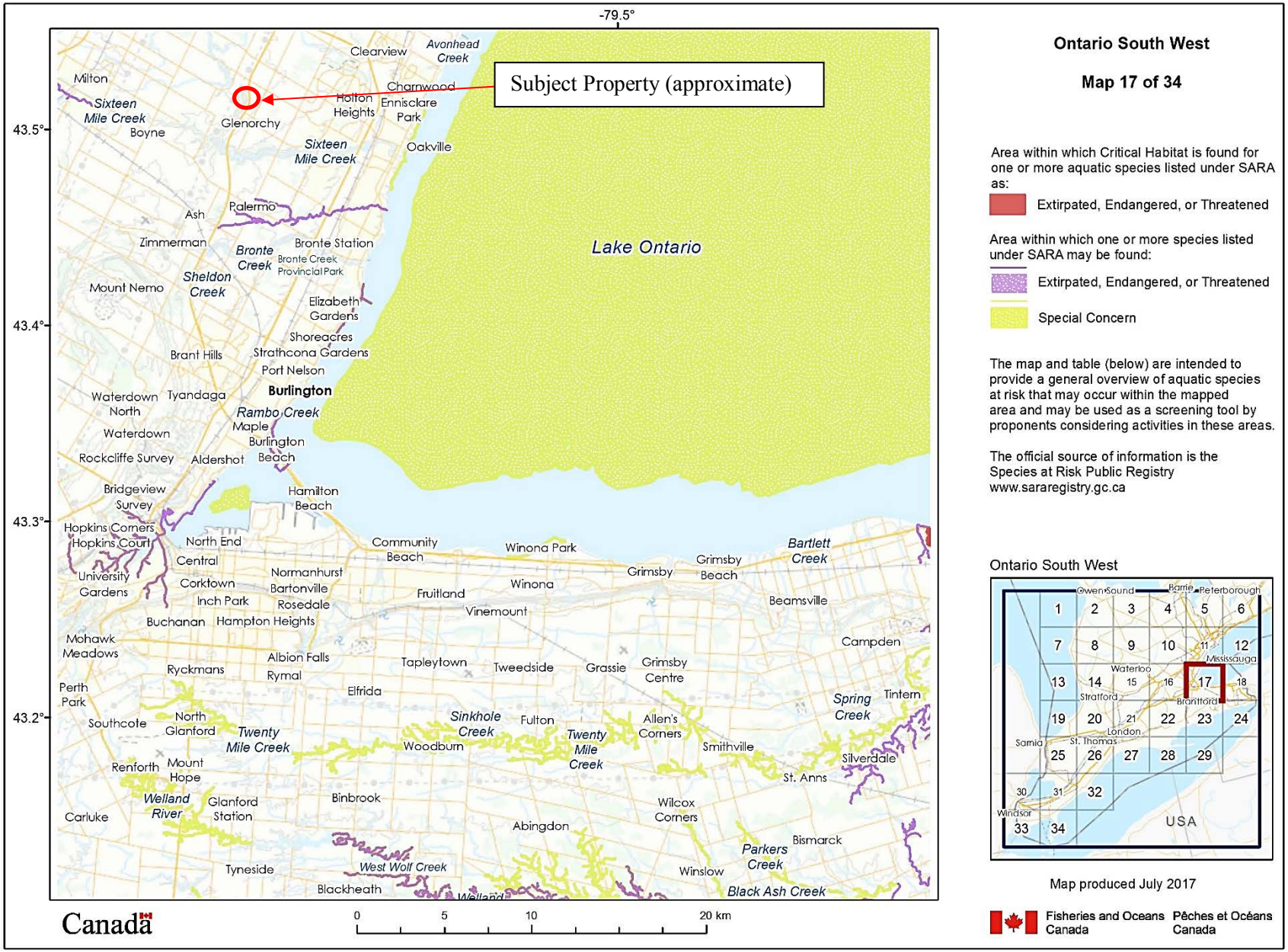
Urban Area
Hamlet
Key Features
Enhancement Areas, Linkages and Buffers
Prime Agricultural Areas in NHS Enhancements/Linkages/Buffers
Greenbelt NHS

Mineral Resource Extraction Area
North Aldershot Policy Area

September 28, 2015

Appendix B

Ontario South West Map 17 of 34 – Critical Habitat for Aquatic Species Listed Under SARA



Ontario South West

Map 17 of 34

Area within which Critical Habitat is found for one or more aquatic species listed under SARA as:

Extirpated, Endangered, or Threatened

Area within which one or more species listed under SARA may be found:

Extirpated, Endangered, or Threatened

Special Concern

The map and table (below) are intended to provide a general overview of aquatic species at risk that may occur within the mapped area and may be used as a screening tool by proponents considering activities in these areas.

The official source of information is the Species at Risk Public Registry www.sararegistry.gc.ca

Ontario South West

Map produced July 2017

Fisheries and Oceans Canada / Pêches et Océans Canada

Appendix C
MNRF's Natural Heritage Information Centre – SGGC Query

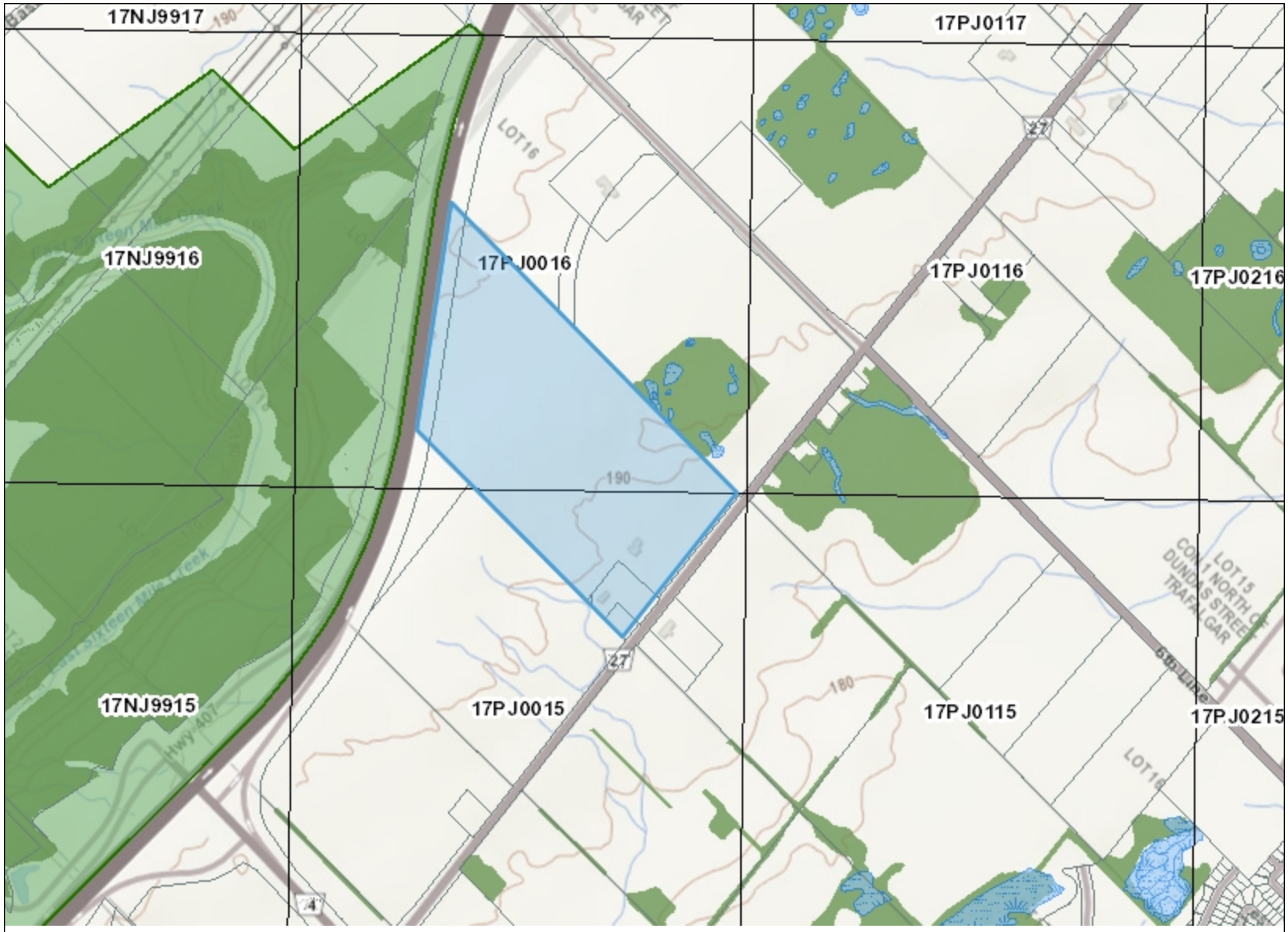
Ontario

Ministry of Natural Resources and Forestry

Make-a-Map: Natural Heritage Areas

SGGC Natural Heritage Query

Notes: Data Accessed October 6, 2017



Legend

- Assessment Parcel
- Woodland
- Conservation Reserve
- Provincial Park
- Natural Heritage System
- Ecoregion

Wetland

- Provincially Significant Wetland Evaluated
- Non - Provincially Significant Wetland Evaluated
- Unevaluated Wetland

Area of Natural Heritage & Scientific Interest (ANSI)

- Provincially Significant Life Science ANSI
- Provincially Significant Earth Science ANSI

Greenbelt Plan

- Boundary
- River Valley Connections

Land Use Designations

- Protected Countryside
- Towns and Villages
- Hamlets
- Urban River Valley
- Specialty Crop Area

Niagara Escarpment Plan (NEP)

- Boundary
- Parks and Open Space System

Land Use Designations

- Escarpment Natural Area
- Escarpment Protection Area
- Escarpment Rural Area
- Mineral Resource Extraction Area
- Escarpment Recreation Area
- Urban Area
- Minor Urban Centre

Oak Ridges Moraine Conservation Plan (ORM)

- Boundary

Land Use Designations

- Natural Core Area
- Natural Linkage Area
- Countryside Area
- Rural Settlement
- Palgrave Estates Residential Community
- Settlement Area

0.9 0 0.46 0.9 Kilometers

Scale: 1 : 18,055

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Natural Resources and Forestry(OMNRF) shall not be liable in any way for the use of, or reliance upon, this map or any information on this map.

Appendix D
SGGC Flora List

Appendix D SGGC Flora List

	Scientific Name	Common Name	GRank	SRank	SARO	COSEWIC	ELC Community				Halton NAI (2006)
							CUM1-1	CUW1	FOD2	MAM2-10	
	ACERACEAE	**MAPLE FAMILY**									
	Acer negundo	manitoba maple	G5	S5				X	X		C
	Acer saccharinum	silver maple	G5	S5					X		C
	Acer saccharum var. saccharum	sugar maple	G5T?	S5				X	X		C
	ALISMATACEAE	**WATER-PLANTAIN FAMILY**									
	Alisma plantago-aquatica	common water-plantain	G5	S5						X	C
	ANACARDIACEAE	**SUMAC FAMILY**									
	Rhus hirta	staghorn sumac	G5	S5			X				C
	Toxicodendron radicans ssp. negundo	poison-ivy	G5T	S5			X				C
	APIACEAE	**PARSLEY FAMILY**									
*	*Daucus carota*	wild carrot	G?	SE5			X				I
	ASCLEPIADACEAE	**MILKWEED FAMILY**									
	Asclepias syriaca	common milkweed	G5	S5			X				C
	ASTERACEAE	**ASTER FAMILY**									
*	*Anthemis arvensis*	corn chamomille	G?	SE5			X				I
*	*Arctium minus*	common burdock	G?T?	SE5			X	X	X		I
	Aster sp.	aster							X		
	Bidens frondosa	devil's beggar-ticks	G5	S5						X	C
*	*Cirsium arvense*	Canada thistle	G?	SE5					X		I
*	*Cirsium vulgare*	bull thistle	G5	SE5			X				I
*	*Hieracium caespitosum*	field hawkweed		SE5			X				I
*	*Leucanthemum vulgare*	ox-eye daisy	G?	SE5			X				I
	Solidago canadensis	canada goldenrod	G5	S5					X	X	C
*	*Taraxacum officinale*	common dandelion	G5	SE5			X	X	X		I
	BERBERIDACEAE	**BARBERRY FAMILY**									
	Podophyllum peltatum	may-apple	G5	S5					X		C
	BETULACEAE	**BIRCH FAMILY**									
	Ostrya virginiana	ironwood	G5	S5					X		C
	BRASSICACEAE	**MUSTARD FAMILY**									
*	*Alliaria petiolata*	garlic mustard	G5	SE5			X	X	X		I
*	*Erysimum cheiranthoides ssp. cheiranthoides*	wormseed mustard		SE5			X				I
*	*Hesperis matronalis*	dame's rocket	G4G5	SE5			X				I
	CAPRIFOLIACEAE	**HONEYSUCKLE FAMILY**									
*	*Lonicera tatarica*	tartarian honeysuckle	G?	SE5					X		I
	Viburnum lentago	nannyberry	G5	S5					X		C
	CARYOPHYLLACEAE	**PINK FAMILY**									
*	*Dianthus armeria*	deptford pink	G?	SE5					X		I
	CHENOPODIACEAE	**GOOSEFOOT FAMILY**									
*	*Chenopodium album var. album*	lamb's quarters	G5T5	SE5			X				
	CORNACEAE	**DOGWOOD FAMILY**									
	Cornus alternifolia	alternate-leaved dogwood	G5	S5					X		C
	Cornus racemosa	red panicled dogwood	G5?	S5					X		C
	Cornus racemosa	red panicled dogwood	G5?	S5				X			C
	CYPERACEAE	**SEDGE FAMILY**									
	Carex bebbii	Bebb's sedge	G5	S5						X	C
	Carex vulpinoidea	fox sedge	G5	S5						X	C
	DIPSACACEAE	**TEASEL FAMILY**									
*	*Dipsacus fullonum ssp. sylvestris*	wild teasel	G?T?	SE5			X		X	X	I
	FABACEAE	**PEA FAMILY**									
*	*Trifolium hybridum ssp. elegans*	alsike clover		SE5			X			X	I
*	*Trifolium pratense*	red clover	G?	SE5			X			X	I
*	*Vicia cracca*	tufted vetch	G?	SE5			X				I
	FAGACEAE	**BEECH FAMILY**									
	Quercus macrocarpa	bur oak	G5	S5					X		C

	Scientific Name	Common Name	GRank	SRank	SARO	COSEWIC	ELC Community				Halton NAI (2006)
							CUM1-1	CUW1	FOD2	MAM2-10	
	Quercus rubra	red oak	G5	S5					X		C
	GERANIACEAE	**GERANIUM FAMILY**									
*	*Geranium robertianum*	herb-robert	G5	SE5					X		I
	GROSSULARIACEAE	**GOOSEBERRY FAMILY**									
	Ribes triste	wild red currant	G5	S5					X		C
	GUTTIFERAE	**ST. JOHN'S-WORT FAMILY**									
*	*Hypericum perforatum*	common St. John's-wort	G?	SE5			X				I
	JUGLANDACEAE	**WALNUT FAMILY**									
	Carya ovata var. ovata	shagbark hickory	G5	S5					X		C
	LILIACEAE	**LILY FAMILY**									
	Erythronium americanum ssp. americanum	yellow dog's-tooth violet	G5T5	S5				X	X		C
	Maianthemum stellatum	star-flowered Solomon's seal	G5	S5					X		C
	Streptopus lanceolatus var. roseus	rose twisted-stalk	G5	S5					X		C
	Trillium grandiflorum	white trillium	G5	S5					X		C
	LYTHRACEAE	**LOOSESTRIFE FAMILY**									
*	*Lythrum salicaria*	purple loosestrife	G5	SE5						X	I
	OLEACEAE	**OLIVE FAMILY**									
	Fraxinus pennsylvanica	red ash	G5	S5				X	X		C
	PAPAVERACEAE	**POPPY FAMILY**									
*	*Chelidonium majus*	celandine	G?	SE5					X		I
	PINACEAE	**PINE FAMILY**									
	Pinus strobus	eastern white pine	G5	S5					X		C
	PLANTAGINACEAE	**PLANTAIN FAMILY**									
*	*Plantago lanceolata*	ribgrass	G5	SE5			X				I
	POACEAE	**GRASS FAMILY**									
*	*Echinochloa crusgalli*	common barnyard grass	G?	SE5						X	I
	Phalaris arundinacea	reed canary grass	G5	S5				X	X	X	C
	POLYGONACEAE	**SMARTWEED FAMILY**									
*	*Rumex crispus*	curly-leaf dock	G?	SE5			X				I
	RHAMNACEAE	**BUCKTHORN FAMILY**									
*	*Rhamnus cathartica*	common buckthorn	G?	SE5				X	X		I
	ROSACEAE	**ROSE FAMILY**									
*	*Aruncus dioicus*	dioecious goat's-beard	G5	SE1			X				I
	Crataegus sp.	hawthorn						X	X		
	Fragaria sp.	strawberry						X			
	Fragaria vesca ssp. americana	woodland strawberry	G5T?	S5					X		C
*	*Prunus avium*	sweet cherry	G?	SE4					X		I
	Prunus virginiana var. virginiana	choke cherry	G5T?	S5				X	X		C
*	*Pyrus communis*	common pear	G5	SE4				X	X		I
*	*Rubus idaeus ssp. idaeus*	red raspberry	G5T5	SE1				X	X		I
	SALICACEAE	**WILLOW FAMILY**									
	Salix sp.	willow		?					X		
	TILIACEAE	**LINDEN FAMILY**									
	Tilia americana	basswood	G5	S5					X		C
	TYPHACEAE	**CATTAIL FAMILY**									
	Typha latifolia	broad-leaved cattail	G5	S5						X	C
	ULMACEAE	**ELM FAMILY**									
	Ulmus americana	white elm	G5?	S5					X		C
	VITACEAE	**GRAPE FAMILY**									
	Vitis riparia	riverbank grape	G5	S5					X		C

Definitions

G-Rank (Global Rank)

G1- extremely rare; usually 5 or fewer occurrences in the overall range or very few remaining individuals or because of some factor (s) making it especially vulnerable
G2-very rare; usually between 5-20 occurrences in the range or with many individuals in fewer occurrences or because of some factor (s) making it vulnerable to extinction
G3- rare to uncommon; usually between 20 and 100 occurrences; may have fewer occurrences but with a large number of individuals in some populations or may be susceptible to large-scale disturbances
G4-common; usually more than 100 occurrences, usually not susceptible to immediate threats
G5-very common; demonstrably secure under present conditions

S-Rank (Provincial Rank)

S1-critically imperiled; critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor (s) such as very steep declines making it especially vulnerable to extirpation from the state/province
S2-imperilled; imperilled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines or other factors making it very vulnerable to extirpation from the nation or state/province
S3-vulnerable; vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines or other factors making it vulnerable to extirpation
S4-apparently secure; uncommon but not rare; some cause for long-term concern due to declines or other factors
S5-secure; common, widespread and abundant in the nation or state/province
SNA- not applicable; a conservation status rank is not applicable because species is not a suitable target for conservation activities
SZB-breeding migrants/vagrants
SZN-non-breeding migrants/vagrants

COSEWIC (Committee on the Status of Endangered Wildlife in Canada)

NAR- not at risk; a wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances
THR-threatened; a wildlife species likely to become endangered if limiting factors are not reversed
END-endangered; a wildlife species facing imminent extirpation or extinction
EXT-extirpated; a species no longer existing in the wild in Canada but occurring elsewhere
SC-special concern; a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats
DD-data deficient; a wildlife species for which there is in adequate information to make a direct, or indirect, assessment of its risk of extinction

SARA (Species at Risk Act)

Schedule 1- official list of wildlife species at risk
THR-threatened; a wildlife species likely to become endangered if limiting factors are not reversed
END-endangered; a wildlife species facing imminent extirpation or extinction
EXT-extirpated; a species no longer existing in the wild in Canada but occurring elsewhere
SC-special concern; a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats

SARO (Species at Risk in Ontario)

END-Endangered; a species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's ESA
EXP-Extirpated; a species that no longer exists in the wild in Ontario but exists elsewhere
THR-Threatened; a species that is at risk of becoming endangered in Ontario if limiting factors are not reversed
SC-Special Concern; a species with characteristics that make it sensitive to human activities or natural events

Conservation Priority

level 1-highest priority
level 4-lowest priority

Local Status (Halton Natural Areas Inventory, 2006)

R – Rare
U – Uncommon
C – Common
? – Requires further revision
E – Extirpated
I – Introduced

Appendix E
SGGC Wildlife List

Appendix E WildlifeList

Type	Scientific Name	Common Name	10-May-17	13-Jun-17	28-Jun-17	08-May-18	02-Jun-18	OBBA Code	Breeding Evidence	G-Rank	S-Rank	COSEWIC	SARA	SARO	FWCA	MBCA	SWH-TG Area Sensitive Species	Interior Species	Halton Region NAI (2006)	Priority Species (Halton)
Amphibian	*Pseudacris triseriata*	Western Chorus Frog (Great Lakes/St. Lawrence Canadian Shield population)	X							G5	S3	THR	THR						C	
Bird	*Corvus brachyhrynchos*	American Crow	X	X	X			T	Probable	G5	S5B									
Bird	*Carduelis tristis*	American Goldfinch	X	X	X			T	Probable	G5	S5B					X				level 3
Bird	*Turdus migratorius*	American Robin	X	X	X			P	Probable	G5	S5B					X				
Bird	*Icterus galbula*	Baltimore Oriole		X				S	Possible	G5	S4B					X				
Bird	*Hirundo rustica*	Barn Swallow	X	X	X			P	Probable	G5	S4B	THR		THR		X				level 4
Bird	*Cyanocitta cristata*	Blue Jay	X		X			S	Possible	G5	S5				P					
Bird	*Dolichonyx oryzivorus*	Bobolink		X					Observed	G5	S4B	THR		THR		X	X			level 2
Bird	*Toxostoma rufum*	Brown Thrasher		X				H	Possible	G5	S4B					X				level 1
Bird	*Molothrus ater*	Brown-headed Cowbird	X	X	X			S	Possible	G5	S4B									
Bird	*Bombycilla cedrorum*	Cedar Waxwing		X	X			H	Possible	G5	S5B					X				
Bird	*Spizella passerina*	Chipping Sparrow			X			H	Possible	G5	S5B					X				
Bird	*Quiscalus quiscula*	Common Grackle		X	X			T	Probable	G5	S5B									
Bird	*Geothlypis trichas*	Common Yellowthroat		X				S	Possible	G5	S5B					X				
Bird	*Picoides pubescens*	Downy Woodpecker			X			H	Possible	G5	S5					X				
Bird	*Sturnus vulgaris*	European Starling	X					H	Possible	G5	SNA								I	
Bird	*Dumetella carolinensis*	Gray Catbird			X			S	Possible	G5	S4B					X				level 4
Bird	*Ardea herodias*	Great Blue Heron	X	X	X			X	Observed	G5	S4					X				
Bird	*Myiarchus crinitus*	Great Crested Flycatcher		X	X			T	Probable	G5	S4B					X				
Bird	*Eremophila alpestris*	Horned Lark	X	X	X			P	Probable	G5	S5B					X			U	level 3
Bird	*Passer domesticus*	House Sparrow		X	X			T	Probable	G5	SNA								I	
Bird	*Charadrius vociferus*	Killdeer	X	X	X			T	Probable	G5	S5B,S5N					X				
Bird	*Zenaida macroura*	Mourning Dove		X	X			H	Possible	G5	S5					X				
Bird	*Cardinalis cardinalis*	Northern Cardinal	X		X			S	Possible	G5	S5					X				
Bird	*Colaptes auratus*	Northern Flicker	X		X			S	Possible	G5	S4B					X				
Bird	*Dryocopus pileatus*	Pileated Woodpecker	X					S	Possible	G5	S5					X	X	X	U	level 2
Bird	*Vireo olivaceus*	Red-eyed Vireo		X				S	Possible	G5	S5B					X		X		
Bird	*Buteo jamaicensis*	Red-tailed Hawk			X			H	Possible	G5	S5				P					
Bird	*Agelaius phoeniceus*	Red-winged Blackbird	X	X	X			A	Probable	G5	S4									
Bird	*Regulus calendula*	Ruby-crowned Kinglet	X					S	Possible	G5	S4B					X				level 4
Bird	*Passerculus sandwichensis*	Savannah Sparrow	X	X	X			P	Probable	G5	S4B					X	X			level 1
Bird	*Melospiza melodia*	Song Sparrow	X	X	X			T	Probable	G5	S5B					X				
Bird	*Actitis macularius*	Spotted Sandpiper		X	X			A	Probable	G5	S5					X				level 3
Bird	*Zonotrichia albicollis*	White-throated Sparrow	X					S	Possible	G5	S5B					X			U	level 2
Invertebrates	*Fallicambarus fodiens*	Chimney Crayfish	X			X	X													
Invertebrates	*Danaus plexippus*	Monarch		X						G5	S4B, S2N	SC		SC	P				C	
Mammals	*Tamiasciurus hudsonicus*	Red Squirrel		X						G5	S5				F				C	
Mammals	*Odocoileus virginianus*	White-tailed Deer			X					G5	S5				G				C	

10-May-17 10:00 W:1 T:11 C:0 P:0
13-Jun-17 08:00 W:1 T:24C C:100% P:0
28-Jun-17 07:45 W:2 T:18C C:0 P:0

Appendix F
SGGC Amphibian Call Survey Results

LGL LIMITED –FROG CALL SURVEY DATA SHEET

Site #: 145 Burnhamthorpe Road, Town of Oakville, Halton Region **Stream Name/Associated Wetland:** Core Area 6

Location, Nearest 911#: **UTM Co-ordinates:** Zone 17 600796, 4816099

Site Description and Map: SGGC Property approximately 150 metres north of Burnhamthorpe Road, adjacent to Core Area 6 west boundary.

VISIT 1	VISIT 2	VISIT 3
Date: May 9, 2017 **Time:** 20:30 **Weather Conditions**: Low cloud cover, slight winds from the SE. **Air Temperature:** 8^0 C **Investigators:** A. Bruce	**Date:** May 31, 2017 **Time:** 20:45 **Weather Conditions:** Clear, calm. **Air Temperature**: 14^0 C **Investigators:** A. Bruce	**Date:** June 13, 2017 **Time:** 20:40 **Weather Conditions:** Clear, calm **Air Temperature:** 21^0 C **Investigators:** A. Bruce

Species	Code	Visit 1 Call Level	Visit 2 Call Level	Visit 3 Call Level
American Toad	**AMTO**			
Western Chorus Frog	**CHFR**	1		
Gray Tree Frog	**GRTR**		1	1
Green Frog	**GRFR**			
Northern Leopard Frog	**NLFR**			
Spring Peeper	**SPPE**	2	1	
Wood Frog	**WOFR**			
Bull Frog	**BUFR**			
Other				

Habitat Description (e.g. vegetation type, dominant species, extent of open water):

None found on site. Small wetland inclusions and a suspected artificial pond is situated on the adjacent property to the east (Core Area 6).

Comments: There were no amphibians heard vocalizing on site. All calls originated from Core Area 6 to the east of the SGGC property.

Code 1: individual calls do not overlap and calling individuals can be discretely counted;
Code 2: calls of individuals sometimes overlap, but numbers of individuals can still be estimated;
Code 3: overlap among calls seems continuous (full chorus), and a count estimate is impossible;

Appendix G

Significant Wildlife Habitat Mitigation Support Tool #36 – Terrestrial Crayfish Habitat

INDEX #36: TERRESTRIAL CRAYFISH HABITAT

Ecoregions:	6E, 7E
Species Group:	Chimney or Digger Crayfish (Fallicambarus fodiens), Meadow Crayfish or Devil Crawfish (Cambarus diogenes)
Significant Wildlife Habitat Category:	Habitat of Species of Conservation Concern
Functional Habitat:	Wet meadows and edges of wetlands

DEVELOPMENT TYPES IN THIS INDEX

Residential and Commercial Development
Major Recreational Development
Aggregate and Mine Development
Energy Development
Road Development

HABITAT FUNCTION AND COMPOSITION

In Ontario, there are two species of crayfish that are semi-terrestrial and that are primary or secondary burrowers. These are the Meadow Crayfish (or Devil Crawfish) (Cambarus diogenes) and the Chimney or Digger Crayfish (Fallicambarus fodiens). These species spend most of their time within burrows that consist of a series of underground tunnels, but they leave the burrows at night to feed. They appear to be obligate burrowers in Ontario (Guiasu et al. 1996).

The Meadow Crayfish typically constructs colonies of burrows in wet meadows and marshes. Areas used typically have standing water at least in the spring. In the United States, burrows may also occur near permanent surface waters such as spring-fed pools, artesian wells, and marsh and farm ponds, but they may also burrow far from surface water of any kind (Crocker and Barr 1968). In early spring during the breeding season, adults are often found in streams, lakes, and rivers (Crocker and Barr 1968). Terrestrial vascular plants appear to be important in its diet and individuals leave the burrow at night to forage. The Meadow Crayfish is the rarest Ontario crayfish, being restricted to extreme southwestern Ontario, except for a single record from Atikokan (Crocker and Barr 1968). In that there appears to be considerable suitable habitat farther north than its current range, its distribution may be restricted by climate (Crocker and Barr 1968). The total range of the Meadow Crayfish in southern Ontario covers an area of about 4,500 km2, an area about 300 km long (from Point Pelee to Wainfleet) but only 10 to 30 km wide (Guiasu et al. 1996).

The Chimney Crayfish is usually associated with marshy fields, drainage ditches, marshes, and ponds. The burrows are usually constructed in clay soil, which may also contain varying proportions of sand or coarse gravel. Colonies may be a few square metres in area with 10 to 20 chimneys, or be as large as 0.4 ha (Crocker and Barr 1968). The Chimney Crayfish may occur in woodland ponds and even in temporary streams (Williams et al. 1974).

See the Appendix of species descriptions for details about the burrows of these two crayfish species.

Potential Development Effects and Mitigation Options

Development within habitat for the Meadow and Chimney Crayfish will result in direct loss of their habitat and possibly extirpation of the local population. Some of the local populations reported by Crocker and Barr (1968) have since been developed and no longer support burrowing crayfish (Guiasu et al. 1996).

RESIDENTIAL AND COMMERCIAL DEVELOPMENT

Potential Development Effects

Large-scale site alteration in terrestrial crayfish habitat may result in loss of the habitat. Excavation and filling where there are burrows will physically destroy the burrows and associated tunnels used by terrestrial crayfish. Heavy machinery may cause sufficient soil compression to damage or destroy burrows and subterranean tunnels. Additionally, where development alters the habitat's hydrology, ecological function may be reduced or lost.

Surface water that is directed toward crayfish habitat has the potential to have adverse effects as this may result in flooding of burrows, unstable water levels within burrows and introduction of contaminants into the crayfish habitat (e.g., urban and industrial pollution, road runoff). Additionally, surface water has the potential to introduce sediments into crayfish habitat. If the clay and silty-clay soils that they require become covered with other sediments, the soils may not be suitable for burrowing or constructing chimneys.

Although limited data are available, it appears that both species of these crayfish feed primarily on terrestrial vascular plants (Guiasu et al. 1996). Development activities that clear and/or remove plants within or immediately adjacent to crayfish habitat may affect their food supply.

Development on adjacent land also has the potential to affect populations of burrowing crayfish. Activities that result in a change in the water table (drainage works, flow diversions, piping watercourses, etc.) may either result in flooding of burrows or making the soils too dry to support crayfish. Higher water tables may result in asphyxiation of crayfish if the burrow becomes filled with water too near the surface. Crayfish may also be forced to move to adjacent areas where the water table is lower to obtain the correct mix of air and water within the burrow. If the water table declines or if areas are drained/dewatered, the soil may become too hard and dry for the crayfish to burrow in it, or they may have to burrow an excessive depth to reach water.

Mitigation Options

Development will not be permitted within the SWH unless it can be demonstrated that there will be no negative impacts on the feature or its ecological function (OMNRF 2014). The ELC ecosite that contains the terrestrial crayfish burrow(s) is the SWH.

Site selection is typically an important component of a successful mitigation strategy. Best practices for site selection should also include consideration of cumulative impacts. For example, planners should account for known impacts in neighbouring developments and the cumulative amount of disturbed/converted habitat relative to the amount of undisturbed habitat (OMNR 2011).

Vegetation clearing, excavation, draining and filling for development in terrestrial crayfish habitat will destroy the affected habitat. The ecological function of the remaining habitat will be reduced or lost if the development alters the hydrology of the habitat, or if compression of the soil damages or destroys burrows or subterranean tunnels. The best mitigation option is to avoid developing in the habitat.

When complete avoidance of the habitat is not possible, and the SWH is large, minimize the amount of habitat affected by: 1) making the development footprint where it affects the habitat as small as possible; and 2) placing it at an edge as far from any burrow sites as possible. When planning the development, avoid siting it where it will block crayfish travelling between burrows and temporary or permanent wet areas of the habitat. These measures will maximize the amount of undisturbed habitat, and reduce the barrier effect. Because terrestrial crayfish appear to be colonial, often occupying only a small proportion of the available habitat, it should be possible to avoid areas supporting crayfish.

A water balance study needs to be undertaken to ensure that there will be no measurable change in the water table level or in surface water quality or quantity. Drainage of wet meadows and marshy wetlands should always be avoided.

Vegetation should never be removed immediately adjacent to crayfish habitat, as this is important forage.

Surface water runoff needs to be directed away from potential crayfish burrows to avoid sedimentation that adversely affects the crayfish's ability to dig burrows. Maintenance of drainage ditches (e.g., clearing of ditches) should be scheduled for periods when the crayfish are less likely to be present (e.g., early spring, when adults are often found in streams, lakes, and rivers) (Crocker and Barr 1968).

Public awareness about the presence of burrowing crayfish and the importance of maintaining their habitat is also an important conservation strategy.

MAJOR RECREATIONAL DEVELOPMENT

Potential Development Effects

Marinas and golf courses are the types of major recreational development that are most likely to affect habitat of terrestrial crayfish.

Large-scale site alteration in terrestrial crayfish habitat may result in loss of the habitat. Excavation, filling and grading where there are burrows will physically destroy the burrows and associated tunnels used by terrestrial crayfish. Heavy machinery may cause sufficient soil compression to damage or destroy burrows and subterranean tunnels. Additionally, where development alters the habitat's hydrology, ecological function may be reduced or lost.

Surface water that is directed toward crayfish habitat has the potential to have adverse effects as this may result in flooding of burrows, unstable water levels within burrows and introduction of contaminants into the crayfish habitat (e.g., urban, agricultural and industrial pollution, road runoff). Additionally, surface water has the potential to introduce sediments into crayfish habitat. If the clay and silty clay soils that they require become covered with other sediments, the soils may not be suitable for burrowing or constructing chimneys.

Although limited data are available, it appears that both species of these crayfish feed primarily on terrestrial vascular plants (Guiasu et al. 1996). Development activities that clear and/or remove plants within or immediately adjacent to crayfish habitat may affect their food supply.

Development on adjacent land also has the potential to affect populations of burrowing crayfish. Activities that result in a change in the water table may either result in flooding of burrows or making the soils too dry to support crayfish. Higher water tables may result in asphyxiation of crayfish if the burrow becomes filled with water too near the surface. Crayfish may also be forced to move to adjacent areas where the water table is lower to obtain the correct mix of air and water within the burrow. If the water table declines or if areas are drained/dewatered, the soil may become too hard and dry for the crayfish to burrow in it, or they may have to burrow an excessive depth to reach water.

Mitigation Options

Development will not be permitted within the SWH unless it can be demonstrated that there will be no negative impacts on the feature or its ecological function (OMNRF 2014). The ELC ecosite that contains the terrestrial crayfish burrow(s) is the SWH.

Site selection is typically an important component of a successful mitigation strategy. Best practices for site selection should also include consideration of cumulative impacts. For example, planners should account for known impacts in neighbouring developments and the cumulative amount of disturbed/converted habitat relative to the amount of undisturbed habitat (OMNR 2011).

Vegetation clearing, excavation, draining and filling for development in terrestrial crayfish habitat will destroy the affected habitat. The ecological function of the remaining habitat will be reduced or lost if the development alters the hydrology of the habitat, or if compression of the soil damages or destroys burrows or subterranean tunnels. The best mitigation option is to avoid developing in the habitat.

When complete avoidance of the habitat is not possible, and the SWH is large, minimize the amount of habitat affected by: 1) making the development footprint where it affects the habitat as small as possible; and 2) placing it at an edge as far from any burrow sites as possible. When planning the development, avoid siting it where it will block crayfish travelling between burrows and temporary or permanent wet areas of the habitat. These measures will maximize the amount of undisturbed habitat, and reduce the barrier effect. Because terrestrial crayfish appear to be colonial, often occupying only a small proportion of the available habitat, it should be possible to avoid areas supporting crayfish.

A water balance study needs to be undertaken to ensure that there will be no measurable change in the water table level or in surface water quality or quantity. Drainage of wet meadows and marshy wetlands should always be avoided.

Vegetation should never be removed immediately adjacent to crayfish habitat, as this is important forage. On golf courses, spraying of pesticides and fertilizers should never occur in areas near crayfish habitat, as this has the potential to affect their food supply.

Surface water runoff should always be directed away from potential crayfish burrows to avoid sedimentation that adversely affects the crayfish's ability to dig burrows. Maintenance of drainage ditches (e.g., clearing of ditches) should be scheduled for periods when the crayfish are less likely to be present (e.g., early spring, when adults are often found in streams, lakes, and rivers) (Crocker and Barr 1968).

Public awareness about the presence of burrowing crayfish and the importance of maintaining their habitat is also an important conservation strategy.

AGGREGATE AND MINE DEVELOPMENT

Potential Development Effects

Removal of clay for bricks and other products has the potential to occur directly within habitat for terrestrial crayfish. Clay removal may also result in a lowering of the water table and consequent drying of adjacent habitat that supports crayfish. This may make the area too dry to be suitable for burrow construction, or the water table may be too deep for the crayfish to access it.

Mitigation Options

Development will not be permitted within the SWH unless it can be demonstrated that there will be no negative impacts on the feature or its ecological function (OMNRF 2014). The ELC ecosite that contains the terrestrial crayfish burrow(s) is the SWH.

Site selection is typically an important component of a successful mitigation strategy. Best practices for site selection should also include consideration of cumulative impacts. For example, planners should account for known impacts in neighbouring developments and the cumulative amount of disturbed/converted habitat relative to the amount of undisturbed habitat (OMNR 2011).

Vegetation clearing, excavation, draining and filling for development in terrestrial crayfish habitat will destroy the affected habitat. The ecological function of the remaining habitat will be reduced or lost if the development alters the hydrology of the habitat, or if compression of the soil damages or destroys burrows or subterranean tunnels. The best mitigation option is to avoid developing in the habitat.

When complete avoidance of the habitat is not possible, and the SWH is large, minimize the amount of habitat affected by: 1) making the development footprint where it affects the habitat as small as possible; and 2) placing it at an edge as far from any burrow sites as possible. When planning the development, avoid siting it where it will block crayfish travelling between burrows and temporary or permanent wet areas of the habitat. These measures will maximize the amount of undisturbed habitat, and reduce the barrier effect. Because terrestrial crayfish appear to be colonial, often occupying only a small proportion of the available habitat, it should be possible to avoid areas supporting crayfish.

Mining of clay has a greater potential to affect crayfish, as moist clay is a primary habitat requirement for these species. Ontario's two species of terrestrial crayfish appear to be somewhat colonial, occupying small areas within large areas of potentially suitable habitat. Inventories should be undertaken prior to mining to determine areas that support crayfish. These areas should be retained if at all possible.

A hydro-geological study should be undertaken to determine if clay mining will affect the water table level where the crayfish habitat is located. If the water table has the potential to be adversely affected, mitigation will be required to maintain appropriate water levels. This may entail limiting the depth of extraction, creating an impermeable barrier so that the crayfish habitat is not affected by dewatering activities, or by pumping water at appropriate rates to the crayfish habitat.

Water from dewatering activities should always be directed away from potential crayfish burrows to avoid sedimentation that adversely affects the crayfish's ability to dig burrows. There may, however, be circumstances where it is beneficial to direct water toward crayfish habitat to maintain the water balance. In these cases, the water should be directed to sediment ponds before it flows into the crayfish habitat.

ENERGY DEVELOPMENT

Potential Development Effects: Wind Power Facilities

There is the potential that wind power facilities could be constructed in damp meadows that support terrestrial crayfish. Permanent access roads and pads for turbines can result in loss of habitat. Compaction of soil by heavy equipment may destroy existing burrows/tunnels, or make the substrate less suitable for burrowing new tunnels. Access roads may also affect drainage patterns and suitability of areas adjacent to the roads for burrowing by crayfish.

Mitigation Options; Wind power facilities

The siting of wind turbines within 120 m of the edge of terrestrial crayfish SWH should be avoided (Ontario Regulation 359/09:38.1.8 and 38.2). The 120 m setback is from the tip of the turbine blade when it is rotated toward the habitat, as opposed to from the base of the turbine. The ELC ecosite that contains the terrestrial crayfish burrow(s) is the SWH. Applicants wishing to develop within the SWH or the 120 m setback must conduct an Environmental Impact Study (EIS) to determine what mitigation measures can be implemented to ensure there will be no negative effects on the habitat or its ecological function. The ELC ecosite that contains the terrestrial crayfish burrow(s) is the SWH.

Site selection is generally the most important component of a successful mitigation strategy for wind power developments (Everaert and Kuijken 2007; OMNR 2011). Turbines should be located as far from SWH as possible. Best practices for site selection should also include consideration of cumulative impacts on the habitat. For example, planners should account for known impacts in neighbouring developments and the cumulative amount of disturbed/converted habitat relative to the amount of undisturbed habitat (OMNR 2011).

Vegetation clearing, excavation, draining and filling for development in terrestrial crayfish habitat will destroy the affected habitat. The ecological function of the remaining habitat will be reduced or lost if the development alters the hydrology of the habitat, or if compression of the soil damages or destroys burrows or subterranean tunnels. The best mitigation option is to avoid developing in the habitat.

When complete avoidance of the habitat is not possible, and the SWH is large, minimize the amount of habitat affected by: 1) making the development footprint where it affects the habitat as small as possible; and 2) placing it at an edge as far from any burrow sites as possible. When planning the development, avoid siting turbines where they will block crayfish travelling between burrows and temporary or permanent wet areas of the habitat. These measures will maximize the amount of undisturbed habitat, and reduce the barrier effect. Because terrestrial crayfish appear to be colonial, often occupying only a small proportion of the available habitat, it should be possible to avoid areas supporting crayfish.

When planning the development, avoid siting it where it will block crayfish travelling between burrows and temporary or permanent wet areas of the habitat. Prior to construction, areas that support crayfish need to be fenced off so that they are not damaged by equipment.

Sufficient culverts should be installed under access roads to ensure that natural drainage patterns are maintained.

Potential Development Effects: Solar Power Facilities

Large-scale site alteration in terrestrial crayfish habitat may result in loss of the habitat. Vegetation clearing, drainage, filling etc. where there are burrows will physically destroy the burrows and associated tunnels used by terrestrial crayfish. Heavy machinery may cause sufficient soil compression to damage or destroy burrows and subterranean tunnels. Additionally, where development alters the habitat's hydrology, ecological function may be reduced or lost.

Surface water that is directed toward crayfish habitat has the potential to have adverse effects as this may result in flooding of burrows, unstable water levels within burrows and introduction of contaminants into the crayfish habitat (e.g., contaminated runoff from solar panels and access roads). Additionally, surface water has the potential to introduce sediments into crayfish habitat. If the clay and silty-clay soils that they require become covered with other sediments, the soils may not be suitable for burrowing or constructing chimneys.

Although limited data are available, it appears that both species of these crayfish feed primarily on terrestrial vascular plants (Guiasu et al. 1996). Development activities that clear and/or remove plants within or immediately adjacent to crayfish habitat may affect their food supply.

Development on adjacent land also has the potential to affect populations of burrowing crayfish. Activities that result in a change in the water table (drainage works, flow diversions, piping watercourses, etc.) may either result in flooding of burrows or making the soils too dry to support crayfish. Higher water tables may result in asphyxiation of crayfish if the burrow becomes filled with water too near the surface. Crayfish may also be forced to move to adjacent areas where the water table is lower to obtain the correct mix of air and water within the burrow. If the water table declines or if areas are drained/dewatered, the soil may become too hard and dry for the crayfish to burrow in it, or they may have to burrow an excessive depth to reach water.

Mitigation Options: Solar Power Facilities

The siting of solar panel arrays within 120 m of the edge of terrestrial crayfish SWH should be avoided (Ontario Regulation 359/09:38.1.8 and 38.2). The ELC ecosite that contains the terrestrial crayfish burrow(s) is the SWH. Applicants wishing to develop within the SWH or the 120 m setback must conduct an Environmental Impact Study (EIS) to determine what mitigation measures can be implemented to ensure there will be no negative effects on the habitat or its ecological function. The ELC ecosite that contains the terrestrial crayfish burrow(s) is the SWH.

Site selection is typically an important component of a successful mitigation strategy. Best practices for site selection should also include consideration of cumulative impacts. For example, planners should account for known impacts in neighbouring developments and the cumulative amount of disturbed/converted habitat relative to the amount of undisturbed habitat (OMNR 2011).

Vegetation clearing, drainage, filling and other site alterations for development in terrestrial crayfish habitat will destroy the affected habitat. The ecological function of the remaining habitat will be reduced or lost if the development alters the hydrology of the habitat, or if compression of the soil damages or destroys burrows or subterranean tunnels. The best mitigation option is to avoid developing in the habitat.

When complete avoidance of the habitat is not possible, and the SWH is large, minimize the amount of habitat affected by: 1) making the development footprint where it affects the habitat as small as possible; and 2) placing it at an edge as far from any burrow sites as possible. When planning the development, avoid siting it where it will block crayfish travelling between burrows and temporary or permanent wet areas of the habitat. These measures will maximize the amount of undisturbed habitat, and reduce the barrier effect. Because terrestrial crayfish appear to be colonial, often occupying only a small proportion of the available habitat, it should be possible to avoid areas supporting crayfish.

A water balance study needs to be undertaken to ensure that there will be no measurable change in the water table level or in surface water quality or quantity. Drainage of wet meadows and marshy wetlands should always be avoided.

Vegetation should never be removed immediately adjacent to crayfish habitat, as this is important forage.

Surface water runoff needs to be directed away from potential crayfish burrows to avoid sedimentation that adversely affects the crayfish's ability to dig burrows. Maintenance of drainage ditches (e.g., clearing of ditches) should be scheduled for periods when the crayfish are less likely to be present (e.g., early spring, when adults are often found in streams, lakes, and rivers) (Crocker and Barr 1968).

Public awareness about the presence of burrowing crayfish and the importance of maintaining their habitat is also an important conservation strategy.

ROAD DEVELOPMENT

Potential Development Effects

The development of roads in terrestrial crayfish habitat may result in its loss.

Surface water from roads that is directed toward crayfish habitat has the potential to have adverse effects as this may result in flooding of burrows, unstable water levels within burrows and introduction of contaminants into the crayfish habitat. Additionally, surface water has the potential to introduce sediments into crayfish habitat. If the clay and silty clay soils that they require become covered with other sediments, the soils may not be suitable for burrowing or constructing chimneys.

Roads may act as a barrier to surface water and shallow groundwater movement. This results in wetter conditions on one side of the road and drier conditions on the other. This may either result in flooding of burrows or making the soils too dry to support crayfish. Higher water tables may result in asphyxiation of crayfish if the burrow becomes filled with water to near the surface. Crayfish may also be forced to move to adjacent areas where the water table is lower to obtain the correct mix of air and water within the burrow. If the water table declines or if areas are drained/dewatered, the soil may become too hard and dry for the crayfish to burrow in it, or they may have to burrow an excessive depth to reach water.

Mitigation Options

Development will not be permitted within the SWH unless it can be demonstrated that there will be no negative impacts on the feature or its ecological function (OMNRF 2014). The ELC ecosite that contains the terrestrial crayfish burrow(s) is the SWH.

Site selection is typically an important component of a successful mitigation strategy. Best practices for site selection should also include consideration of cumulative impacts. For example, planners should account for known impacts in neighbouring developments and the cumulative amount of disturbed/converted habitat relative to the amount of undisturbed habitat (OMNR 2011).

Vegetation clearing, excavation, draining and filling for development in terrestrial crayfish habitat will destroy the affected habitat. The ecological function of the remaining habitat will be reduced or lost if the development alters the hydrology of the habitat, or if compression of the soil damages or destroys burrows or subterranean tunnels. The best mitigation option is to avoid developing in the habitat.

When complete avoidance of the habitat is not possible, and the SWH is large, minimize the amount of habitat affected by: 1) making the development footprint where it affects the habitat as small as possible; and 2) placing it at an edge as far from any burrow sites as possible. When planning the development, avoid siting roads where they will block crayfish travelling between burrows and temporary or permanent wet areas of the habitat. These measures will maximize the amount of undisturbed habitat, and reduce the barrier effect. Because terrestrial crayfish appear to be colonial, often occupying only a small proportion of the available habitat, it should be possible to avoid areas supporting crayfish.

Vegetation should never be removed immediately adjacent to crayfish habitat, as this is important forage. Spraying of pesticides to control roadside vegetation should be avoided in areas near crayfish habitat, as this has the potential to affect the crayfish food supply. Consideration should be given to using de-icing compounds other than salt near the habitat.

Roadside ditches should be designed so that they do not drain crayfish burrows or dry up the soils where burrows are located.

Surface water runoff should always be directed away from crayfish habitat to avoid sedimentation that adversely affects the crayfish's ability to dig burrows. It may be necessary to construct stormwater management ponds if surface runoff is likely to run directly into crayfish habitat. Maintenance of ditches should be scheduled for periods when the crayfish are less likely to be present (e.g., early spring, when adults are often found in streams, lakes, and rivers) (Crocker and Barr 1968).

Sufficient culverts should be installed under the road to ensure unimpeded movement of surface water and groundwater.