



Claireville Conservation Area

Terrestrial Biological Inventory and Assessment

January, 2016



Report prepared by: Paul Prior, Fauna Biologist
Natasha Gonsalves, Flora Biologist
Patricia Moleirinho, GIS Technologist

Reviewed by: Sue Hayes, Project Manager, Terrestrial Field
Inventories
Scott Jarvie, Associate Director, Environmental
Monitoring and Data Management Section

This report may be referenced as:

Toronto and Region Conservation Authority (TRCA). 2016. Claireville
Conservation Area Terrestrial Biological Inventory and Assessment.

Table of Contents

	page
1.0 Introduction	1
1.1 TRCA's Terrestrial Natural Heritage Program	1
2.0 Study Area Description	2
3.0 Inventory Methodology.....	3
3.1 Landscape Analysis.....	3
3.2 Vegetation Communities, Flora and Fauna Species	5
4.0 Results and Discussion	7
4.1 Regional Context	7
4.2 Habitat Patch Findings for Claireville Conservation Area	7
4.2.1 Quantity of Natural Cover.....	8
4.2.2. Quality Distribution of Natural Cover.....	8
4.3 Vegetation Community Findings for Claireville Conservation Area	9
4.3.1 Vegetation Community Representation	9
4.3.2 Vegetation Communities of Concern	14
4.4 Flora Findings for Claireville Conservation Area	17
4.4.1 Flora Species Representation.....	17
4.4.2 Flora Species of Concern	19
4.4.3 Invasive Species.....	21
4.5 Fauna Species Findings for Claireville Conservation Area.....	22
4.5.1 Fauna Species Representation	22
4.5.2 Fauna Species of Concern	23
5.0 Summary and Recommendations	35
5.1 Site Summary	35
5.2 Site Recommendations	37
6.0 References	40

List of Tables

Table 1: Habitat patch quality, rank and species response.....	4
Table 2: Schedule of the TRCA biological surveys at Study Area.....	6
Table 3: Fauna inventories and monitoring projects conducted within Study Area	6
Table 4: Summary of Vegetation Communities within Study Area	9
Table 5: Summary of Flora Species in Study Area	16
Table 6: Summary of Fauna Species of Regional Concern within Study Area	24

List of Figures

Figure 1: Hawthorn Successional Savannah in Study Area.....	12
Figure 2: Inland Sedge Meadow Marsh and Cattail Mineral Shallow Marsh in Study Area	13
Figure 3: Proportion of vegetation communities by local rank within Study Area.....	15
Figure 4: Bluff formation along riverine system in Study Area	16
Figure 5: Flora diversity by plant type recorded within Study Area	17
Figure 6: Proportion of species within Study Area by L-rank.....	20
Figure 7: Bobolink	23
Figure 8: Spotted salamander.....	26
Figure 9: Clay-coloured sparrow.....	28
Figure 10: Indigo bunting is a common forest-edge breeding bird throughout Claireville	30
Figure 11: Number of L1 to L3 breeding bird territories recorded at Claireville in 2002 and 2014	35

List of Maps

Map 1: Claireville Study Area in the Context of Regional Natural Cover	42
Map 2: Claireville Study Area (Block A, B, C).....	43
Map 2a: Claireville Study Area (Block A and B)	44
Map 2b: Claireville Study Area (Block C).....	45
Map 3: Regional Natural System Habitat Patch Quality.....	46
Map 4: Distribution of Fauna Regional Species of Concern	47
Map 5a: Habitat Patch Size Scores with Fauna Area Sensitivity Scores (Block A and B)	48
Map 5b: Habitat Patch Size Scores with Fauna Area Sensitivity Scores (Block C).....	49
Map 6a: Interior Forest at Claireville Study Area (Block A and B)	50
Map 6b: Interior Forest at Claireville Study Area (Block C)	51
Map 7a: Scores for Matrix Influence and Flora Sensitivity to Development (Block A and B).....	52
Map 7b: Scores for Matrix Influence and Flora Sensitivity to Development (Block C)	53
Map 8a: Scores for Matrix Influence and Fauna Sensitivity to Development (Block A and B).....	54
Map 8b: Scores for Matrix Influence and Fauna Sensitivity to Development (Block C)	55
Map 9a: Habitat Patch Quality (Block A and B).....	56
Map 9b: Habitat Patch Quality (Block C)	57
Map 10a: Vegetation Communities with their Associated Local Ranks (Block A and B)	58

Map 10b: Vegetation Communities with their Associated Local Ranks (Block C)	59
Map 11a: Location of Flora Species of Concern (Block A and B)	60
Map 11b: Location of Flora Species of Concern (Block C)	61
Map 12a: Flora Habitat Dependence Scores (Block A and B)	62
Map 12b: Flora Habitat Dependence Scores (Block C)	63
Map 13a: Location of Fauna Species of Concern (Block A and B)	64
Map 13b: Location of Fauna Species of Concern (Block C)	65
Map 14a: Fauna Species Habitat Dependence Scores (Block A and B)	66
Map 14b: Fauna Species Habitat Dependence Scores (Block C)	67
Map 15: Forest Bird Species of Concern (L1 – L3) for 2002 and 2014 Inventories (Block C)	68

List of Appendices

Appendix 1: List of Vegetation Communities	69
Appendix 1a: List of Vegetation Communities (Block A)	71
Appendix 1b: List of Vegetation Communities (Block B)	72
Appendix 1c: List of Vegetation Communities (Block C)	73
Appendix 2: List of Flora Species	75
Appendix 3: List of Fauna Species	82
Appendix 3a: List of Fauna Species (Block A)	86
Appendix 3b: List of Fauna Species (Block B)	88
Appendix 3c: List of Fauna Species (Block C)	90
Appendix 4: Fauna Habitat Guilds	94

1.0 Introduction

Over the two field seasons of 2014 and 2015 the Toronto Region Conservation Authority (TRCA) conducted fauna and flora inventories of the entire TRCA property at Claireville Conservation Area as well as a few smaller sections of publicly and privately owned lands in the northwest (herein referred to as the Study Area). These inventories were undertaken primarily to update existing information for the property, information which had been collected for the section to the south of Queen Street East in a previous inventory conducted in 2002; but also in order to fulfill the TRCA's commitment to maintaining up-to-date data on vegetation communities, flora and fauna species across its jurisdiction. Hence, the information can be used for both local and regional natural heritage assessment and planning.

At the larger scale, the purpose of the work conducted by the TRCA during the 2014 field season was to *characterize the terrestrial natural heritage features* of the Study Area. Once characterized, the site features can then be understood within the larger watershed and the regional context of the Terrestrial Natural Heritage Program, enabling a better understanding of biodiversity across the jurisdiction. Results can be used to improve the Terrestrial Natural Heritage System Strategy (TNHSS) targets. The question that the inventory addresses is “*How does the area surveyed at the Claireville Study Area fit within the regional and watershed natural system, and how should its contribution to this system be protected and maximized?*” The important underlying message offered by this question is that the health of the natural system is measured at the regional scale and specific sites must be considered together for their benefits at all scales, from the site to the larger system.

1.1 TRCA's Terrestrial Natural Heritage Program

Rapid urban expansion in the TRCA jurisdiction has led to continuous and incremental loss of natural cover and species. In a landscape that probably supported 95% forest cover prior to European settlement, current mapping shows that only 17.8% forest and wetland cover remains. Agricultural and natural lands are increasingly being urbanized while species continue to disappear from a landscape that is less able to support them. This represents a substantial loss of ecological integrity and ecosystem function that will be exacerbated in the future according to current urbanization trends. With the loss of natural cover, diminishing proportions of various natural vegetation communities and reduced populations of native species remain. Unforeseen stresses are then exerted on the remaining flora and fauna in the natural heritage system. They become even rarer and may eventually be lost. This trend lowers the ability of the land to support biodiversity and to maintain or enhance human society (e.g. through increased pollution and decreased space for recreation). **The important issue is the *cumulative* loss of natural cover in the TRCA region that has resulted from innumerable site-specific decisions.**

In the late 1990s the TRCA initiated the Terrestrial Natural Heritage Program to address the loss of terrestrial biodiversity within the jurisdiction's nine watersheds. This work is based on two landscape-level indicators: the quality distribution of natural cover and the quantity of natural cover. The aim of the program is to create a conservation strategy that both protects elements of the natural system (vegetation communities, flora and fauna species) *before* they become rare and promotes greater ecological function of the natural system as a whole. This preventive approach is needed because by the time a community or species has become rare, irreversible damage has often already occurred. A healthy natural system capable of supporting regional biodiversity in the long term is the goal of the Terrestrial Natural Heritage Systems Strategy, achieved by setting targets – both short- and long-term (100 years) – for the two landscape indicators in order to provide direction in planning at all scales (TRCA 2007a, TRCA 2007b).

A target system that identifies a land base where natural cover should be restored is a key component of the Strategy. Although the objectives of the Strategy are based on making positive changes at all scales, the evaluation models were developed at the landscape scale using a combination of digital land cover mapping and field-collected data. Field-collected data also provides ground-level information in the application of the landscape models at the site scale. The two indicators and the targets that have been set for them are explained in Section 3.1. It is important to understand that habitat quality and distribution are interdependent. For example, neither well-distributed poor-quality natural cover nor poorly-distributed good-quality natural cover achieves the desired condition of sustainable biodiversity and social benefits across the watershed.

The natural habitat associated with the Study Area acts as an important link along the West Humber riparian corridor, part of the continuous corridor of natural cover that extends from the rural upper reaches of the Humber watershed through urban Brampton and Toronto to the Lake Ontario shoreline.

2.0 Study Area Description

The Study Area is located in the lower central reaches of the West Humber River in the Local Municipality of the City of Brampton. Located just outside of the City of Toronto, the Study Area is bound to the north-west by Castlemore Road; to the south-west by Humber West Parkway (north section) and Goreway Drive; to the north-east by McVean Drive (northern section), Queen Street East and The Gore Road; and to the south by Highway 407. For the purpose of this report and to facilitate direct comparisons with earlier inventories, the whole Study Area is broken down into three sections. Block A, the smallest section, lies on the western edge of the northern half (west of Goreway Drive); Block B constitutes the remainder of the northern half to the east of Goreway Drive; and Block C, the largest area, is the entire southern section to the south of Queen Street East (Maps 1, 2, 2a and 2b).

Claireville Conservation Area falls almost entirely within the Great Lakes - St. Lawrence floristic

region which is composed of mixed coniferous-deciduous forests. A small stretch of the south-western edge extends into the Carolinian floristic region (a region that is characterised by broad-leaved deciduous trees). In terms of physiographic regions, the Study Area is located within the Peel Plain. Bevelled till plains is the main physiographic feature type and lends itself to a topography that ranges from flat to slightly undulating; steep slopes are few and generally only exists along waterways where dynamic erosive forces are in effect. Dense clay and loam based soils, typical of the Peel Plain favour the development of wetland pockets as seen through much of the lowland areas.

3.0 Inventory Methodology

A biological inventory of the Study Area was conducted at the levels of habitat patch (landscape analysis), vegetation community, and species (flora and fauna) according to the TRCA methodologies for landscape evaluation (TRCA 2007c) and field data collection (TRCA 2007d). Habitat patch mapping was collected across all TRCA watersheds in 2013 using four broadly-defined patch categories: forest, wetland, meadow, and dynamic (i.e. beach, bluff, dune, prairie, or savannah) communities. The mapping was digitized using ArcView GIS software. This data was then used to conduct the landscape analysis across the TRCA region and a subset using The Study Area, the vegetation community and species level data were collected through site level biological inventories.

A key component of the field data collection is the scoring and ranking of vegetation communities and flora and fauna species to generate local “L” ranks (L1 to L5); this process was undertaken in 1996-2000 and ranks are reviewed regularly (TRCA 2010). Vegetation community scores and ranks are based on two criteria: *local occurrence* and the number of *geophysical requirements* or factors on which they depend. Flora species are scored using four criteria: *local occurrence*, *population trend*, *habitat dependence*, and *sensitivity to impacts associated with development*. Fauna species are scored based on seven criteria: *local occurrence*, *local population trend*, *continent-wide population trend*, *habitat dependence*, *sensitivity to development*, *area-sensitivity*, and *patch isolation sensitivity*. With the use of this ranking system, communities or species of *regional concern*, ranked L1 to L3, now replace the idea of *rare* communities or species. Rarity (*local occurrence*) is still considered as one of many criteria that make up the L-ranks, making it possible to recognize communities or species of regional concern before they have become rare.

In addition to the L1 to L3 ranked species, a large number of currently common or secure species at the regional level are considered of concern in the urban context. These are the species identified with an L-rank of L4. Although L4 species are widespread and frequently occur in relatively intact urban sites, they are vulnerable to long-term declines.

3.1 Landscape Analysis

The quality, distribution and quantity of natural cover in a region are important determinants of the

species distribution, vegetation community health and the provision of “ecosystem services” (e.g. air and water quality, recreation, aesthetics) in that region.

Base Mapping

The first step in evaluating a natural system or an individual *habitat patch* is to interpret and map land cover using aerial photographs. The basic unit for the evaluation at all scales is the habitat patch in the region, which are then combined and evaluated as a system at any scale. A *habitat patch* is a continuous piece of habitat, as determined from aerial photo interpretation. The TRCA maps habitat according to four broad categories: *forest*, *wetland*, *meadow*, and *dynamic* (beach, dune, or bluff). At the regional level, the TRCA jurisdiction is made up of thousands of habitat patches. This mapping of habitat patches in broad categories is conducted through remote-sensing and is used in the evaluation of quality, distribution and quantity of natural cover. It should not be confused with the more detailed mapping of vegetation communities obtained through field surveys and that is used to ground-truth the evaluation (see Section 3.2).

Quality Distribution of Natural Cover

The quality of each habitat patch is evaluated according to three criteria: *size* (the number of ha occupied by the patch), *shape* (edge-to-area ratio), and *matrix influence* (measure of the positive and negative impacts from surrounding land use) (TRCA 2007c). A total score for each patch is obtained through a weighted average of the scores for the three criteria. This total score is used as a measure of the ‘quality’ of a habitat patch and is translated into a local rank (L-rank) ranging from L1 to L5 based on the range of possible total scores from 3 to 15 points. Of these L-ranks, L1 represents the highest quality habitat and L5 the poorest.

Species presence or absence correlates to habitat patch quality (size, shape and matrix influence) (Kilgour 2003). The quality target is based on attaining a quality of habitat patch throughout the natural system that would support in the very long term a broad range of biodiversity, specifically a quality that would support the region’s fauna Species of Conservation Concern (Table 1).

Table 1: Habitat patch quality, rank and species response

Size, Shape and Matrix Influence	Patch Rank	Fauna Species of Conservation Concern
Excellent	L1	Generally found
Good	L2	Generally found
Fair	L3	Generally found
Poor	L4	Generally not found
Very Poor	L5	Generally not found

Quantity

The amount of natural cover needed in the landscape is based on the quantity required to

accommodate and achieve the quality distribution targets described above. The two targets are therefore linked to each other: it will be impossible to achieve the required distribution of natural heritage quality without the appropriate quantity of natural cover. The proportion of the region that needs to be maintained as natural cover in order to achieve the desired quality has been identified as 30%.

3.2 Vegetation Communities, Flora and Fauna Species

Vegetation community and flora and fauna species data were collected through field surveys. These surveys were done during the appropriate times of year to capture breeding status in the case of amphibians and birds, and during the optimal growing period of the various plant species and communities. Vegetation communities and flora species were surveyed concurrently.

Botanical field-work related to Block C was conducted in 2014 with Block A and B being completed in 2015. In both years, inventory work was carried-out between the months of May through September (Table 2). Botanical data also includes additional records obtained within the last 15 years relevant to the Study Area. Data older than 15 years are deemed historic and are not included in the scope of this report.

Vegetation community designations were based on the Ecological Land Classification (ELC) and determined to the level of vegetation type (Lee *et al.* 1998). Community boundaries were outlined onto printouts of 2013 digital ortho-rectified photographs (ortho-photos) to a scale of 1:2000 and then digitized in ArcView. Flora regional species of concern (species ranked L1 to L4) were mapped as point data with approximate number of individuals seen. A list of all other species observed was documented for the site.

The 2014 fauna inventory of the southern half of the Claireville Conservation Area (Block C) was the first complete fauna inventory of this section since 2002. In 2015, the 2 blocks (A and B) were inventoried fully for the first time. Between 2002 and 2014 there were no formal surveys of the site, indeed the only records for that period are incidental observations associated with the long term monitoring project stations set up in Blocks A and C (Table 2).

In both 2002 and 2014/15, fauna surveys were conducted on dates in April, late May and June/July. The April visits searched primarily for frog species of regional concern but recorded incidentally the presence of any early-spring nocturnal bird species (owls and American woodcocks). Surveys in late May, June, and July were concerned primarily with the mapping of breeding bird species of regional concern. As per the TRCA data collection protocol, breeding bird surveys were carried out by visiting the site at least twice during the breeding season (last week of May to mid-July) to determine the breeding status of each mapped point. The methodology for identifying confirmed and possible breeding birds follows Cadman *et al.* (2007). All initial visits were completed by the end of the third week of June. The field-season is to be organized so that by late June only repeat visits are being conducted. It is imperative that any visit made in the first half of June is subsequently validated by a second visit later in the season. Fauna

species of regional concern (species ranked L1 to L3) were mapped as point data with each point representing a possible breeding territory.

Table 2. Schedule of TRCA biological surveys at Study Area, 2014-2015

Survey Item	Survey Dates	Survey Effort
Patch / Landscape	2013: ortho-photos	32 hours
Vegetation Communities and Flora Species	2014: May 6, 7,8, 22,23,28,30; June 4, 12,18,19, 25,27; Jul. 7, 9, 21, 22, 29; Aug. 13, 14, 21, 22, 28, 29; Sept. 2, 3, 10, 11, 12, 15, 17, 18,	224 hours
	2015: May 7, 11, 12, 19, 20; June 2, 10,12; Jul 10, 15; Aug. 7, 12, 25, 27; Sep. 9, 11, 14, 15, 16, 18, 22, 23, 24, 25, 28	175 hours
Frogs and Nocturnal Spring Birds	2014: April 23, 25 2015: April 15	5 hours 4.5 hours
Breeding Songbirds	2014: June 2, 3, 5, 6; July 2-4 2015: May 25-29; June 1, 15-19, 22, 23	37.25 hours 40.75 hours

In addition to the 2014 and 2015 data, this inventory considers all incidental fauna observations mapped over the previous 10 years. The TRCA's fauna data management protocol imposes a 10 year threshold on use of historical data, and therefore observations made prior to 2006 are not included in the current fauna inventory. Nevertheless, comparisons can be made to archival data sets. Table 3 shows the extent of fauna surveys and monitoring (as part of the TRCA's regional long term monitoring program (LTMP), monitoring forest birds, forest salamanders, meadow birds, wetland birds and wetland frogs) conducted at Claireville Conservation Area over the past two decades.

Table 3. Fauna inventories and monitoring projects conducted within Study Area

Year	Survey Block(s)		
	A	B	C
1995		Incidental records	
1997			Incidental records
1999	Incidental records	Incidental records	Incidental records
2000		Incidental records	
2001	Incidental records	Partial survey	
2002			Full survey
2007	Incidental records	Incidental records	Incidental records
2008			LTMP - fb/mb
2009			LTMP - fb/mb/wbf
2010			LTMP - fb/mb/wbf

2011	LTMP- mb		LTMP - fs /fb/mb/wbf
2012	LTMP - mb		LTMP - fb/mb/wbf
2013	LTMP - mb		LTMP - fb/mb/wbf
2014	LTMP - mb		Full survey + fb/mb/wbf LTMP
2015	Full survey, LTMP - mb	Full survey	LTMP - fb/mb/wbf

fs = forest salamander; fb = forest bird; mb = meadow bird; wbf = wetland bird/frog

4.0 Results and Discussion

Information pertaining to the Study Area was collected through both remote-sensing and ground-truthing surveys. This information contains three levels of detail: habitat patch, vegetation community, and species (flora and fauna). This section provides the information collected and its analysis in the context of the TNHS Strategy.

4.1 Regional Context

Based on 2013 ortho-photography, 26% of the land area in the TRCA jurisdiction consists of natural cover but this figure includes meadow. Although historically, the region would have consisted of up to 95% forest cover, currently (i.e. 2013) only about 17.8% is covered by forest (includes successional) and wetland. Of the non-natural cover (i.e. the remaining 74%), 48% is urban and 27% is rural / agricultural.

The regional level analysis of habitat patches shows that the present average patch quality across the TRCA jurisdiction is “fair” (L3); forest and wetland cover is contained largely in the northern half of the TRCA jurisdiction, especially on the Oak Ridges Moraine; and the quantity is 16.7% of the surface area of the jurisdiction (Map 3). In addition, meadow cover stands at 7.7% of the region. Thus the existing natural system stands below the quantity target that has been set for the region (30%) and also has an unbalanced distribution. The distribution of fauna species of concern is also largely restricted to the northern part of the jurisdiction; fauna species of regional concern are generally absent from the urban matrix (Map 4). The regional picture, being the result of a long history of land use changes, confirms that **all** site-based decisions contribute to the condition of a region.

4.2 Habitat Patch Findings for Claireville Conservation Area

The following details the Study Area according to the two natural system indicators used in designing the Terrestrial Natural Heritage System Strategy: the *quality distribution* and *quantity* of natural cover. Analysis was based on 2013 ortho-photos.

4.2.1 Quantity of Natural Cover

The Humber watershed covers a total of 91,078 ha. Natural cover in the watershed covers 30,270 ha (33%), including 20,100 ha as forest/successional, 8334 ha as meadow and 1836 ha as wetland. The Study Area is 701.9 ha in size and contains 614.8 ha of natural habitat (Table 4; Appendix 1), which amounts to 2 % of the total natural cover in the Humber watershed. The natural cover includes 220.5 ha of forest, 129.6 ha of successional, 46.8 ha of wetland, 22.8 ha of aquatic and 188 ha of meadow.

4.2.2. Quality Distribution of Natural Cover

The results for quality distribution are reported below under the headings of habitat patch size and shape, matrix influence and total score.

Habitat Patch Size and Shape

Size and shape contribute to a large extent to the quality or functioning of a habitat patch and, when all patches are combined, the Study Area as a whole. Habitat patch scores for size and shape vary considerably by block. In terms of size, habitat patch scores in Block A are evenly split between “poor” and “fair” (i.e. between two and three points); the majority of patches in Block B score as “fair” (three points); while to the south of Queen St., Block C contains extensive patches scoring either “fair” or “good” (three and four points). The distribution of these size scores – gradually improving from the north-west to the south-east corner of the study area - is well illustrated in Maps 5a and 5b.

Habitat patch score for shape also varied noticeably by block. Most patches in Blocks A and B, being heavily fragmented and linear, and constrained by the river running through the centre of these two smaller blocks, scored “fair” to “poor”. The majority of habitat patches in Block C despite having “good” size scored “very poor” for shape. This low score for shape is a result of a combination of the irregular edges imposed by the river course and the extensive trail and road system throughout Block C. The resulting irregular patch shapes achieve the lowest shape scores. At the course landscape level, more rounded patches are generally considered to offer superior protection against negative edge effects; however, increased patch size can largely compensate for such edge effects, while a very small but perfectly round habitat patch will achieve a very poor function.

Related to an optimal configuration of patch size and patch shape is the concept of forest interior, a reflection of the distance of any point in the forest to the closest edge. Forest interior is measured at 100 m increments from the forest edge. Within the Study Area there is little to no interior forest present. A few tiny slivers, not sufficient enough in size to support interior-forest dependent species, are all that exist within the Study Area, with the most extensive forest interior located in the largest forest patch in the south-east corner of Block C (Maps 6a and 6b).

Habitat Patch Matrix Influence

Analysis based on the 2013 ortho-photos shows that the matrix influence score for habitat patches in the Study Area is quite low. For the most part, patches scored “poor” with only a few of the more interior patches in block C (buffered somewhat by the wide swath of surrounding natural cover) scoring “fair”. Claireville Conservation Area is situated in a densely populated urban area; it is bordered to the north and east quadrants by large neighbourhoods of residential developments and to the west and south by a mix of residential and commercial developments. The combinations of negative impacts from these surrounding land-uses results in an overall “poor” score (Maps 7a, 7b, 8a, 8b).

Habitat Patch Total Score

The habitat total patch score combines the results of size, shape and matrix influence. Collectively they provide an indication of the overall habitat patch quality. The vast majority of the Study Area scores “poor” for the total score with only a few areas, mainly along the western edge of Blocks B and C, receiving a score of “fair” (Maps 9a and 9b).

4.3 Vegetation Community Findings for Claireville Conservation Area

4.3.1 Vegetation Community Representation

The Study Area has a total of 100 different vegetation communities, 18 are found solely as an inclusion or complex within a larger community. Of the vegetation community types found, forest cover is the most diverse (53 types). Collectively, forest and meadow occupy the greatest extent of the area as compared to aquatic, successional and wetland type communities (Table 4).

Table 4. Summary of Vegetation Communities within Study Area

Habitat Cover Class	Number of Types	Area (hectares)
Forest	53	220.5
Successional	12	129.6
Meadow	3	188.0
Dynamic	7	7.1
Wetland	19	46.8
Aquatic	6	22.8
<i>Total</i>	<i>100</i>	<i>614.8</i>

Forest, classifies into 53 different vegetation community types (including plantation), and consists of a scattered mosaic of fragmented patches that vary in size and shape. The cover provided by forest is 220.5 ha which equates to 35.8% of the total natural cover in the Study Area. Broken down further, natural forest types (31) cover 108.4 ha and plantation types (22) cover 112.05 ha.

Of the natural forest types (31), well drained woodlots, particularly in the tableland regions, commonly support sugar maple (*Acer saccharum* spp. *saccharum*), white ash (*Fraxinus americana*), red oak (*Quercus rubra*), and American beech (*Fagus grandifolia*). These same species in concurrence with larger assemblages of bur oak (*Quercus macrocarpa*) and ironwood (*Ostrya virginiana*) repeatedly characterised the dryer sections. Typical vegetation communities include: Dry-Fresh Sugar Maple-Oak Forest (FOD5-3), Dry-Fresh Sugar Maple Deciduous Forest (FOD5-1), Dry-Fresh Oak-Hickory Deciduous Forest (FOD2-2), and Dry-Fresh Ironwood Deciduous Forest (FOD4-A). North facing slopes with exposures to cooler climate generally favour the formation of slope forests dominated by eastern hemlock (*Tsuga canadensis*). However, topographical constraints within the site limit the occurrence of hemlock forest community types. Presently only 2 vegetation types with hemlock are found within the Study Area and they are found exclusively as inclusions: Fresh-Moist Sugar Maple-Hemlock Mixed Forest (FOM6-1) and Fresh-Moist Hemlock-Hardwood Mixed Forest (FOM6-2). In the lowland areas and poorly drained tablelands, the heavy clay and loam soils support the establishment of moisture tolerant species specifically, shagbark hickory (*Carya ovata*), black maple (*Acer saccharum* ssp. *nigrum*), bittersweet hickory (*Carya cordiformis*), basswood (*Tilia americana*), white elm (*Ulmus americana*), black walnut (*Juglans nigra*) and several willow species (*Salix* spp.). Vegetation communities such as Fresh-Moist Sugar Maple-Black Maple Deciduous Forest (FOD6-2), Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3) and Fresh-Moist Black Maple Lowland Deciduous Forest (FOD7-5) provide examples of typical floodplain and riparian communities while Fresh-Moist Shagbark Hickory Deciduous Forest (FOD9-4) was consistently encountered throughout bottomland areas.

Many abandoned apple orchards and old cattle grazing fields have succeeded into forests filled with mature apple (*Malus pumila*), dotted hawthorn (*Crataegus punctata*) and mature buckthorn (*Rhamnus carthartica*). These communities are primarily found along the edge of existing successional and meadow habitats; examples of which include: Dry-fresh Apple-Hawthorn Deciduous Forest (FOD4-H) and Dry-Fresh Exotic Deciduous (FOD4-e). Dry-fresh Apple-Hawthorn Deciduous Forest (FOD4-H) accounts for the largest proportion of any single forest vegetation type with 19.5 ha. This is followed by Fresh-Moist Sugar Maple-Black Maple Deciduous Forest (FOD6-2, 12.17 ha), Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3, 8.31 ha), Dry-Fresh-Exotic Forest (FOD4-e, 8.24 ha), and Fresh-Moist Shagbark Hickory Deciduous (FOD9-4, 8.18 ha). All other forest communities occupy less than 8 ha.

Plantations are classified into 22 different types that collectively encompass 112.05 ha; 18.2 % of the Study Areas' total natural cover. A number of reforestation or habitat restoration initiatives have been implemented or are currently underway throughout Claireville Conservation Area. Plantations in Blocks A and B are generally younger in age, those most recent are deemed as "pioneer" and mainly occur in existing meadow and open field habitats. These younger areas have been extensively planted with coniferous species particularly white spruce (*Picea glauca*), Colorado blue spruce (*Picea pungens*) and white cedar (*Thuja occidentalis*). The latter was chosen for use in both wet (e.g. riparian corridors) and dry sites. Deciduous and mixed plantings utilized deciduous trees such as basswood, hackberry (*Celtis occidentalis*), red oak, bur oak, and silver maple (*Acer saccharinum*). White Spruce Coniferous Plantation (CUP3-C), Restoration Mixed

Plantation (CUP2-A), and Mixed Coniferous Plantation (CUP3-H) are the three most common plantation communities described. Older plantations are mostly associated with Block C, in the areas located to the south of Queen Street. White pine (*Pinus strobus*), white spruce, white cedar, Carolina poplar (*Populus x canadensis*), black walnut, black locust (*Robinia pseudoacacia*) and silver maple are the main associates. Examples of plantation communities dominated by these species are White Pine Coniferous Plantation (CUP3-2), Mixed Coniferous Plantation (CUP3-H), Hybrid Poplar-Conifer Mixed Plantation (CUP2-f) and Black Locust Deciduous Plantation (CUP1-c). With 33.8 ha and 29.7 ha respectively, White Spruce Coniferous Plantation (CUP3-C) and Restoration Mixed Plantation (CUP2-A) accounted for the largest proportion of any plantation type.

Successional communities are classified into 12 different types that collectively span 129.6 ha and account for 21.1 % of the total natural cover. Much the area previously used for livestock or orchards, where they are no longer maintained, has reverted to open thicket or scrubland type habitats. Existing successional cover is shrub dominated with only few trees species present. Domestic apple, buckthorn, English hawthorn (*Crataegus monogyna*), dotted hawthorn and long-thorned hawthorn (*Crataegus macracantha*) are the prevailing shrub species with scattered occurrences of trees particularly black walnut, crack willow (*Salix x fragilis*), weeping willow (*Salix x sepulcralis*), Manitoba maple (*Acer negundo*), trembling aspen (*Populus tremuloides*) and basswood. Some thickets occupied with a mixture of buckthorn, wild grape (*Vitis riparia*) and various hawthorn species (*Crataegus spp.*) have developed along hedgerows where they are shielded from the impacts of ploughing, mowing and/or grazing. The three most prevalent successional communities are Hawthorn Successional Savannah (CUS1-1) (28.3 ha) (Figure 1), Exotic Successional Woodland (CUW1-b) (27.7 ha), and Native Successional Woodland (CUW1-A3) (21.4 ha). The latter two communities are typical along riparian corridors and lowland areas, while the former is seen in valley and terraced areas.



Figure 1: Hawthorn Successional Savannah (CUS1-1); a typical semi-open vegetation community within Study Area

Meadow, consisting of 3 types is vast throughout Claireville Conservation Area. Encompassing 188 ha, it provides 30.6 % of the natural cover in the Study Area (*second only to forest*). Exotic Cool Season Grass Graminoid Meadow (CUM1-b) dominated by smooth brome grass (*Bromus inermis*), and Kentucky blue grass (*Poa pratensis ssp. pratensis*) is the most expansive type and covers 93 ha. This is closely followed by 83.9 ha of Native Forb Meadow (CUM1-A) and 11.1 ha of Exotic Forb Meadow (CUM1-c). Native forb meadows are in large part associated with tall goldenrod (*Solidago altissima*), heath aster (*Symphyotrichum ericoides var. ericoides*), common milkweed (*Asclepias syriaca*) and New England Aster (*Symphyotrichum novae-angliae*). While the main extent of exotic forb meadows are occupied by weedy non-natives including, brown knapweed (*Centaurea jacea*), field thistle (*Cirsium arvense*), ox-eye daisy (*Leucanthemum vulgare*) and Queen Anne's lace (*Daucus carota*).

Wetlands span 46.8 ha and provide 7.1 % of the natural cover in the Study Area. Such formations frequently occur as discrete inland pockets that are coarsely categorized as either marsh or swamp. Additionally, wetland creation opportunities were undertaken where suitable conditions existed. Nineteen different wetland types are classified (including 6 communities found solely as either inclusion or complex).

Narrow-leaved Cattail Mineral Shallow Marsh (MAS2-1b) provides the largest proportion of wetland cover with 14.8 ha. This exotic community, found along riverine systems, inland

depressions and wet roadside ditches is dominated by all non-native species chiefly, narrow-leaved cattail (*Typha angustifolia*), hybrid cattail (*Typha x glauca*), reed canary grass (*Phalaris arundinacea*), and purple loosestrife (*Lythrum salicaria*). Its native counterpart, Broad-leaved Cattail Mineral Shallow Marsh (MAS2-1A) currently occupies 5.7 ha but is seen to persist more inland under less disturbed (sheltered) conditions. Common associates to this community type are broad-leaved cattail (*Typha latifolia*), boneset (*Eupatorium perfoliatum*), soft bulrush (*Schoenoplectus tabernaemontani*), spotted Joe-Pye weed (*Eutrochium maculatum* var. *maculatum*) and various native sedge species (*Carex spp.*). The second highest wetland cover is provided by Reed Canary Grass Mineral Meadow Marsh (MAM2-2). Spanning 14 ha, this exotic community is frequently found developing along streams and shallow marsh edges and is mainly comprised of reed canary grass, common reed (*Phragmites australis*) and exotic forbs such as purple loosestrife. Native meadow marshes were few and occupied a total cover of less than 1.0 ha. Those encountered supported native sedge species including fox sedge (*Carex vulpinoidea*), lake-bank sedge (*Carex lacustris*), tussock sedge (*Carex stricta*) and crested sedge (*Carex cristatella*). Narrow-leaved Sedge Mineral Meadow Marsh (MAM2-5) is an example of one such community found.

Five swamps (4 deciduous and 1 thicket) occupying 5.1 ha were recorded within the Study Area. Swamp Maple Mineral Deciduous Swamp (SWD3-3) and Willow Mineral Thicket Swamp (SWT2-2) both equaling 1.8 ha were the largest, followed by Willow Mineral Deciduous Swamp (SWD4-1) (1.3 ha) and 0.2 ha of Silver Maple Mineral Deciduous Swamp (SWD3-2). One Red (Green) Ash Deciduous Swamp (SWD2-2) was found as an inclusion only. Willow dominated swamps were common adjacent rivers and were subject to fluctuations in water levels while the maple dominated swamps occurred farther inland with more stagnant or slow moving water levels observed.



Figure 2: Inland Sedge Meadow Marsh and Cattail Mineral Shallow Marsh vegetation communities in Study Area (Block C), 2014

Aquatic communities are represented by 6 different types that together occupy 22.8 ha. The river system (OAO1) that meanders through the Study Area accounts for 12.5 ha of aquatic cover. This is followed by 8.9 ha of Turbid Open Aquatic (OAO1-T). The remaining four shallow aquatic systems that are present occupy <1 ha individually. Duckweed Floating Mineral Shallow Aquatic (SAF1-3) predominantly colonized by turion duckweed (*Lemna turionifera*) is the largest (0.7 ha).

Dynamic communities are classified into seven different vegetation types that when combined amount to 7.1 ha. Mineral Open Bluff (BLO1) is the most prevalent (1.9 ha). However, Fresh-Moist Prairie Plantings (TPO2-A) are the most expansive (3.4 ha). Plantings include a mix of native forb and grass habitat specialists including: switch grass (*Panicum virgatum*), Indian grass (*Sorghastrum nutans*), big blue-stem (*Andropogon gerardii*) and black-eyed susan (*Rudbeckia hirta*).

4.3.2 Vegetation Communities of Concern

The vegetation communities that occur in the TRCA jurisdiction are scored and given a local rank from L1 to L5 based on the two criteria mentioned in Section 3.0. Vegetation communities with a rank of L1 to L3 are considered of concern across the entire jurisdiction while L4 communities are considered of concern in the urban portion of the jurisdiction. The Claireville Conservation Area lies within the urban landscape so L1 to L4 communities were identified as being of conservation concern. In addition, community ranks do not take into account the intactness or quality of individual examples of communities; thus, a common type of vegetation community may be of conservation concern at a particular site because of its age, intact native ground layer, or other considerations aside from rank. For example, an old-growth sugar maple forest may belong to a relatively common vegetation type but should still be considered of high conservation concern.

Of the 100 described vegetation communities, 37 are of conservation concern. Eleven are deemed to be of regional conservation concern (two L2 and nine L3 ranked communities) and the remaining 26 are of urban concern (Figure 3). The forest community most sensitive at Claireville Conservation Area (ranked L2) is a Dry-Fresh Red Oak Deciduous Forest (FOD1-1) and was captured as an inclusion within another community. This community is typical of well-drained areas particularly those occurring on sands and coarse loams. It does well in drier sites. Another 4 forest communities are ranked L3, one of which, a Fresh-Moist Hemlock-Hardwood Mixed Forest (FOM6-2) being found only as an inclusion. Overall, forests of regional concern are largely hickory and oak dominated; Fresh-Moist Shagbark Hickory Deciduous Forest (FOD9-4) (8.2 ha) and Dry-Fresh Oak-Hickory Deciduous Forest (FOD2-2) (4.1 ha) are the most extensive.

Communities of urban concern tally to 11 (2 found as inclusions). They are largely in lowland areas dominated by black walnut, white elm, basswood and black maple. Fresh-Moist Sugar Maple-Black Maple Deciduous Forest (FOD6-2) with 12.2 ha and Fresh-Moist Black Maple Lowland Deciduous Forest (FOD7-5) at 7.8 ha occupy the greatest area. The third and fourth most expansive communities were in upland areas. Dry-Fresh Sugar Maple-Oak Deciduous Forest (FOD5-3) occupied 6.0 ha followed by 4.0 ha of Dry-Fresh Ironwood Deciduous Forest (FOD4-A).

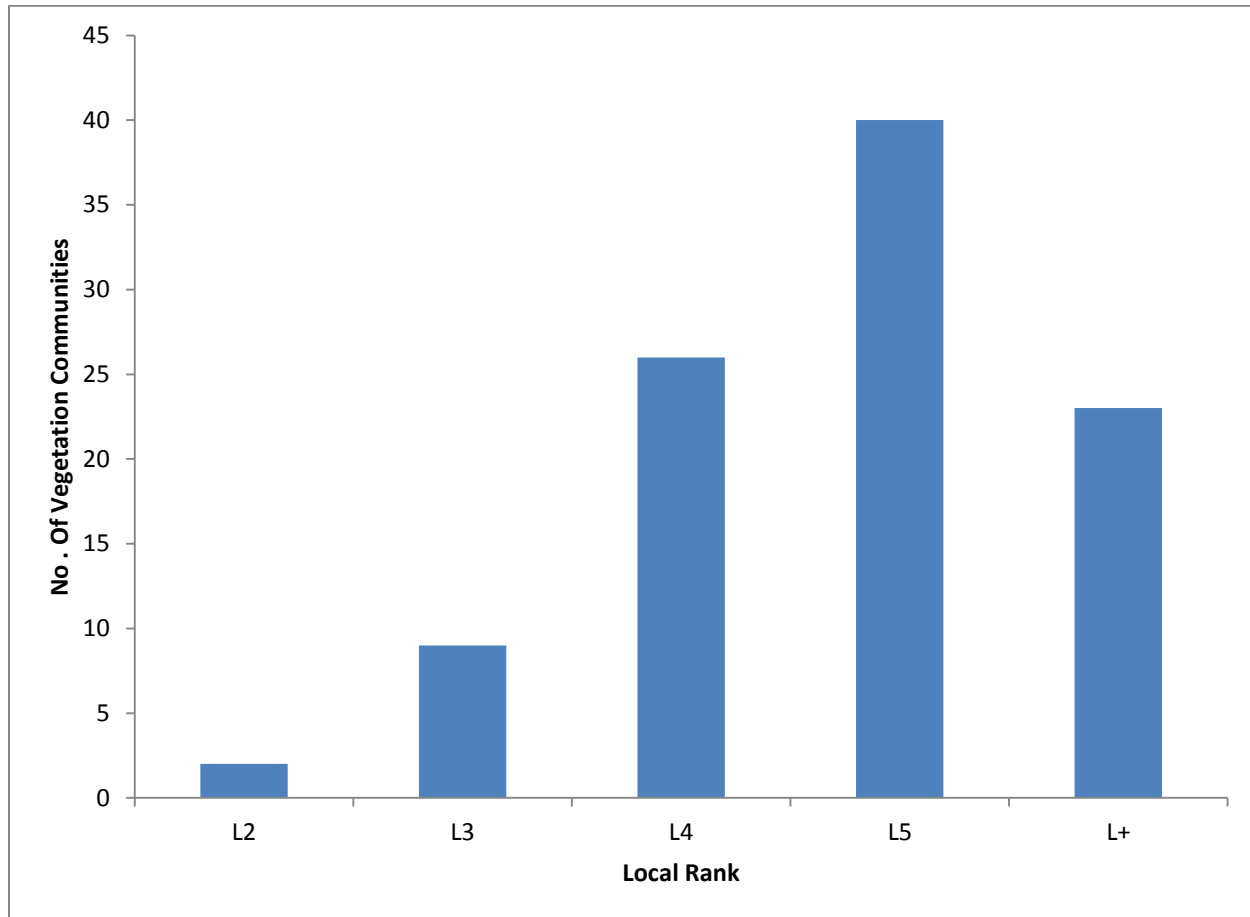


Figure 3: Proportion of vegetation communities by local rank within Study Area, 2014-2015.
Note: non-native communities ranked L+

Three wetlands of regional concern were identified within the Study Area. They are Narrow-leaved Sedge Mineral Meadow Marsh (MAM2-5), Broad-leaved Sedge Mineral Meadow Marsh (MAM2-6) and Broad-leaved Mineral Shallow Marsh (MAS2-4). The latter two were found solely as inclusions. All swamps (four mineral deciduous swamps and one thicket swamp) recorded are of urban concern. These particular communities are dominated by willow and maple species. The larger patches are located in the southern half of the Study Area where the topography and clay soils is conducive to wetland development. Similarly, all shallow aquatic communities (four) found are of urban concern. These communities colonized by submerged and aquatic plants are particularly sensitive to surface contamination (e.g. nearby agricultural run-off and/or salt-spray).

Three dynamic communities of regional concern are described within the Claireville Conservation Area. Two are only captured as inclusions and are Open Clay Barren (CBO1; L2) and Deciduous Treed Bluff (BLT1-B; L3). The other is Bur Oak Non-tallgrass Savannah (CUS1-3B) which spans 1.2 ha. Listed of urban concern are Willow Shrub Riparian Bar (BBS1-2B) and Mineral Open Bluff (BLO1) (Figure 4). Both communities are associated with riparian corridors.



Figure 4: Bluff formation along riverine system in Study Area (Block B), 2015.

Pest and disease, depending on the severity and frequency of occurrence, can significantly alter forest community structure. The 2014 and 2015 vegetation surveys noted evident declines in the vigour of white elm, white ash and red ash (*Fraxinus pennsylvanica*) tree species. Mid-aged to mature white elm individuals were found to be either dead or in severe decline in all forests inventoried. The younger specimens were found to be living, but with the prevalence of Dutch elm disease (caused by a fungus *Ophiostoma ulmi*) the probability of these individuals surviving into maturity is unlikely. Forests where this species was the dominant are succeeding into forests dominated by its past co-dominants and associates. Similarly, all ash species, namely white and green/red are under attack by Emerald Ash Borer (EAB); almost all trees observed through inventory work were in severe decline or dead. Only a few appeared to have evaded infestation. In those ash-dominated forests, the existing dead snags have created gaps in the canopy which have increased light penetration to the forest floor. Over time these gaps will encourage the establishment of faster growing shade intolerant species.

Where forest patch size and shape is linear and narrow, the loss of these key species (i.e. ash and elm) has already resulted in community structure and compositional changes. Field observations in impacted areas show a gradual succession into woodland and thicket communities dominated by wild grape, Manitoba maple and buckthorn. Examples of some sensitive communities currently in transformation are Fresh-Moist Ash Deciduous Forest (FOD7-2) and Fresh-Moist White Elm Lowland Deciduous Forest (FOD7-1).

4.4 Flora Findings for Claireville Conservation Area

4.4.1 Flora Species Representation

Floristic surveys conducted by TRCA in 2014 and 2015 identified a total of 523 species of vascular plants (Table 5; Appendix 2). Of these, 470 species recorded were naturally occurring; the remaining 53 were associated with restoration and garden plantings. Of the non-planted species recorded, 300 are native (64%) and 170 are exotic (36%).

Table 5. Summary of Flora Species in Study Area (2014-2015)

Total # of species	523
Naturally-occurring species	470
Planted species	53
Native (naturally-occurring) species	300
Number of L1 to L3 and LX species (excludes planted)	45
Number of L4 species (excludes planted)	97
Number of L5 species (excludes planted)	158
Exotic species (established)	170

Although highly fragmented, the Study Area has sufficient habitat type variance to provide conditions suited for a wide complement of forb, sedge, shrub and tree species (Figure 5).

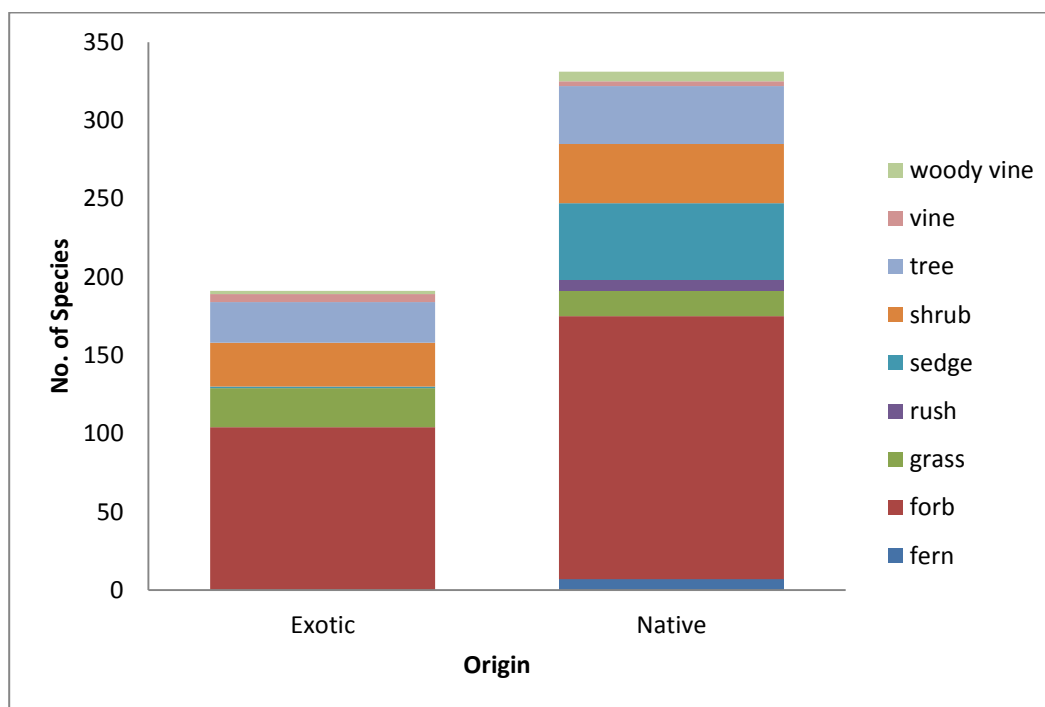


Figure 5: Flora diversity by plant type within Study Area, 2014-2015

Upland sugar maple forests with drier soils showed seasonal variation in species richness. In the spring, mature sugar maple upland woodlots supported large populations of spring ephemerals such as spring beauty (*Claytonia virginiana*), wood anemone (*Anemone quinquefolia*), trout lily (*Erythronium americanum ssp. americanum*) as well as an array of sedges including Pennsylvania sedge (*Carex pensylvanica*), early-flowering sedge (*Carex pedunculata*) and purple-tinged sedge (*Carex woodii*). As the season progressed the ground layers of these forests shifted to one either relatively devoid of vegetation or one dominated by sugar maple seedlings and saplings mixed in with scattered patches of choke cherry (*Prunus virginiana var. virginiana*), blue cohosh (*Caulophyllum thalictroides*) and Virginia waterleaf (*Hydrophyllum virginianum*).

Lowland forests sustained a wide array of species both native and exotic. Mid-aged to mature forest supported several spring ephemerals including Dutchman's breeches (*Dicentra cucullaria*), squirrel-corn (*Dicentra canadensis*), and broad-leaved toothwort (*Cardamine concatenata*). The low-lying native shrub running strawberry-bush (*Euonymus obovata*) was also abundant throughout most forested areas. A steady mix of non-native forbs, grasses and shrub were also intermingled through the ground layer. Prime examples being urban avens (*Geum urbanum*), buckthorn seedlings and orchard grass (*Dactylis glomerata*).

Successional habitats are shrub dominated. Hawthorn species, buckthorn, and apple are the species that best represent the savannah areas while black walnut, crack willow, Manitoba maple and wild grape define the riparian corridors. The herbaceous layer of savannah habitats overlapped considerably with meadow habitats in terms of the suite of species observed. Assemblages of native asters (*Symphyotrichum spp.*) and goldenrods (*Solidago spp.*) in combination with cow vetch (*Vicia cracca*), bird's foot trefoil (*Lotus corniculatus*) and wild strawberry (*Fragaria virginiana*) were regularly observed. Woodlands on moisture soils possessed ground layers thick with grass and forb species such as reed canary grass, hog-peanut (*Amphicarpaea bracteata*), Canada anemone (*Anemone canadensis*), panicked aster (*Symphyotrichum lateriflorum var. lateriflorum*), white snake root (*Ageratina altissima var. altissima*) and great burdock (*Arctium lappa*).

Wetland species are well represented. Swamps supported a rich network of ferns, sedges and forbs. Those maple dominated swamps with slower moving water exhibited lush patches of fringed sedge (*Carex crinita*), water-parsnip (*Sium suave*), sensitive fern (*Onoclea sensibilis*) and beggarticks (*Bidens spp.*). Willow swamps tended to be favor exotic invasion. Reed canary grass was a common associate in the understory followed by the native false nettle (*Boehmeria cylindrica*). Most open aquatic systems were unvegetated while shallow aquatics had a few different species of submerged and floating aquatic plants. Encountered most often are turion duckweed (*Lemna turionifera*) and common water-weed (*Elodea canadensis*).

A number of enhancement projects both small and large have been completed throughout the Study Area in recent years. Most of the work conducted has involved planting the natural areas with site appropriate species to improve existing habitat features. With the exception of white cedar, Eastern hemlock, red cedar (*Juniperus virginiana*), and a balsam fir seedling (*Abies*

balsamea), conifer species have all been introduced. Additionally, small wetland systems have been constructed where site conditions allow, and some existing systems have been enhanced, with a combination of deciduous trees and shrubs and herbaceous species. Some exclusively planted species are river bulrush (*Bolboschoenus fluvialis*), shining willow (*Salix lucida*), and buttonbush (*Cephalanthus occidentalis*).

4.4.2 Flora Species of Concern

There are 45 naturally occurring vascular plant species of regional conservation concern (rank L1 to L3 together with LX, i.e. locally extirpated) in the Study Area (Maps 11a and 11b; Appendix 2). Five of these L1 to L3 plants are regionally rare (found in 6 or fewer of the forty-four 10x10 km UTM grid squares that cover the TRCA jurisdiction). Two rank as provincially-uncommon (provincial rank S4): purple-tinged sedge and white trout lily (*Erythronium albidum*) (unconfirmed). The first requires rich forests; thriving populations of this sedge are seen at few different locations in Claireville Conservation Area. The largest of which is located in a remote sugar maple forest in the southern half of the Study Area (Block C).

Another 97 (106 if including planted spp.) are deemed to be of concern in urban areas. Local rank designations for flora species are based on sensitivity to human disturbance associated with development; and habitat dependence, as well as on rarity (TRCA 2013). Specific development impacts on flora species include: changes in hydrology and surficial conditions; trampling, with its associated plant tissue damage and soil compaction; competition from invasive exotic species that readily move into disturbed or fragmented habitats from gardens or trails; picking and collection; herbivory and pollution (i.e. soil, water and/or air). These factors are all included in the TRCA's scoring for sensitivity to development for flora species (see Section 3.0).

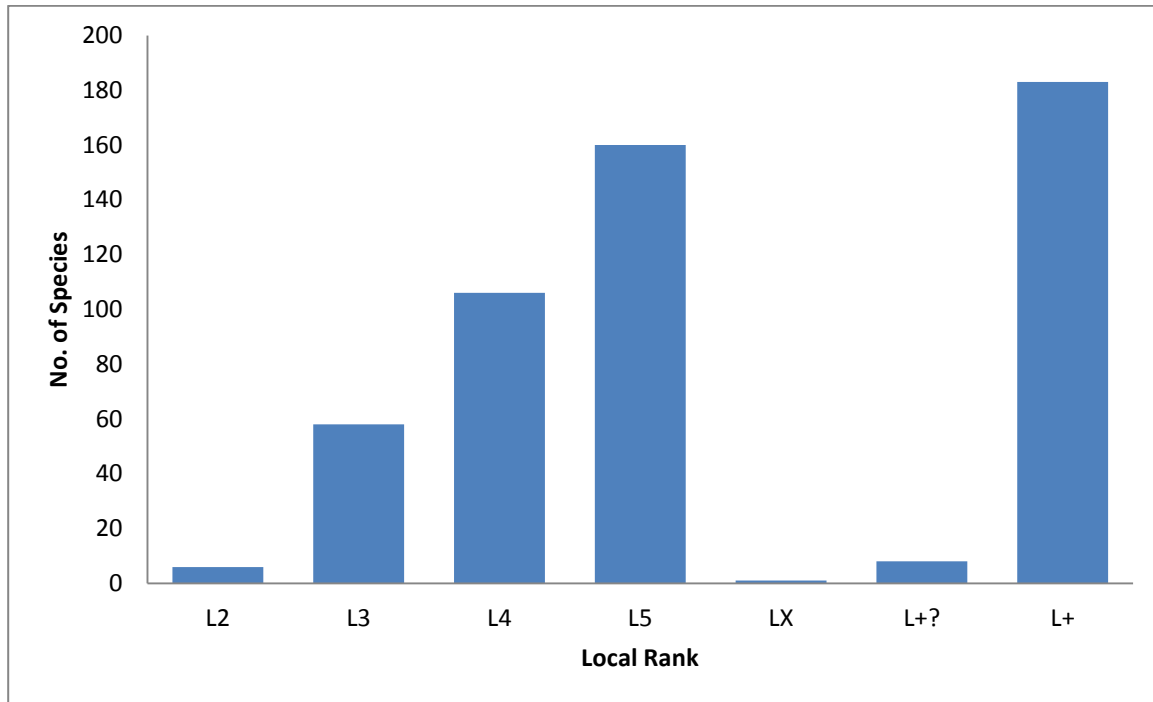


Figure 6: Proportion of species within Study Area by L-rank (*natural and planted combined*).
Note: non-native species are ranked L+ or L+?

Those most sensitive are wetland species which depend on specific hydrological conditions to persist, any change in wetland hydrology would be reflected by a shift in species composition. Examples of hydrologically sensitive species include: foxtail wood sedge (*Carex alopecoidea*), turtlehead (*Chelone glabra*), smooth-sheathed sedge (*Carex laevivaginata*) and fringed sedge. These and other species thrive in the wetlands where groundwater seepages are present. Other species, such as eastern hemlock which is not obligate wetland species, still require a moist sheltered environment, and they would be threatened by increased drying, especially from canopy tree removal and the associated increases in exposure to wind and sunlight. Interference with the ground water seepage through drainage or diversion would have serious impacts on all these species.

A number of the flora species of concern identified at Claireville Conservation Area have delicate stems and root systems and are not able to withstand trampling and soil compaction. These include species such as wood anemone, large-flowered bellwort (*Uvularia grandiflora*), and Dutchman's breeches. Other species that are showy and visually appealing such as narrow-leaved spring beauty (*Claytonia virginica*) and white trillium (*Trillium grandiflorum*) are vulnerable to picking and collecting. As access and use of a site increases, populations of these species will be under more pressure from picking and collecting.

Pollution and other forms of chemical alteration of habitat may affect certain plants. While air pollution tends to be a regional rather than a site-specific issue, alterations to soil and ground-

water are a frequent local threat arising from development. For example, runoff from agricultural fields, lawns and streets is often laden with silt, nutrients, and pesticides. This runoff enters nearby wetlands and other natural habitats. Many native plants, especially those of wetlands, require a natural water input which is relatively low in silt and nutrients. A large proportion of flora species of concern present in Claireville Conservation Area are affected by surficial contamination. These include species such as miterwort (*Mitella diphylla*), marsh marigold (*Caltha palustris*), and hairy-fruited sedge (*Carex trichocarpa*) and they would likely be impacted negatively by adjacent urban development and potentially construction work within the Study Area.

Herbivory pressure is high throughout the Study Area as deer populations, in the absence of management, are exploding. White trillium and other species that have complex germination cycles are vulnerable to such predation. In areas where herbivory pressure is high, there are noticeable differences in the growth pattern of favoured floral species. These species are often stunted and unable to reach maturity as they are less vigorous. To protect against browse, most of the restoration plantings have exclusion fences constructed around them.

4.4.3 Invasive Species

The Study Area supports 191 non-native species (including 21 planted species). Depending on the habitat, the majority of exotic species exhibit only mild to moderate degrees of aggressiveness. However, a select few are highly invasive in nature, possessing the ability to displace their native counterparts if conditions prove favourable. Garlic mustard (*Allaria petiolata*) is an example of an aggressive ground-flora species; it has entered into the edge and core areas of many sugar maple forests. It, as well as dog-strangling vine (*Cynanchum rossicum*), are particularly expansive in the sugar maple forests around the Etobicoke field center and near old homesteads. Their presence provides direct competition to native spring ephemerals including squirrel-corn and spring beauty as well as other native flora. Other sections closest to human influences, such as well trafficked trails, have a degraded understory and ground layer filled with non-native species.

Open and semi-open habitats tended to have understories with high concentration of exotics particularly exotic grasses and forbs such as brome grass (*Bromus inermis*). Exotic honey suckles (*Lonicera spp.*) and buckthorn formed hedgerows between plantation formations.

Wetlands with altered chemistry, especially high levels of nutrients and silt, tend to be taken over by aggressive species that take advantage of the high fertility, such as reed canary grass which is easily dispersed by wind and water. Reed canary grass is currently well distributed, occurring in many locations throughout the Study Area. Marsh community edges were invaded and in some instances dominated by hybrid cattail, narrow-leaved cattail and common reed. Fortunately large expanses of the native broad-leaved cattail naturally occurring and planted exist and provide enough viable seed to slow further encroachment of the non-native cattails throughout the larger and intact marsh communities. The smaller wetlands are however more vulnerable to invasion especially in those wetlands subject to a lot of human traffic.

4.5 Fauna Species Findings for Claireville Conservation Area

4.5.1 Fauna Species Representation

The most recent TRCA fauna inventory at the Claireville Conservation Area (Blocks A, B and C), conducted over the course of 2 field seasons (2014 and 2015), documented a total of 73 bird species, 8 herpetofauna (amphibians and reptiles) species and 14 mammal species for a total of 95 terrestrial vertebrate fauna species.

The TRCA fauna database has records for the entire Study Area dating back to 1997, however any record prior to the previous 10 years is considered archival and therefore is not included in any analysis conducted to assess the current status of regional fauna species. Archival records are extremely important in comparing past and present populations and distributions, but it needs to be understood that the TRCA inventory protocol was only formalised from 2001 onwards. Nevertheless, the fauna checklist for the Study Area, based on all records, archival and current, stands at 110 species. Only 4 of these species have not been reported in the past 10 years. These apparent absences are all bird species: ruffed grouse (*Bonasa umbellatus*, L2); eastern screech-owl (*Megascops asio*, L4); sedge wren (*Cistothorus platensis*, L3); and eastern meadowlark (*Sturnella magna*, L3). The TRCA inventory protocol is geared primarily to audio clues, i.e. songbirds and frogs, and likely under-reports nocturnal owl species, it is therefore quite possible that eastern screech-owl persists within the study area. Ruffed grouse was last reported in 2000 from Block B; the only sedge wren records are 2 territories reported from Block C in 2002; and eastern meadowlarks were previously reported from all 3 blocks but most recently from Block C in 2002. The latter species' absence in more recent years is somewhat surprising given the persistence of its fellow Species at Risk, bobolink (*Dolichonyx oryzivorus*) (Figure 7), and may reflect the broader continental decline of this species rather than any more site specific issue. Meanwhile, ruffed grouse is a species which is certainly sensitive to urban encroachment as has been witnessed elsewhere in the region's urbanising landscape. Refer to Appendices 3, and 3a to 3c for lists of the fauna species and their corresponding L-ranks.



Figure 7: A small population of bobolinks, an open country Species at Risk, is persisting at Claireville Conservation Area.

4.5.2 Fauna Species of Concern

Fauna species, like vegetation communities and flora species are considered of regional conservation concern if they rank L1 to L3 based on their scores for the seven criteria mentioned in Section 3.0. Since the subject site is situated in an entirely urban or urbanising landscape this document also reports on those species ranked as L4, i.e. those species that are of concern in urban landscapes. However, any comparison between the current mapped species and the ones mapped prior to 2006 needs take into account the fact that several species that are currently ranked as L4 (mappable) were ranked lower in, for example, 2002 and therefore would not have been mapped. This being the case, a comparison between current and archival point abundance should be restricted to L1 to L3 species.

Fauna surveys at the Study Area in 2014/15 reported 43 bird species, 8 herp species and 11 mammals of Regional and Urban Concern (L1 to L4). Several species can be added if the entire 10 year threshold period (2006 to 2015) is considered: 9 bird species, 1 herp species, and 1

mammal species (a single, presumably exceptional, sighting of a fisher, *Martes pennant*, in Block C, reported by TRCA staff in 2012) giving an overall total of 73 Species of Regional and Urban Concern (L1 to L4). Locations of these breeding fauna are depicted on Maps 13a and 13b. Given the change in the regional listing of L4 species over the past 15 years (and therefore changes in whether such L4 species are mapped or not), Table 6 only lists the richness of L1 to L3 fauna species in the 3 periods (L1 to L3 species are mapped wherever surveys are conducted, across rural and urban portions of the region).

Table 6. Summary of Fauna Species of Regional Concern (L1 to L3) within Study Area

Fauna	Number of Species of Regional Concern (L1 to L3) pre 2006	Number of Species of Regional Concern (L1 to L3) from 2006 - 2015	Number of Species of Regional Concern (L1 to L3) 2014 and 2015
Birds	11	20	12
Herps	2	5	4
Mammals	0	3	2
<i>Totals</i>	13	28	18

Perhaps more revealing than the comparison between the current 10 year period and archival reports is a comparison between specific inventories. Table 3 (p.6) indicates that the last complete inventory for any one of the 3 study area blocks was the one conducted throughout Block C in 2002. Comparing just the bird Species of Regional Concern – those ranked L1 to L3 – there appears to be no significant change: there were two L2 and six L3 ranked bird species in the 2002 inventory, and one L2 and six L3 ranked bird species in 2014. However, abundance for bird Species of Concern has declined significantly from a total of 31 territories held in 2002, to 23 in 2014. Even more remarkable is that the decline in Species of Regional Concern abundance is almost entirely due to the loss of 14 wood thrush (*Hylocichla mustelina*) territories, countered partially by smaller gains for edge and open habitat species. Elsewhere within the Study Area, the same species appears to be maintaining a small but viable population with 4 territories mapped in Block A in 2015. Given wood thrushes' preference for relatively mature forest habitat it should have been anticipated that the species would have persisted longer within both Blocks B and C than in the considerably smaller Block A. While the higher intensity of public use in Block C is expected to have significant impacts on certain ground-nesting and low-nesting species (ruffed grouse and ovenbird, *Seiurus aurocapillus*), the same pressures associated with such public use (off-leash dogs, increased density of informal trails) should not have impacted a mid-canopy species such as wood thrush quite as dramatically. It is possible that the decline in wood thrush population at the Study Area is more a reflection of the broader continent-wide decline, however, the complete disappearance from Block C while small numbers persist in Block A suggests that further investigation of local causes is required.

Local occurrence is one of seven scoring criteria for fauna species and is based on TRCA data and information from the Natural Heritage Information Centre (NHIC) of the Ontario Ministry of

Natural Resources (OMNR) (NHIC 2008). Using local occurrence as a measure of regional rarity, any species that is reported as a probable or confirmed breeder in fewer than 10 of the forty-four 10x10 km UTM grid squares in the TRCA jurisdiction is considered regionally rare (i.e. scores three to five points for this criterion) (TRCA, 2010).

Fauna surveys at the Study Area between 2006 and 2015 have documented a total of eight fauna species considered regionally rare including two species that have only been reported from between 2 and 5 of the regional grid squares: fisher (L2) and *Peromyscus* sp. (either white-footed mouse, *P. leucopus*, or deer mouse, *P. maniculatus*, L4). The difficulty in observing small mammals is the main reason why this species has been reported from so few squares. The report of a fisher from Block C, on the other hand, is remarkable. This large member of the *Mustelid* family has been observed at 5 locations across the region in the past few years and appears to be establishing a foothold, at least in the forested areas in the east-end of the region. The first documented TRCA record was of an animal coming to bait in the extreme north-east corner of the region in 2010. It is thought that the Claireville Conservation Area record refers to an animal that is wandering widely across the landscape and does not necessarily mean that the Study Area is satisfying an important part of the species' ecological requirement.

Certainly, the most important of these regionally rare species reported from the Study Area is western chorus frog, *Pseudacris triseriata*. Although the study area is located in the western section of the region where this declining species has its regional stronghold, the presence of such a seemingly healthy population of chorus frogs at Block C, a heavily used public property just outside of the City of Toronto, is highly significant. As a part of the Great Lakes/St. Lawrence-Canadian Shield population, the western chorus frogs at the Study Area are listed as Threatened under the federal Species at Risk Act. Since urban expansion is considered one of the greatest threats to the survival of the species in southern Ontario and given that the species is generally fairly sedentary – not embarking on the same mass seasonal migrations across the landscape that wood frogs (*Lithobates sylvatica*) and spring peepers (*Pseudacris crucifer*) undertake – the population at Claireville Conservation Area should be able to persist despite further development occurring beyond the Study Area boundaries.

It should be noted that a TRCA staff member who has regularly visited Block C at Claireville Conservation Area in her own time over the past decade, reports that 2015 appeared to be the worst year for chorus frog that she has experienced (Sue Hayes, pers comm). This is a significant observation in more than one respect: the current document bases its assessment of the Block C chorus frog population on observations made in 2014, by all accounts a successful year for the species. Furthermore, if, as observed by S. Hayes, 2015 was a poor year for the species, it is possible that the frog survey effort concentrated in Blocks A and B in 2015 have under-reported the species. The anecdotal report emphasises the importance of continued and repeated monitoring of such populations. It is hoped that the apparent population crash, reported in 2015 for Block C is a temporary anomaly and that further investigation will reveal additional populations in Block B.

A second amphibian, spotted salamander (*Ambystoma maculatum*, ranked as L1), was reported from vernal pools in the small forest patch in Block A in 2007 and again in 2011 (Figure 8). At the local level, this species is probably more “at risk” than the Threatened western chorus frogs present in Block C. The forest patch where the salamanders are located is adjacent to an extensive housing development which imposes several potentially negative matrix influences on the salamander population, compounded by the seasonal movements of adult salamanders and the species’ habitat requirements.



Figure 8: Block A at the north-west corner of the Study Area holds one of the last few remaining urban spotted salamander populations for the region.

Sensitivity to development is another criterion used to determine the L-rank of fauna species. A large number of impacts that result from local land use, both urban and agricultural, can affect the local fauna. These impacts – considered separately from the issue of actual habitat loss – can be divided into two distinct categories. The first category involves changes that arise from local urbanization that directly affect the breeding habitat of the species in question. These changes alter the composition and structure of the vegetation communities; for example, the clearing and manicuring of the habitat (e.g. by removal of dead wood and clearance of shrub understorey). The

second category of impacts involves changes that directly affect individuals of the species in question. Examples include increased predation from an increase in the local population of predator species that thrive alongside human developments (e.g. blue jays, *Cyanocitta cristata*; American crows, *Corvus brachyrhynchos*; squirrels, *Sciuridae*; raccoons, *Procyon lotor*, and house cats, *Felis catus*); parasitism (from facilitating the access of brown-headed cowbirds, *Molothrus ater*, a species which prefers more open, edge-type habitat); competition (for nest-cavities with bird species such as house sparrows, *Passer domesticus*; and European starlings, *Sturnus vulgaris*); flushing (causing disturbance and abandonment of nest) and, sensitivity to pesticides.

Fauna species are considered to have a high sensitivity to development if they score 3 or more points (out of a possible 5) for this criterion. For the most recent 10 year period, across the entire Study Area, all but 1 of the species that are ranked L1 to L3 receive this score (27 of the 28 species) and are therefore considered sensitive to one or more of the impacts associated with development (Map 8). Another 25 species ranked as L4 are also considered sensitive to development.

The surrounding landscape is almost entirely urban (residential, commercial and industrial) and thus the negative impacts associated with an urban or suburban matrix should be significant. The only portion of undeveloped adjacent land lies on the east side of Block C, and this extensive open area appears to be being prepared for development. Many of the negative influences associated with neighbouring urbanization can also be transferred deep within an otherwise intact natural matrix by extensive trail networks used by large numbers of people originating from both the neighbouring and quite distant urban and suburban centres. Extensive public use of a natural habitat can have substantial negative impact through the cumulative effects of hiking, dog-walking and biking on the site. Various studies have shown that many bird species react negatively to human intrusion (i.e. the mere presence of people) to the extent that nest-abandonment and decreased nest-attentiveness lead to reduced reproduction and survival. One example of such a study showed that abundance was 48% lower for hermit thrushes (a ground-nesting/foraging species) in intruded sites than in the control sites (Gutzwiller and Anderson 1999). Elsewhere, a recent study reported that dog-walking in natural habitats caused a 35% reduction in bird diversity and a 41% reduction in abundance, with even higher impacts on ground-nesting species (Banks and Bryant 2007). Similarly, clearing of forest understory to accommodate trails displaces sensitive low-nesting species.

Of the 36 sensitive bird species of regional and urban concern recorded in the Study Area, 15 are ground- or low-nesting species with half of those being meadow or open-country associated species. Although not true of all of these sensitive birds, some of these meadow species are present in good numbers: bobolink – a Species at Risk - was represented by 10 territories in 2014/15, field sparrow (*Spizella pusilla*) by 36 territories, savannah sparrow (*Passerculus sandwichensis*) by 24 territories and clay-coloured sparrow (*Spizella pallida*) by 7 territories (Figure 9). Furthermore, a high proportion of these territories were in the more heavily used Block C. This seemingly thriving meadow-bird community makes the loss of eastern meadowlark as a

breeding species at the Study Area somewhat difficult to explain, although there are nuances of vegetation structure in meadow habitat that may favour bobolinks and sparrows at the expense of eastern meadowlark. For example, it appears that meadowlarks prefer a more heterogeneous meadow habitat and will tolerate a higher degree of shrub encroachment (McCracken et al., 2013). Regardless of the loss of this one sensitive ground-nesting meadow species, it is still quite surprising to find so many field sparrow, savannah sparrow and bobolink territories. Most meadow species nest earlier in the season than either wetland or forest species, and it may be that this timing allows such species to establish territories before the peak of public-use through the summer months, when perhaps forest birds are more impacted.



Figure 9: Small numbers of clay-coloured sparrows held territories in the meadow habitat of Blocks B and C in 2014 and 2015.

Wetland habitats, even in somewhat disturbed urban landscapes where public use is fairly intense, often maintain a surprisingly high level of fauna function. The rank vegetation growth and persistence of surface water usually precludes any serious incursion by hikers, dogs, cats and

cyclists, thereby removing a considerable portion of the more obvious direct negative matrix influences. It is therefore as expected that two wetland ground- or low-nesting songbirds are so well represented: common yellowthroat (*Geothlypis trichas*, L4) and swamp sparrow (*Melospiza georgiana*, L4) held 61 and 13 territories respectively. The rather poor representation by rails with only two pairs of Virginia rail (*Rallus limicola*, L3) is probably more a result of the type of wetland habitat available than of any matrix influence issue. The same wetland habitats in Block C also provide excellent opportunities for the Study Area's most significant fauna species, western chorus frogs. Again, since these wetland habitats effectively create their own buffers against ground-borne anthropogenic disturbances, this important population of frogs is currently thriving. In 2014 staff reported choruses from 11 distinct locations spread through the central southern section of Block C; this has not changed appreciably since the previous complete fauna inventory of Block C in 2002 (Maps 13a and 13b).

Only 5 of the 15 ground-nesting species are forest or forest-edge associates, and the 5 species were represented by just 11 territories over the past 10 year period, with 2 species – black-and-white warbler (*Mniotilta varia*) and ovenbird – not recorded since 2009 and 2011 respectively. This poor representation of such sensitive forest birds together with the dramatic decline in the number of wood thrush territories over the past 10 years suggests that forest habitat is subject to considerable disturbance. Compared to the meadow and wetland habitats, the forest is functioning at a very low level from a fauna perspective. Generally, it would be expected that the reverse would be true: most meadow birds are ground-nesters and as such should be most impacted by the ground-borne disturbances associated with heavy public use. Ground-nesting birds are highly susceptible both to increased predation from ground-foraging predators that are subsidized by local residences (house cats, raccoons) and to repeated flushing from the nest (by pedestrians, off-trail bikers and dogs) resulting in abandonment and failed breeding attempts.

Birds that nest higher in the canopy are generally less susceptible to the types of negative impacts imposed by an increase in public use of any forest block. In the case of Blocks B and C there is perhaps another issue in addition to the heavy trail use that is having an impact on higher, mid-level and canopy nesting species. The only section that still accommodates any forest bird species of concern (i.e. those ranked L1 to L3) is Block A where a total of 4 wood thrush territories were mapped. Block A has just 21.1 ha of forest cover compared to 125.4 ha for Block C and 73.9 ha for Block B. As would be expected, L4 forest birds are somewhat better represented but, even then, red-eyed vireo (*Vireo olivaceus*) and eastern wood-pewee (*Contopus virens*) hold only 20 and 13 territories respectively for the entire 242 ha of forest cover. Great-crested flycatcher (*Myiarchus crinitus*), usually at considerably lower densities than either of the previous two species, is the only forest species that seems well-represented in Block C with 14 territories.

Mid-level forest-edge and generalist species, however, are well-represented in Block C with indigo bunting (*Passerina cyanea*, L4; Figure 10) and grey catbird (*Dumetella carolinensis*, L4) holding 36 and 37 territories. This may well provide an insight into the reason for such low representation of true forest species in Block C, where perhaps it is the overall forest quality that is the biggest issue, since forest edge species appear to be doing rather well. Both of these species are

somewhat less sensitive to those negative matrix influences that have such an impact on forest species, in fact will persist as long as ample shrub cover (understory or edge habitat) is available.



Figure 10: Indigo bunting is a common forest-edge breeding bird throughout Claireville Conservation Area – especially the eastern half of Block C.

Generally, all herpetofauna are considered sensitive to development, and are recognized as being one of the first groups of species to be extirpated from heavily disturbed sites, as has been amply illustrated by the disappearance of all but the hardiest of herpetofauna from the urbanized landscape of the City of Toronto. The two L2 ranked frog species (wood frog and western chorus frog) together with the L1 ranked spotted salamander are all affected by any negative impacts that are imposed on both their wetland breeding habitat (water quality issues; increased turbidity due to incursion by unleashed dogs) and their upland foraging and overwintering habitat (compaction and drying of soils; predation by artificially subsidized populations of predators such as raccoon, domestic/feral cats, and unleashed dogs; mortality issues associated with increased bicycle traffic on trails, both formal and informal). The nearest viable populations of 2 other sensitive L2 frog species, spring peeper (*Pseudacris crucifer*) and grey treefrog (*Hyla versicolor*), are at Heart Lake and Kortright Conservation Areas, about 9 km west and east of Claireville Conservation Area. Neither species is present within the City of Toronto (although there are small numbers of the

latter species in the Rouge Park) and their absence from Claireville suggests that the Study Area is transitioning from a rural to a more urban property, and it is likely that wood frogs and chorus frogs are persisting due in part to the large size of Block C.

Area sensitivity is a scoring criterion that can be closely related to the issue of a species' need for isolation. Fauna species are scored for area sensitivity based on their requirement for a certain minimum size of preferred habitat. Species that require large tracts of habitat (>100 ha in total) score the maximum five points, while species that either show no minimum habitat requirement, or require <1 ha in total, score one point. Species scoring three points or more (require ≥ 5 ha in total) are deemed area sensitive species. Researchers have shown that for some species of birds, area sensitivity is a rather fluid factor, dependent and varying inversely with the overall percentage forest cover within the landscape surrounding the site where those species are found (Rosenburg *et al.* 1999).

The current fauna inventory for the Study Area lists 27 species that are considered to be area sensitive; many of these species only require in excess of 5 ha of habitat, but 8 of the species have a requirement for at least 20 ha of continuous habitat. All of this latter group of species are forest dependent – including fisher, the one non-avian representative on this short-list. There is ample forest habitat available within the Study Area to satisfy these species' area requirements, primarily Block C, however, the quality of the majority of the forest habitat in Block C is somewhat compromised either by extensive trail systems or the presence of a non-native vegetative understorey. Furthermore, although the total forest habitat available is quite high, the forest system is highly fragmented, a factor which has considerable impact on the breeding success of forest species such as ovenbird, black-and-white warbler and wood thrush (L2, L2 and L3 respectively). All 3 of these species were absent from Block C in the main 2014 inventory. However, this same fragmentation has provided additional edge habitat which has favoured species such as indigo bunting and grey catbird (both L4).

Species' patch-size constraints are due to a variety of factors including foraging requirements and the need for isolation within a habitat block during nesting. Such a variety of habitat needs are more likely satisfied within a larger extent of natural cover. In the case of the need for isolation, regardless of the provision of a habitat patch of sufficient size, if that block is seriously and frequently disturbed by human intrusion, such species will be liable to abandon the site

Patch isolation sensitivity in fauna measures the overall response of fauna species to fragmentation and isolation of habitat patches. One of the two main aspects of this scoring criterion is the physical ability or the predisposition of a species to move about within the landscape and is related to the connectivity of habitat within a landscape. The second main aspect is the potential impact that roads have on fauna species that are known to be mobile. Thus most bird species score fairly low for this criterion (although they prefer to forage and move along connecting corridors) whereas many herpetofauna score very high (since their life cycle requires them to move between different habitat types which may increase likelihood of road-kill). One example of how this criterion affects species populations is the need for adult birds to forage for

food during the nestling and fledgling stage of the breeding season. By maintaining and improving the connectivity of natural cover within the landscape (e.g. by reforestation of intervening lands) we are able to positively influence the populations of such species, improving their foraging and dispersal potential.

Five of the six amphibian species that occur in the Study Area score four points or more for patch isolation sensitivity. All of these species undergo annual migrations to and from breeding wetlands although this migration is very limited in western chorus frog. Fortunately, for the four frog species present in the Block C (green frog, *Lithobates clamitans*, is not included since seasonal migrations are not an integral part of its life-cycle) the habitats are not isolated from each other, thus allowing all four species the opportunity to conduct entire life-cycles within the property boundaries – without having to venture across the busy roads surrounding the site. The presence of spotted salamander in the smallest block within the Study Area, Block A, was a considerable surprise; animals were observed initially in 2007 (records provided by Ecoservices Inc.) and then again by TRCA staff in 2011. There was no intensive search conducted in 2015, although the vernal pools where the egg masses were found in 2009 still exist and host a population of wood frogs. Again, as long as all the species' requirements are met within the boundaries of Block A, precluding any need to cross Goreway Drive to the east, this significant population may persist as long as negative matrix influence from the adjacent residential housing to the north is somehow mitigated. It should be noted that even trails with heavy enough bike traffic can result in herp and small mammal fatalities, although, since the majority of mass amphibian movements occur at night, the level of mortality may not be high enough to affect local amphibian populations. Nevertheless, trails and trail-use should be designed with the mitigation of such impacts in mind.

Fauna species that score greater than three points under the *habitat dependence* criterion are considered habitat specialists (Map 13). These species exhibit a combination of very specific habitat requirements that range from the microhabitat (e.g. decaying logs, aquatic vegetation) and requirements for particular moisture conditions, vegetation structure or spatial landscape structures, to preferences for certain community series and macro-habitat types. There have been 14 fauna species of regional and urban concern that are considered habitat dependent reported from the Study Area over the past decade: 10 birds, 3 herps and 1 mammal. This number drops even lower if only the current survey – 2014 and 2015, covering all 3 survey blocks – is considered: 6 bird species, 2 herps and 1 mammal species. Within this rather short list of bird species there are only 5 forest obligates (and just 3 in 2014/15). It is quite apparent that the high degree of fragmentation of the forest cover (particularly in Block C) has severely compromised the opportunities for forest dependent bird species to maintain populations within the Study Area.

Red-backed salamander (*Plethodon cinereus*) is considered an indicator of forest health and ecological function and therefore the absence of this important species suggests poor forest habitat quality at least in this section of Block C. Again, it is possible that the high degree of fragmentation of forest throughout Block C has resulted in changes in soil moisture and forest microclimate due to increased wind and sun effects; all of which compromises the integrity of the forest habitat, reducing the overall quality of the forest ecosystem.

Meadow habitat obligates such as bobolink, clay-coloured sparrow and field sparrow do not score high for habitat dependence primarily because the scoring process lists several farmed or artificial habitats as significant habitats for such species. Nevertheless, the fact remains that these species are completely dependent on various qualities of open habitat, a habitat that is generally considered highly developable within the region, and therefore is in somewhat short supply. Again, this presents a contradiction to the idea of replanting all open habitats with a view to re-establishing forest habitats. Claireville's most important fauna communities are dependent not on forests but on either wet or dry open habitats.

A site's species list presents only the species' richness, i.e. it indicates only the presence or absence of species at a site but indicates neither the breeding success nor the population stability of each species at the site. A healthy functioning system will accommodate a whole suite of species that are adapted to the habitat types at the site, and will allow those particular species to thrive and breed successfully. As the quality of the habitat patch improves so will the representation of flora and fauna species associated with that habitat. In this way, representation biodiversity is an excellent measure of the health of a natural system. Thus, it certainly seems that the ecosystem functioning of forest habitat at Claireville Conservation Area is severely impaired, more so than what might be expected for such an extensive property. This appears to be a result of a combination of forest fragmentation and intensive public use associated with an extensive trail system at the site, and the impacts of neighbouring properties.

Even if fauna species' specific habitat-type requirements are being met at a site, along with requirements for patch size and connectivity, the site will still fail to support a thriving population of those sensitive species if these habitat patches are persistently or repeatedly subjected to negative matrix impacts. Certainly, the provision of the appropriate habitat types in the optimal configurations of size and connectivity will present the possibility of successful breeding opportunities. But if territories are being abandoned or failing to produce new generations of the species then the site is acting as a population sink; this has considerable implications for the larger population of that species at the regional scale and beyond. First-time breeders of a particular neotropical songbird species, for example, will be unable to predict their nest outcome if upon arrival in late spring they are presented with what looks like the necessary specific forest habitat type. The inexperienced individual will maintain a territory even if subsequently the matrix influence is negative enough to cause abandonment and failure. Thus, in urban situations, even if high quality mature forest patches are present, only the less sensitive generalist species will be present, with just the occasional occurrence of sensitive habitat dependent species which are likely to subsequently fail in their breeding attempts.

Comparison between 2002 and 2014 Inventories at Block C

The fact that complete fauna inventories were conducted at Block C in 2002 and again in 2014, using the same inventory protocol, presents an opportunity to make direct comparisons between the two data sets which will give an indication of trends in local population status. The survey

effort was comparable in both years, and the extent of the area surveyed was the same. However, caution should be exercised if L4 species are to be compared from 2002 to 2014. It is clear from the fauna list for both years that grey catbird, so abundant in 2014, was not mapped at all in 2002. The same issue does not arise in comparing the L1, L2 and L3 species but it is unfortunate that similar comparisons cannot be made across all species (Map 15). The inventory protocol is now more insistent that all L4 species need to be mapped unless the subject site is in an entirely rural situation.

Appendix 3d breaks down the bird species of urban and regional concern by habitat guild (i.e. the species' preferred habitat). The number of L1 to L3 species is rather limited but even so, the forest comparison is unequivocal with the loss of all three L3 species including all 14 wood thrush territories. From an L4 perspective, the 2014 figures seem somewhat healthier, with several species that were not detected in 2002. Some of these earlier absences are questionable (e.g. hairy woodpecker, *Picoides villosus*) but overall it appears that there has been an increase in the L4 representation. This is to be expected since such species are more resilient to any increases in negative matrix influence.

The meadow bird community has been a little more stable overall, with thirteen L1 to L3 territories in 2002 and 12 in 2014. The rather disheartening loss of 5 eastern meadowlark territories has been compensated somewhat by an increase in the number of bobolinks and clay-coloured sparrows. Two of the L4 species show dramatic increases but it is quite certain that for eastern kingbird (*Tyrannus tyrannus*) this is result of a change in L-rank – the species was simply not mapped in 2002. The substantial increase in the number of field sparrow territories is actually consistent with what appears to have happened with the third habitat guild, forest-edge species. Even after removing the rather cryptic American woodcock (*Scolopax minima*) from the 2014 forest-edge list there is an increase from 2 to 7 territories for L1 to L3 species, while the increase in the territory count for the L4 ranked indigo bunting was huge.

In summary, the comparison between bird territories in 2002 and in 2014 appears to confirm the understanding of what is happening to the faunal ecosystem throughout the Study Area. The forest habitats are highly fragmented and rather heavily disturbed, reducing the opportunities for forest obligates, while the mixed wet and dry open meadow and shrub habitats between the somewhat compromised forest patches are providing excellent opportunities for meadow and edge-habitat species. Although this is not good news for forest species, it is apparently very good for the property's only two Species at Risk: bobolink and western chorus frog. Figure 11 illustrates the changes in L1 to L3 bird species' territories for the three habitat guilds

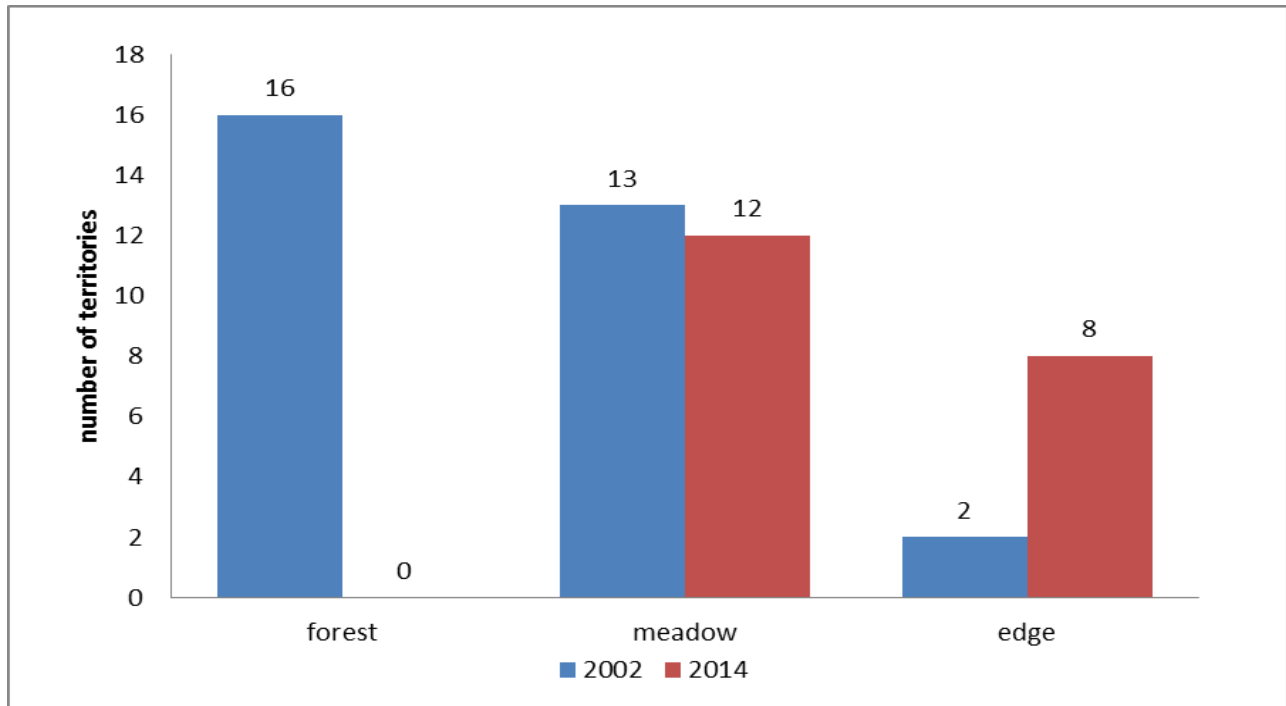


Figure 11: Number of L1 to L3 forest, meadow and forest-edge breeding bird territories recorded at Claireville Conservation Area in 2002 and 2014.

5.0 Summary and Recommendations

The recommendations for the Study Area are given in relation to the regional targets for natural heritage in the TRCA jurisdiction. To reach the regional targets for quality distribution and quantity of natural cover, every site will require its own individualized plan of action. Following is a short summary of the Study Area within the regional context, followed by specific recommendations.

5.1 Site Summary

1. The site is located in the lower-reaches of the West Humber sub-watershed, just outside of the north-west corner of the City of Toronto. The extensive natural cover – meadow and forest - at this site is a significant fraction of the natural habitat remaining in the urbanised landscape and as such fills an important function in helping to maintain a natural corridor to the lower Humber watershed and the Lake Ontario shoreline.
2. As a Conservation Authority property, the site is secure from residential or commercial development. However, negative matrix influences can readily impact even protected areas if public use of such an area is not managed in a way as to maintain the local

- natural systems. There is a degree of flexibility in improving natural heritage at the site thereby contributing to the local and regional terrestrial natural heritage targets.
3. One hundred vegetation types were observed, ranging from coniferous plantation to shallow marsh and aquatic communities. The site includes 6 aquatic, 53 forest, 19 wetland, 12 successional, 3 meadow and 7 dynamic vegetation community types. This is a moderate community diversity given the size of the site (~700 ha) and reflects historical and current land-use practices of the site and surrounding area.
 4. Vegetation communities of concern totalled 37. Eleven are considered to be of regional concern and 26 are of concern in an urban land-use zone. Hickory and oak tree species are dominates in most of these forests.
 5. The impacts of pest and disease have resulted in a noticeable decline in the prevalence of ash and elm species in wooded communities throughout Study Area. Where these species once dominated, natural succession appears to be shifting communities towards replacement by co-dominants in the forested areas and/or fast growing weedy tree and shrubs species along edge and semi-open habitats.
 6. A total of 523 naturally occurring flora species were observed. Amongst them were 45 species of regional concern (ranked L1-L3 and LX) and 97 species of urban concern (ranked L4). Species of concern were associated with wetland, forest, aquatic and successional habitats. Total species richness is moderate for the size of the site and reflects habitat diversity.
 7. The relatively high total of 106 species of vertebrate fauna observed over the past 10 years is a result of the diverse selection of habitats present within the Study Area.
 8. The presence of a seemingly thriving population of western chorus frogs in Block C is of exceptional significance given the site's location within such an urban landscape. There are no viable populations of this Species at Risk within the entire City of Toronto.
 9. A small population of bobolinks is persisting in meadow habitats throughout Block C, although another meadow Species at Risk, eastern meadowlark, has apparently abandoned the site.
 10. The bird community within the forest habitats especially within Block C is in considerable decline with no recent reports of ovenbird or ruffed grouse, and a significant crash of the Block C wood thrush population.
 11. The presence of spotted salamander in the small mature forest patch in Block A constitutes the nearest breeding population of this L1 ranked species to the City of Toronto (although a single animal was found at the lower Highland Creek in 2013).

5.2 Site Recommendations

The recommendations primarily address objectives of protecting regional biodiversity in the TRCA jurisdiction. In order to at least maintain and preferably enhance the current level of biodiversity at the Study Area, the overall integrity of the natural heritage system that includes the site must be protected. Therefore, at the landscape scale, in keeping with the TNHSS, connections to other natural habitat patches in the landscape need to be enhanced and maintained. Furthermore, the recommendations highlight the issues that may occur with any increased public use of the Study Area. Management needs to address this potential increase in negative matrix influence and ensure that effective mitigation is included as part of any future management plans. This includes strategic placement of any interpretive signage, managing public use, allowing healthy dynamic natural processes to proceed, and controlling invasive species.

The following recommendations address the above natural heritage concerns, with an emphasis upon bolstering the existing natural features on site. Thus, we recommend overall that 1) existing habitats and features be protected and enhanced; 2) that public use be managed; and 3) that invasive species be controlled.

1. Protect and Enhance Existing Features

The first priority should be to focus on ***maintaining conditions that allow existing communities or species of conservation concern to thrive.***

- a. Native meadow communities currently provide nesting opportunities for the healthiest assemblage of Species of Concern within the Study Area (bobolink, field sparrow, savannah sparrow, clay-coloured sparrow). It also provides foraging opportunities for migrating monarch butterflies (*Danaus plexippus*) and migrant songbirds in the fall. The wetter areas are vitally important for the populations of western chorus frog. These meadow communities should be given priority in any habitat management conducted on the property, for example, by removing encroaching invasive species and preventing any succession to scrub or thicket habitat.
- b. Hawthorn diversity and health can be maintained by removing invasive species such as buckthorn and European highbush cranberry (*Viburnum opulus ssp. opulus*).
- c. Wetter lowland meadow sites should be maintained and managed specifically to meet the needs of the local western chorus frog populations following guidelines set-out in the Species at Risk Recovery Plan (Environment Canada, 2014).

- d. Considerable effort has been exerted to improve the natural features within the Study Area. Restoration sites are well chosen and should be periodically monitored to ensure planting success.
- e. Consider planting native tree species in the understory of elm and ash dominated forests to replace these declining canopy species with native species suitable to the site such as black walnut, black maple, hickory and oak species.

2. Manage Public Use

Visitor pressure is likely to increase in the future, and it is important that this increase in use does not impact sensitive habitat features that support significant fauna communities.

- a. A large expansive network of formal and informal trails runs through the Study Area. Some of the higher quality areas, particularly in Block C, should be left with minimal or zero public access to protect the existing populations of sensitive flora and fauna species of conservation concern and overall species diversity at the site. The education of users on the importance of staying on formal trails will help to slow the deterioration of habitat quality and reduce the occurrence of trail-related impacts (i.e. compaction, invasive species spread, littering etc).
- b. Hiking and dog-walking activities are currently concentrated in Block C, and certainly TRCA inventories indicate that forest-bird declines have occurred here; however, it appears that this same local concentration of visitor pressure is having surprisingly little impact on the meadow and open habitat fauna species. If there is any intention to encourage greater public use of the natural habitats within the Study Area it is important to establish very definite rules on the presence of dogs. Typically, wherever dog-walkers have access, it follows that there will be an expectation that animals will be allowed to roam off-leash – despite local by-laws to the contrary.
- c. Promote a sense of stewardship with local community residents through outreach programs geared towards more ecologically positive behaviour. Local residents particularly those that abut the Study Area will engage in proper disposal of yard waste, garbage and responsible dog-ownership.

3. Control Invasive Species

Several invasive plant species are threats to the native biodiversity in the Claireville Conservation Area. ***It is essential that well-planned and realistic measures be undertaken to control invasive species.*** Management for invasive species will need to be tailored to the

individual species in question, depending on how wide-spread and established they are.

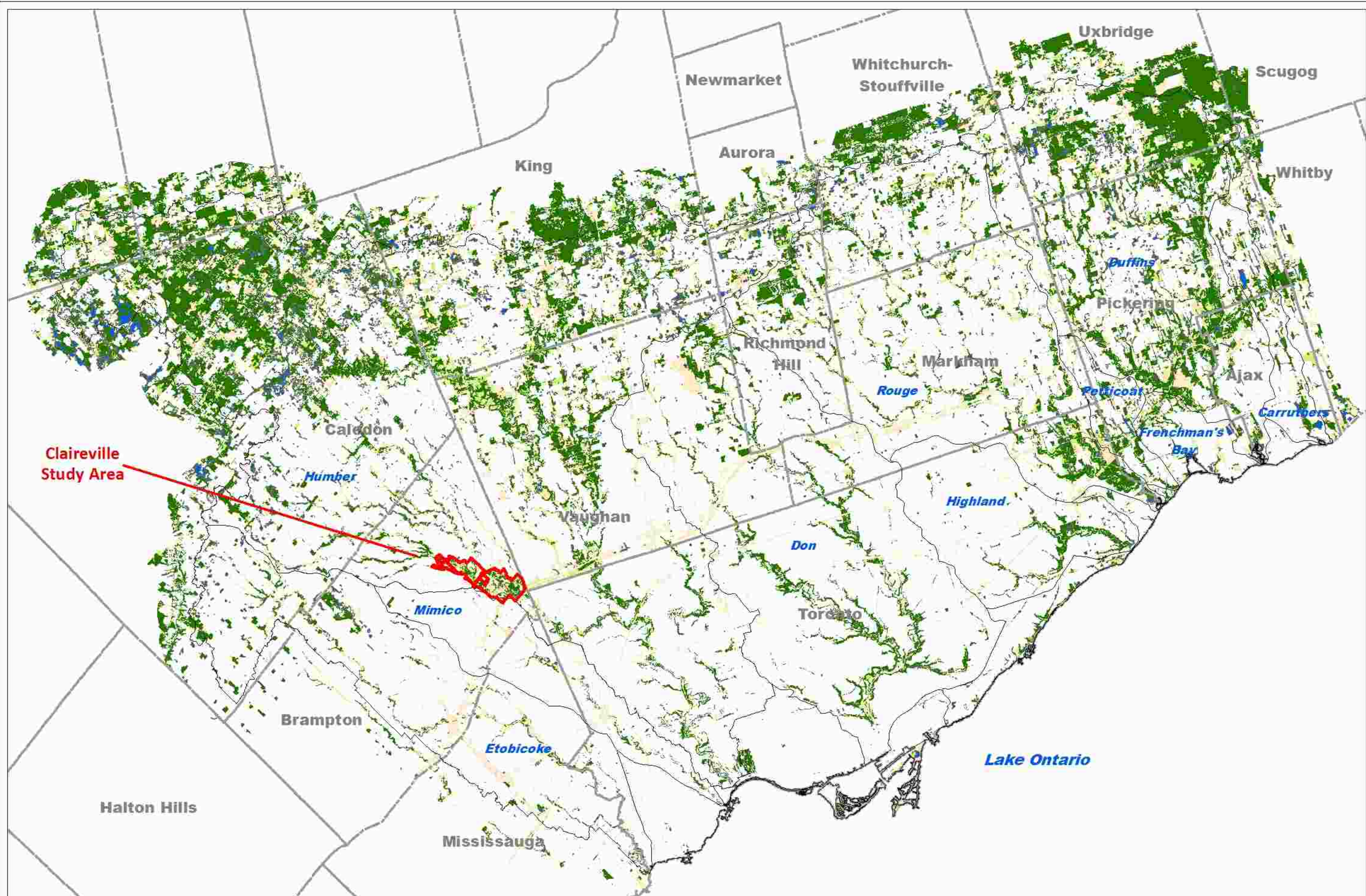
- a. Take a proactive management approach to invasive species control. Pre-assess areas targeted for restoration plantings or trail installation and remove existing exotic populations. This would include local removal of garlic mustard, dog-strangling vine, buckthorn, common reed, and other species that are found throughout the site. Particularly those that occur on or around old homestead areas.
- b. Since most of the invasive species at the site have large and/or diffuse populations, the best approach is to control disturbance that would aid their further spread rather than removal efforts. For example, discouraging dumping or encroachment through unauthorized plantings would reduce the disturbance that encourages exotics such as garlic mustard and urban avens to spread.

Finally, given the extreme significance of the western chorus frog populations at Claireville, it is recommended that a formal monitoring program, specific to these populations, be designed and implemented as soon as possible. This highly specific project would quickly identify the optimal habitats throughout the study area and enable management to better target any restoration or wetland creation work. The apparent decline observed in 2015, serves to emphasise the urgency of implementing such site-wide monitoring (over and above the regional monitoring conducted through the LTMP).

6.0 References

- Banks P.B. and Bryant J.V. 2007. *Four-legged friend or foe? Dog walking displaces native birds from natural areas*. Biology Letters (2007) 3. 611-613. Available on-line at: <http://rsbl.royalsocietypublishing.org/content/3/6/611.full.pdf> [Accessed 8 January 2010].
- Cadman M.D., Sutherland D.A., Beck G.G., Lepage D., and Couturier A.R. (eds). 2007. *Atlas of the Breeding Birds of Ontario, 2001 – 2005*. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706pp.
- Environment Canada. 2004. *How Much Habitat is Enough? A Framework for Guiding Habitat Rehabilitation in Great Lakes Areas of Concern (Second Edition)*.
- Environment Canada. 2014. *Recovery Strategy for the Western Chorus Frog (Pseudacris triseriata), Great Lakes / St. Lawrence – Canadian Shield Population, in Canada [Proposed]*, Species at Risk Act Recovery Strategy Series, Environment Canada, Ottawa, v + 46 pp
- Gutzwiller K.J. and Anderson S.H. 1999. *Spatial extent of human-intrusion effects on subalpine bird distributions*. Condor 101:378-389.
- Kilgour B. 2003. *Landscape and patch character as a determinant of occurrence of eighty selected bird species in the Toronto area*. A report prepared for the TRCA. Jacques-Whitford Ltd., 2003
- Lee H., Bakowsky W.D., Riley J., Bowles J., Puddister M., Uhlig P. and McMurray S. 1998. *Ecological land classification for southern Ontario: first approximation and its application*. Peterborough, Ontario: Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch.
- McCracken, J.D., R.A. Reid, R.B. Renfrew, B. Frei, J.V. Jalava, A. Cowie, and A.R. Couturier. 2013. Recovery Strategy for the Bobolink (*Dolichonyx oryzivorus*) and Eastern Meadowlark (*Sturnella magna*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. viii + 88 pp.
- NHIC [Ontario Natural Heritage Information Centre] 2008. Natural Heritage Information website. Available on-line at: http://nhic.mnr.gov.on.ca/nhic_.cfm [Accessed 14 February 2011].
- Rosenburg K.V., Rohrbaugh R.W. Jr., Barker S.E., Hames R.S. and Dhondt A.A. 1999. *A land manager's guide to improving habitat for scarlet tanagers and other forest-interior birds*. Ithaca, NY: The Cornell Lab of Ornithology.

- TRCA 2007a. *The Terrestrial Natural Heritage System Strategy*. Toronto Region Conservation Authority.
- TRCA 2007b. *Setting Terrestrial Natural Heritage System Targets*. Toronto Region Conservation Authority.
- TRCA 2007c. *Evaluating and Designing Terrestrial Natural Heritage Systems*. Toronto Region Conservation Authority.
- TRCA 2007d. *Terrestrial Natural Heritage Program Data Collection Methodology*. Toronto Region Conservation Authority.
- TRCA 2010. *Vegetation Community and Species Ranking and Scoring method*. Toronto Region Conservation Authority.
- Woeste, K.E., L. Farlee, M.E.; Ostry, J.R. McKenna, and S. Weeks. 2009. *A Forest Manager's Guide to Butternut*. *Northern Journal of Applied Forestry*. 26(1): 9-14.
- https://www.registrelep-sararegistry.gc.ca/default.asp?lang=En&n=7BC7FFC4-1#_07



Map 1:
Claireville Study Area in the
Context of Regional Natural Cover

Natural Cover *

-  Forest
-  Successional
-  Meadow
-  Wetland
-  Beach/Bluff

Legend

-  Study Area Boundary
-  TRCA Jurisdiction
-  Watershed
-  Municipal Boundary



0 250 500 1,000 1,500
Meters

Date: December 2015
Orthophoto: Spring 2014, First Base Solutions

Map 2: Claireville Study Area (Block A, B, C)

Legend

 Study Area Boundary



0 125 250 500 750
Meters

Date: December 2015
Orthophoto: Spring 2014, First Base Solutions

Map 2a: Claireville Study Area (Block A and B)

Legend

 Study Area Boundary



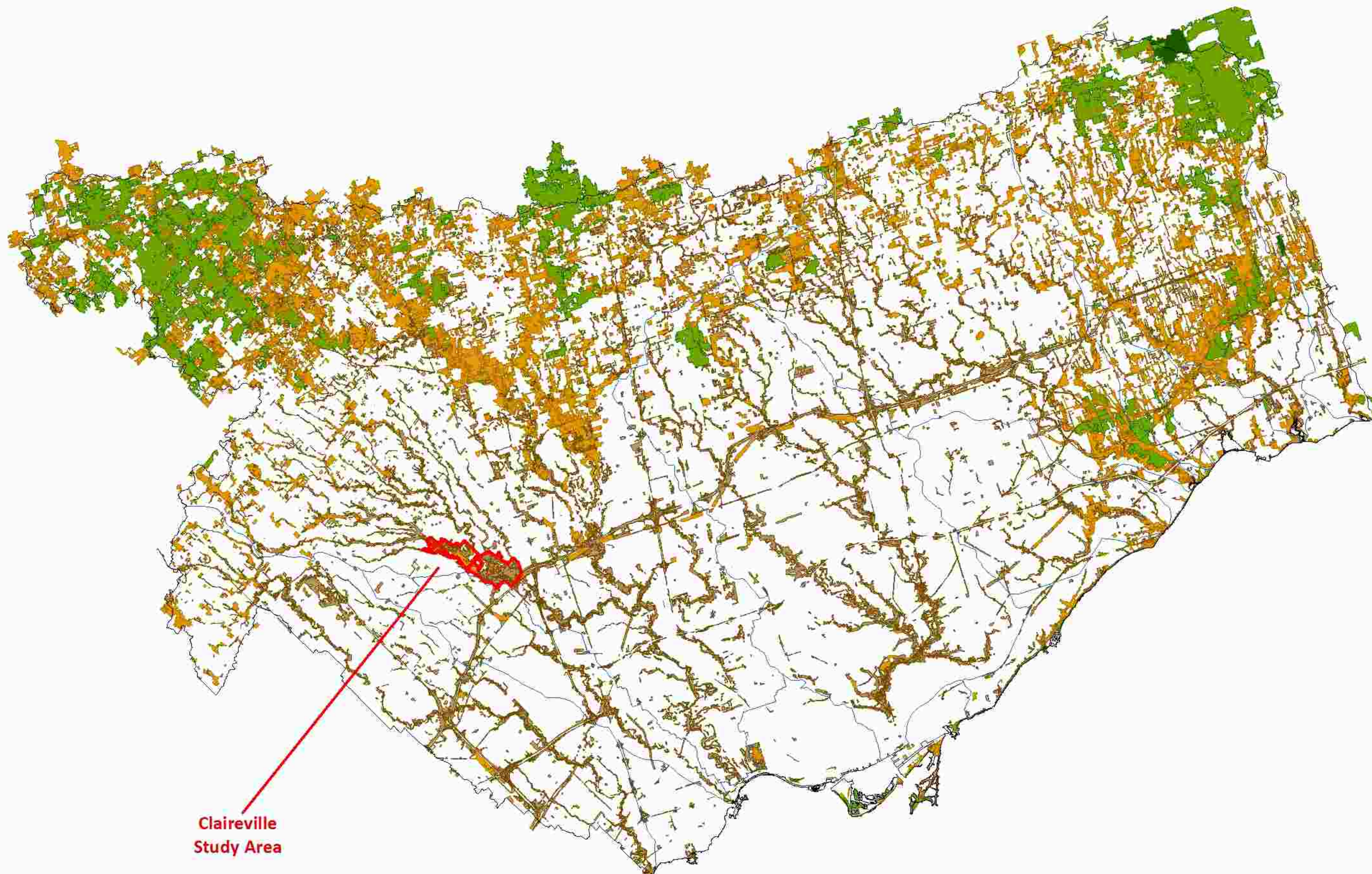
0 125 250 500 750 Meters

Date: December 2015
Orthophoto: Spring 2014, First Base Solutions

Map 2b: Claireville Study Area (Block C)

Legend

 Study Area Boundary



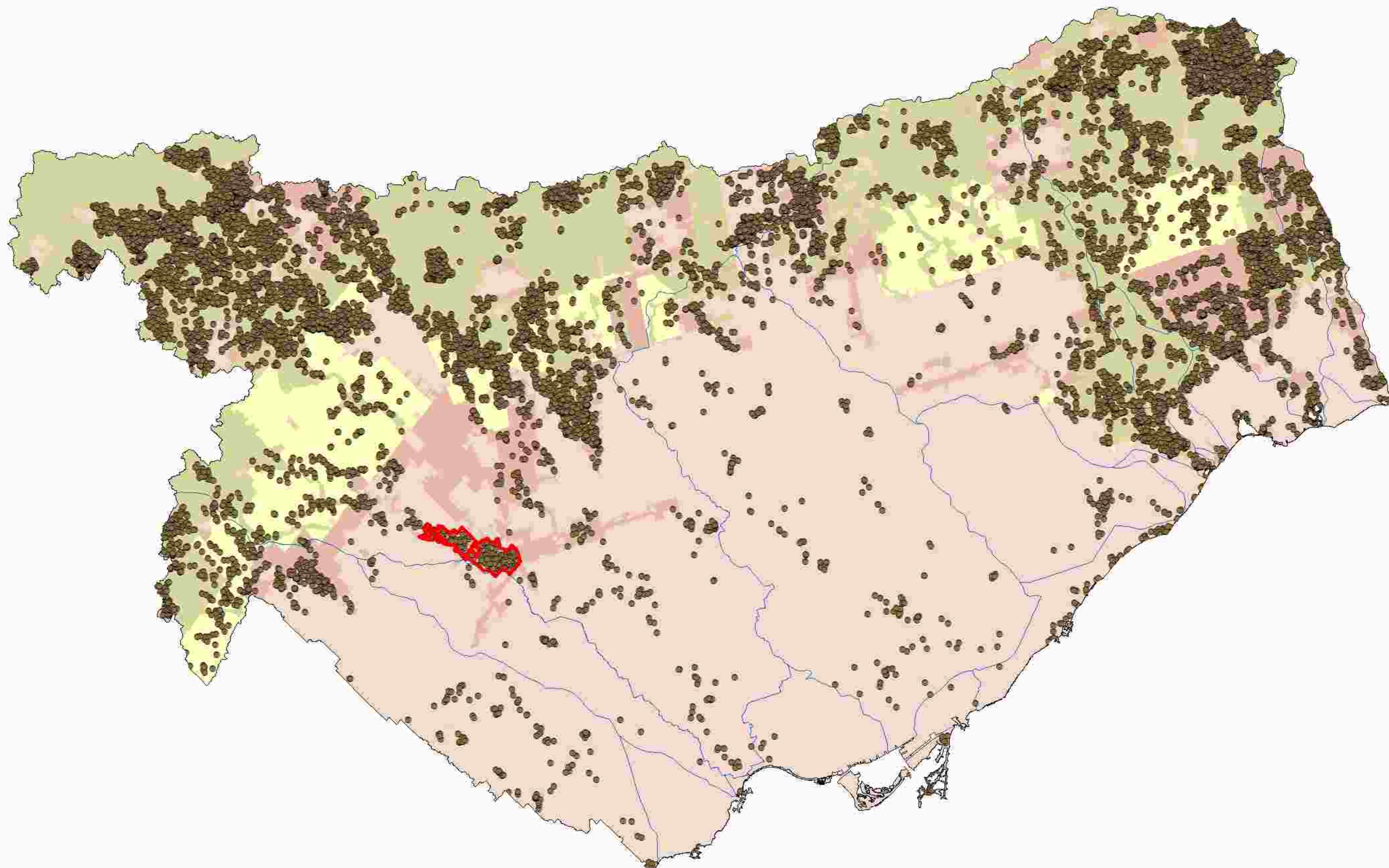
Map 3: Regional Natural System Habitat Patch Quality

Habitat Patch Quality *

-  L1 - Excellent
-  L2 - Good
-  L3 - Fair
-  L4 - Poor
-  L5 - Very Poor

Legend

-  Claireville Study Area Boundary
-  TRCA Jurisdiction
-  Watershed



Toronto and Region
Conservation
for The Living City®



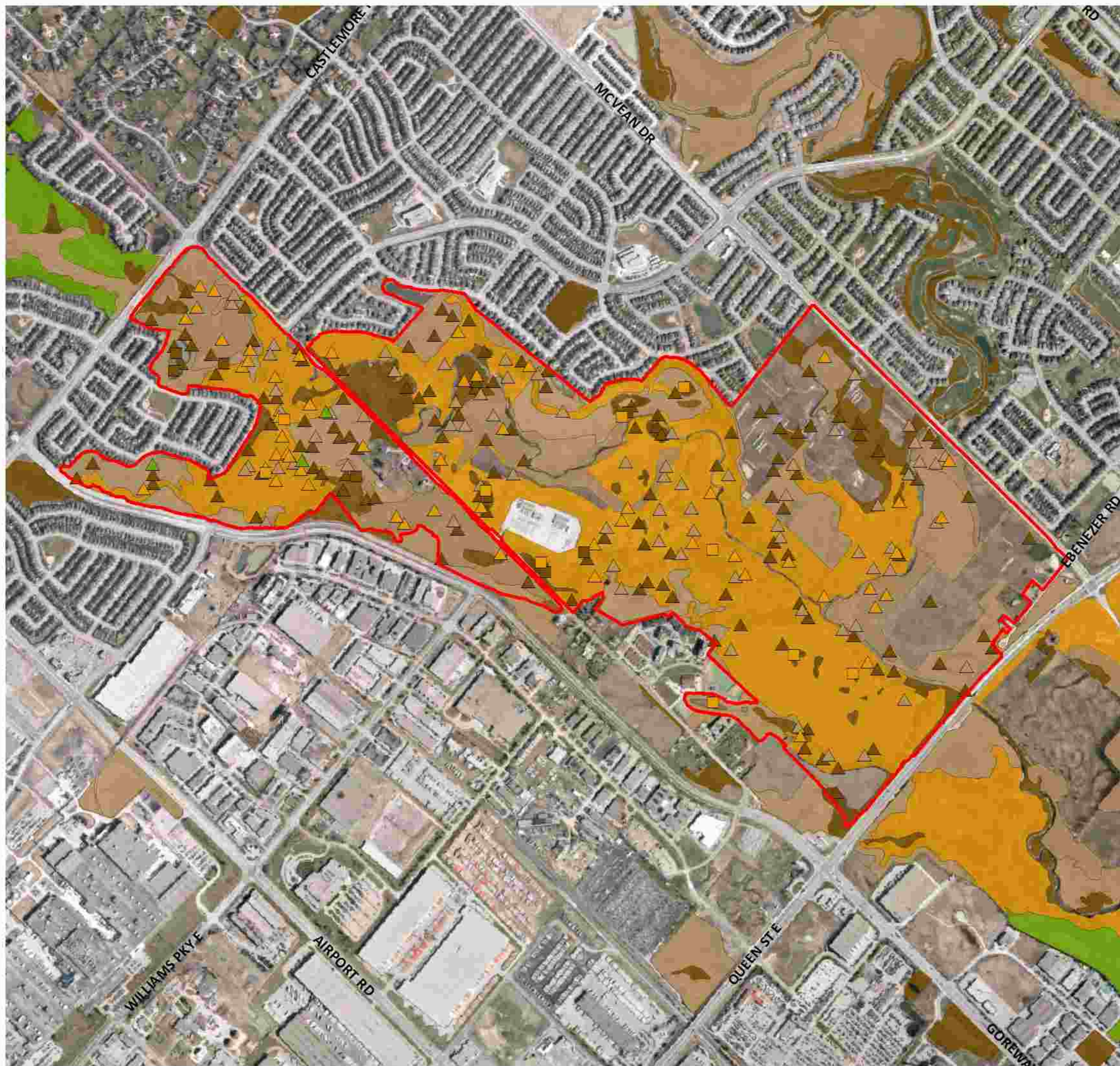
0 2.5 5 10 15 20 Kilometers

Date: December 2015

Map 4:
Distribution of Fauna
Regional Species of Concern

Legend

- Fauna Species of Concern (L1 - L3)
- Claireville Study Area Boundary
- TRCA Jurisdiction
- Watershed
- Agricultural & Rural Area
- Built-up Area
- Designated Greenfield Area
- Greenbelt Area



Fauna Area Sensitivity Scores

- ▲ 5 - >100ha
- ▲ 4 - >20ha
- ▲ 3 - > 5ha
- ▲ 2 - > 1ha
- ▲ 1 - < 1ha

△ Fauna Species

□ Frog Species

□ Claireville Study Area Boundary

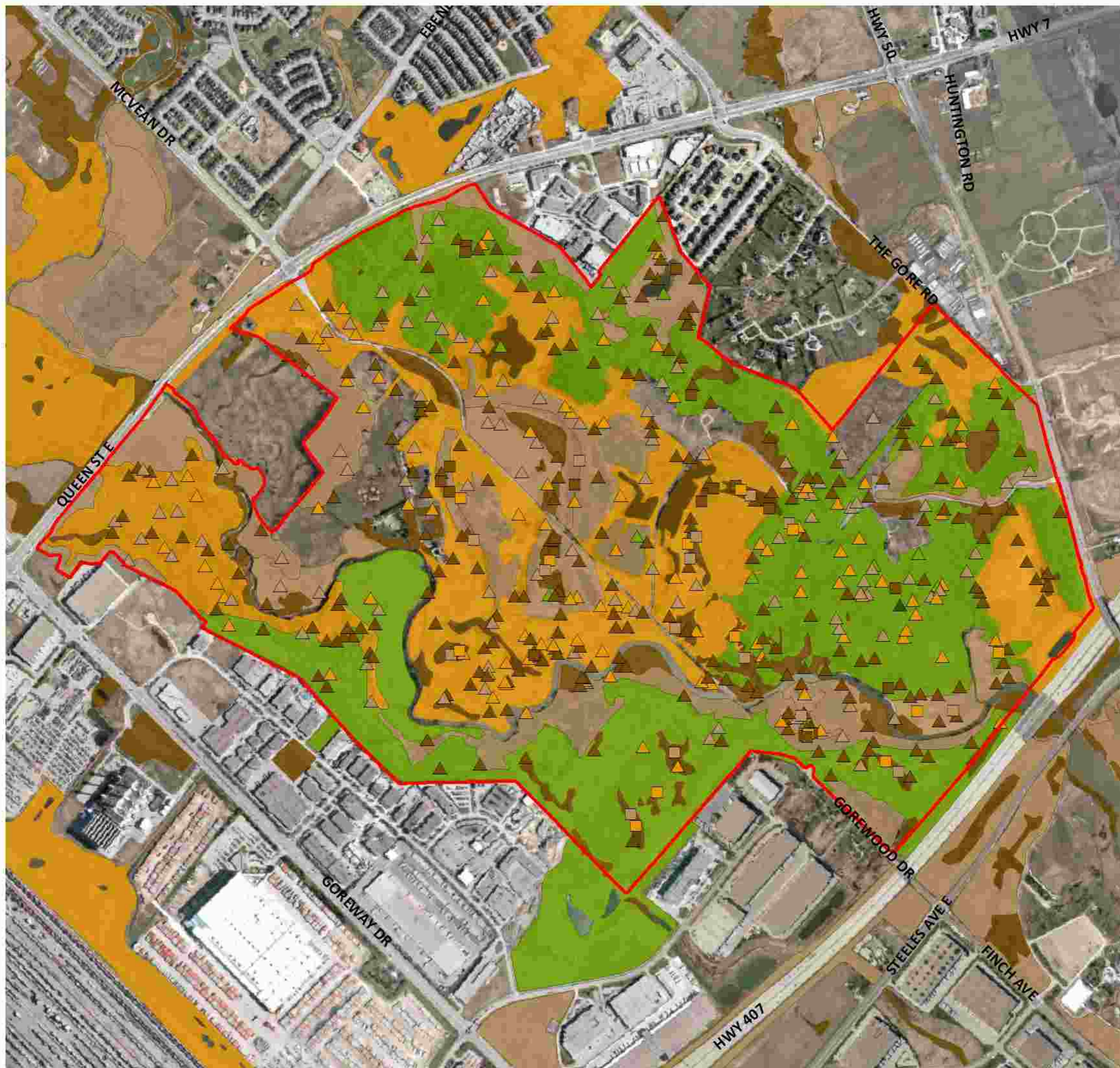
Habitat Patch Size Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor



Map 5a: Habitat Patch Size Scores with Fauna Area Sensitivity Scores (Block A and B)

NOTE: All fauna species with their associated scores for area sensitivity can be found in Appendix #3.



Fauna Area Sensitivity Scores

- ▲ 5 - >100ha
- ▲ 4 - >20ha
- ▲ 3 - > 5ha
- ▲ 2 - > 1ha
- ▲ 1 - < 1ha

△ Fauna Species

□ Frog Species

□ Claireville Study Area Boundary

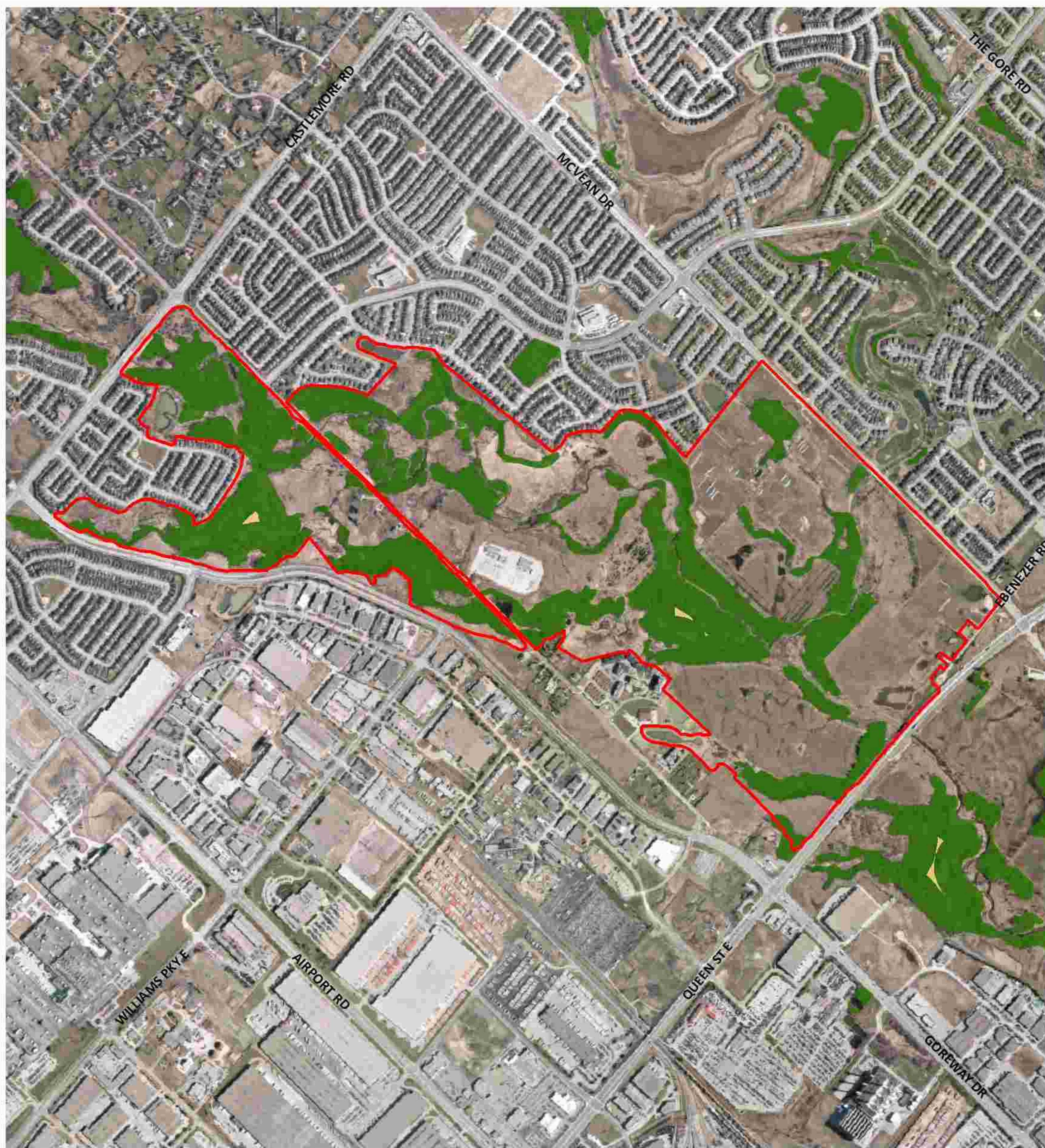
Habitat Patch Size Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor



Map 5b: Habitat Patch Size Scores with Fauna Area Sensitivity Scores (Block C)

NOTE: All fauna species with their associated scores for area sensitivity can be found in Appendix #3.



Map 6a: Interior Forest at Claireville Study Area (Block A and B)

Legend

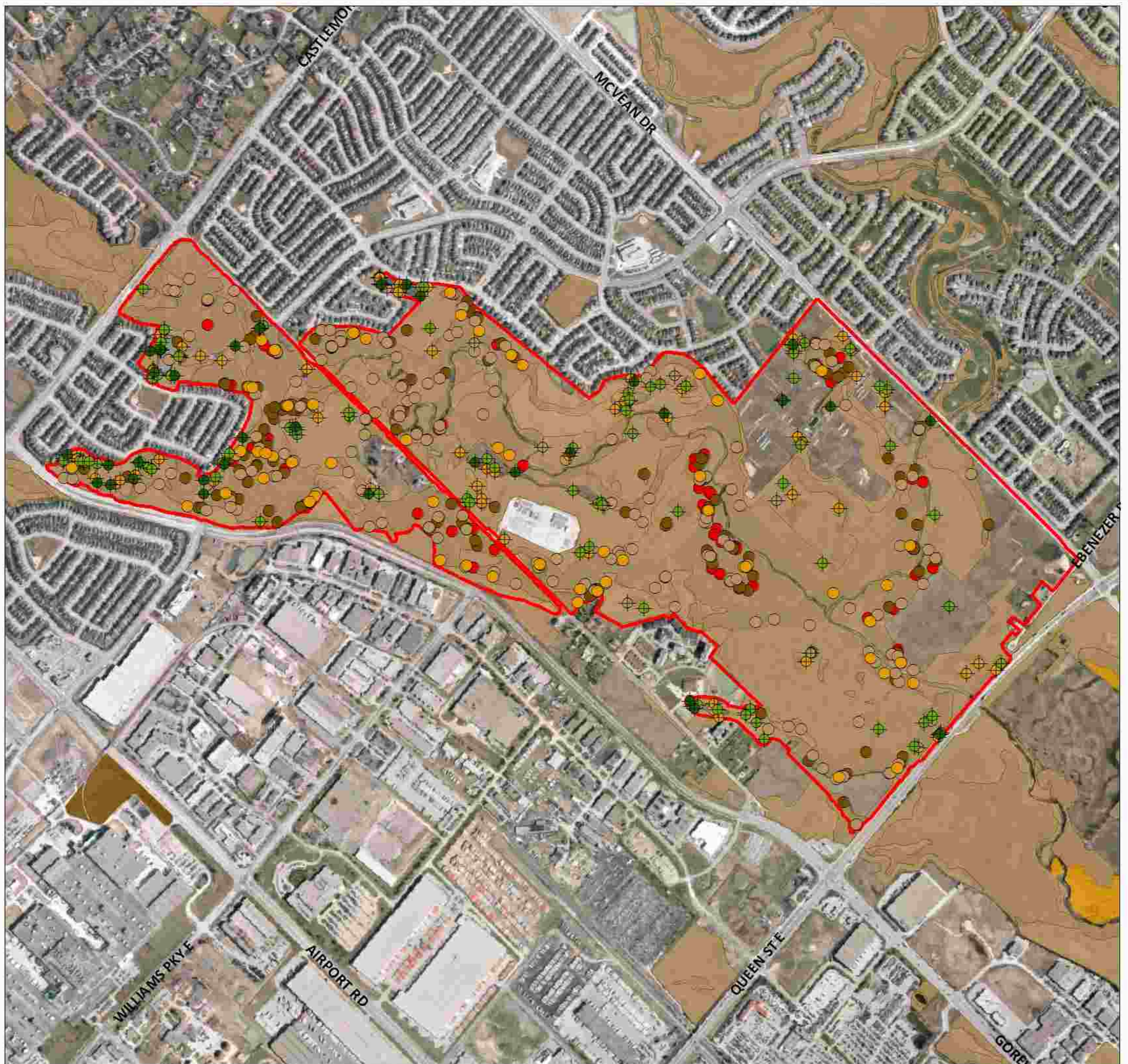
-  Study Area Boundary
-  Forest
- Forest Interior
 -  100m-200m



Map 6b: Interior Forest at Claireville Study Area (Block C)

Legend

- Study Area Boundary
- Forest
- Forest Interior
- 100m-200m



Flora Sensitivity to Development Scores

- 5 - Species receives severe negative impact from development-related disturbances
- 4 - Species receives moderately severe negative impact from development-related disturbances
- 3 - Species receives significant negative impact from development-related disturbances
- 2 - Species receives slight negative impact from development-related disturbances
- 1 - Species experiences no overall benefit or detriment from development-related disturbances (neutral)
- 0 - Species benefits significantly from development-related disturbances

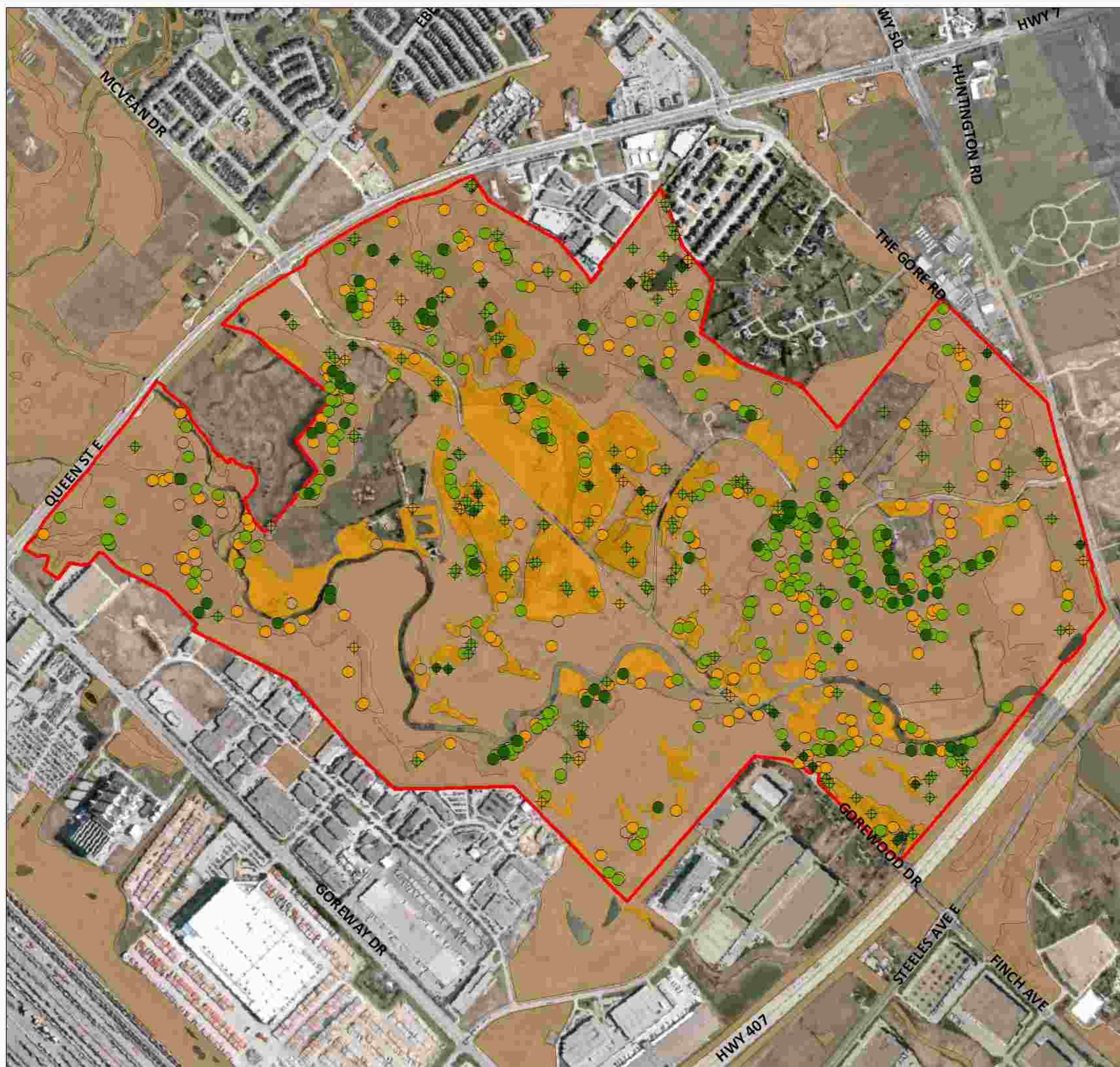
Habitat Matrix Influence Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor
- Flora Species
- ⊕ Planted Flora Species
- Claireville Study Area Boundary



Map 7a: Scores for Matrix Influence and Flora Sensitivity to Development (Block A and B)

NOTE: All flora species
with their associated scores
for sensitivity to development
can be found in Appendix #2.



Flora Sensitivity to Development Scores

- 5 - Species receives severe negative impact from development-related disturbances
- 4 - Species receives moderately severe negative impact from development-related disturbances
- 3 - Species receives significant negative impact from development-related disturbances
- 2 - Species receives slight negative impact from development-related disturbances
- 1 - Species experiences no overall benefit or detriment from development-related disturbances (neutral)
- 0 - Species benefits significantly from development-related disturbances

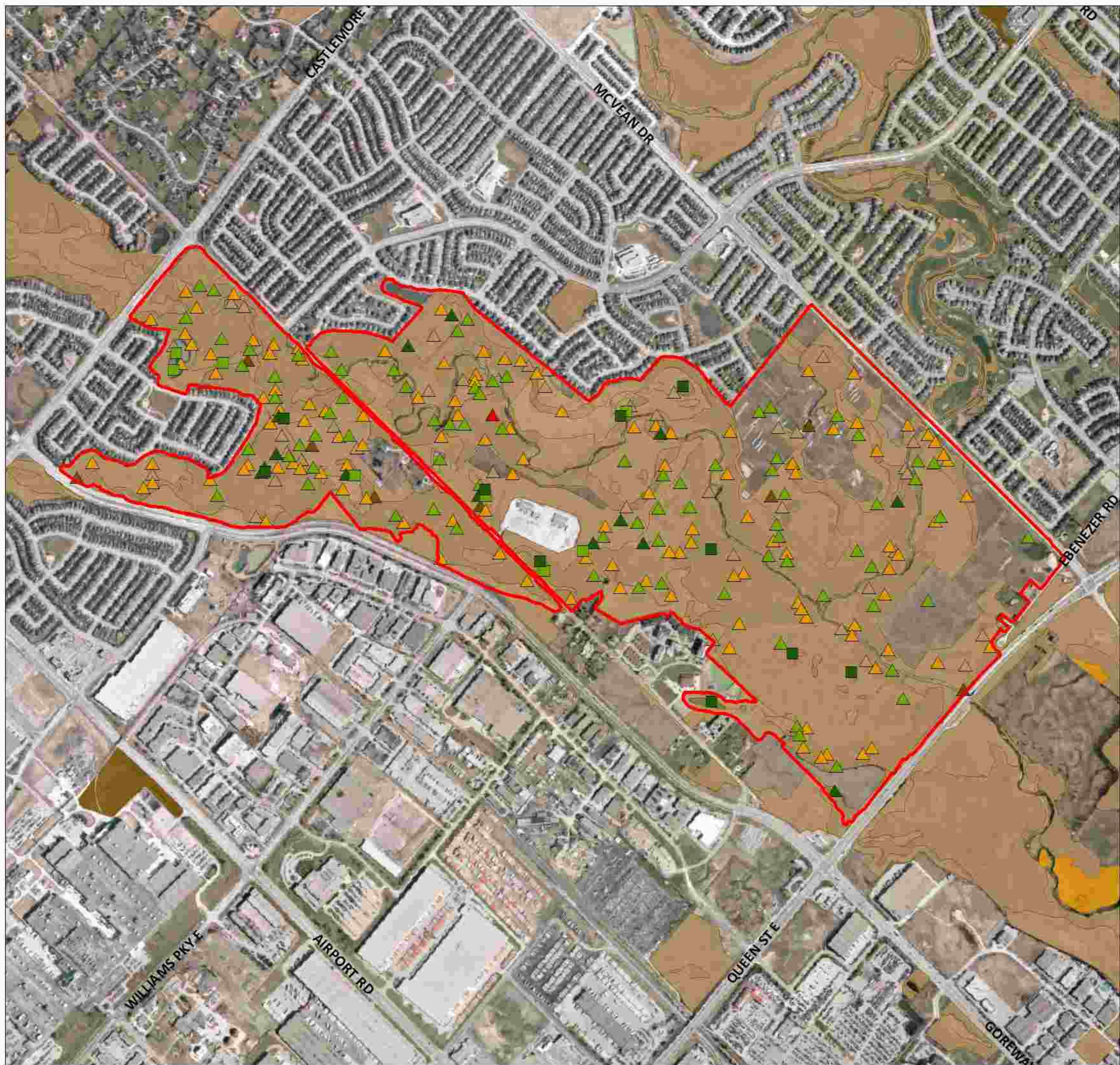
Habitat Matrix Influence Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor
- Flora Species
- ⊕ Planted Flora Species
- Claireville Study Area Boundary



Map 7b: Scores for Matrix Influence and Flora Sensitivity to Development (Block C)

NOTE: All flora species
with their associated scores
for sensitivity to development
can be found in Appendix #2.



Fauna Sensitivity to Development Scores

- ▲ 5 - Species receives severe negative impact from development-related disturbances
- ▲ 4 - Species receives moderately severe negative impact from development-related disturbances
- ▲ 3 - Species receives significant negative impact from development-related disturbances
- ▲ 2 - Species receives slight negative impact from development-related disturbances
- ▲ 1 - Species experiences no overall benefit or detriment from development-related disturbances (neutral)
- ▲ 0 - Species benefits significantly from development-related disturbances

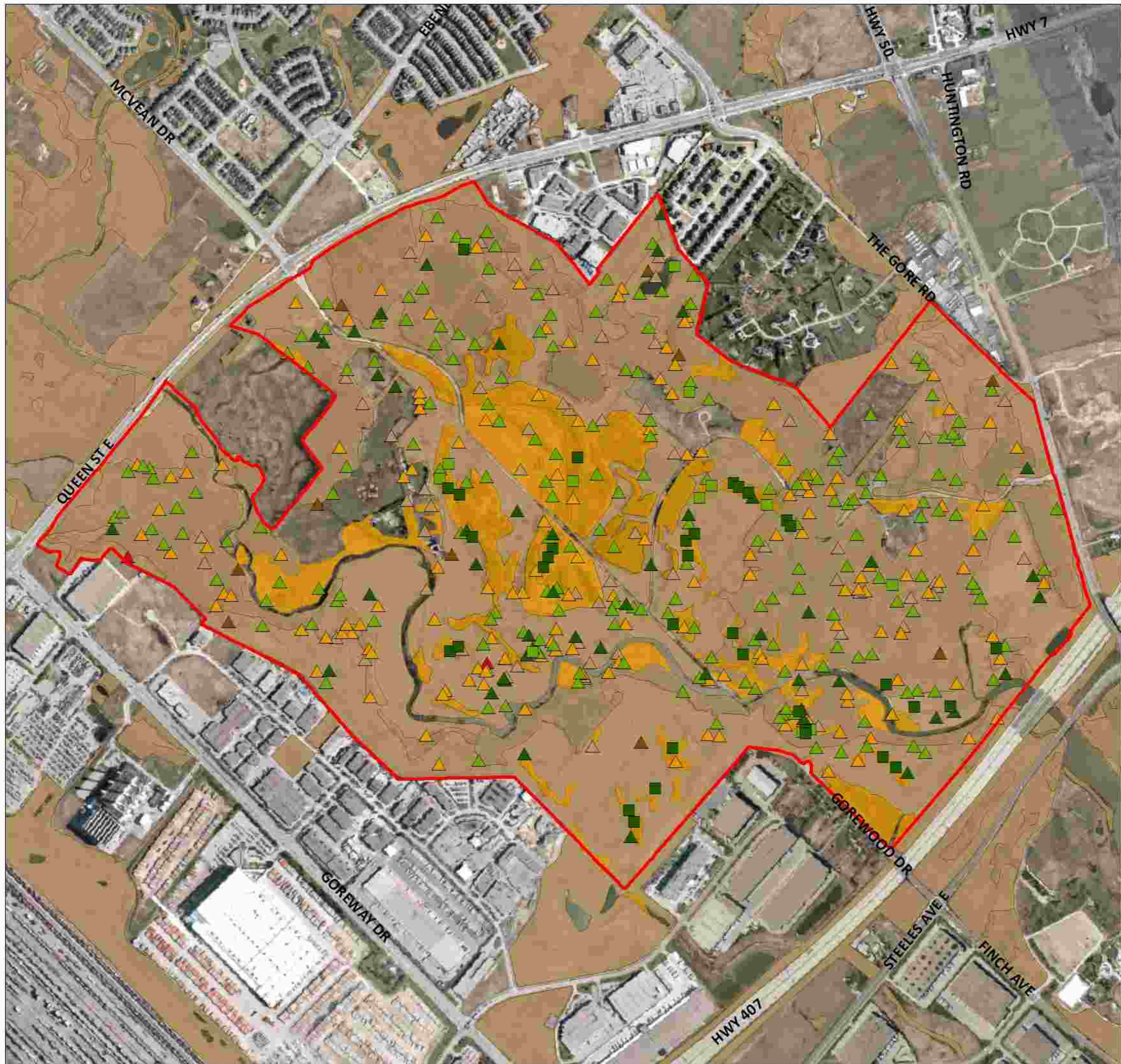
Habitat Matrix Influence Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor
- △ Fauna Species
- Frog Species
- Claireville Study Area Boundary



Map 8a: Scores for Matrix Influence and Fauna Sensitivity to Development (Block A and B)

NOTE: All fauna species with their associated scores for sensitivity to development can be found in Appendix #3.



Fauna Sensitivity to Development Scores

- ▲ 5 - Species receives severe negative impact from development-related disturbances
- ▲ 4 - Species receives moderately severe negative impact from development-related disturbances
- ▲ 3 - Species receives significant negative impact from development-related disturbances
- ▲ 2 - Species receives slight negative impact from development-related disturbances
- ▲ 1 - Species experiences no overall benefit or detriment from development-related disturbances (neutral)
- ▲ 0 - Species benefits significantly from development-related disturbances

Habitat Matrix Influence Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor
- △ Fauna Species
- Frog Species
- Claireville Study Area Boundary



0 125 250 500 750 Meters

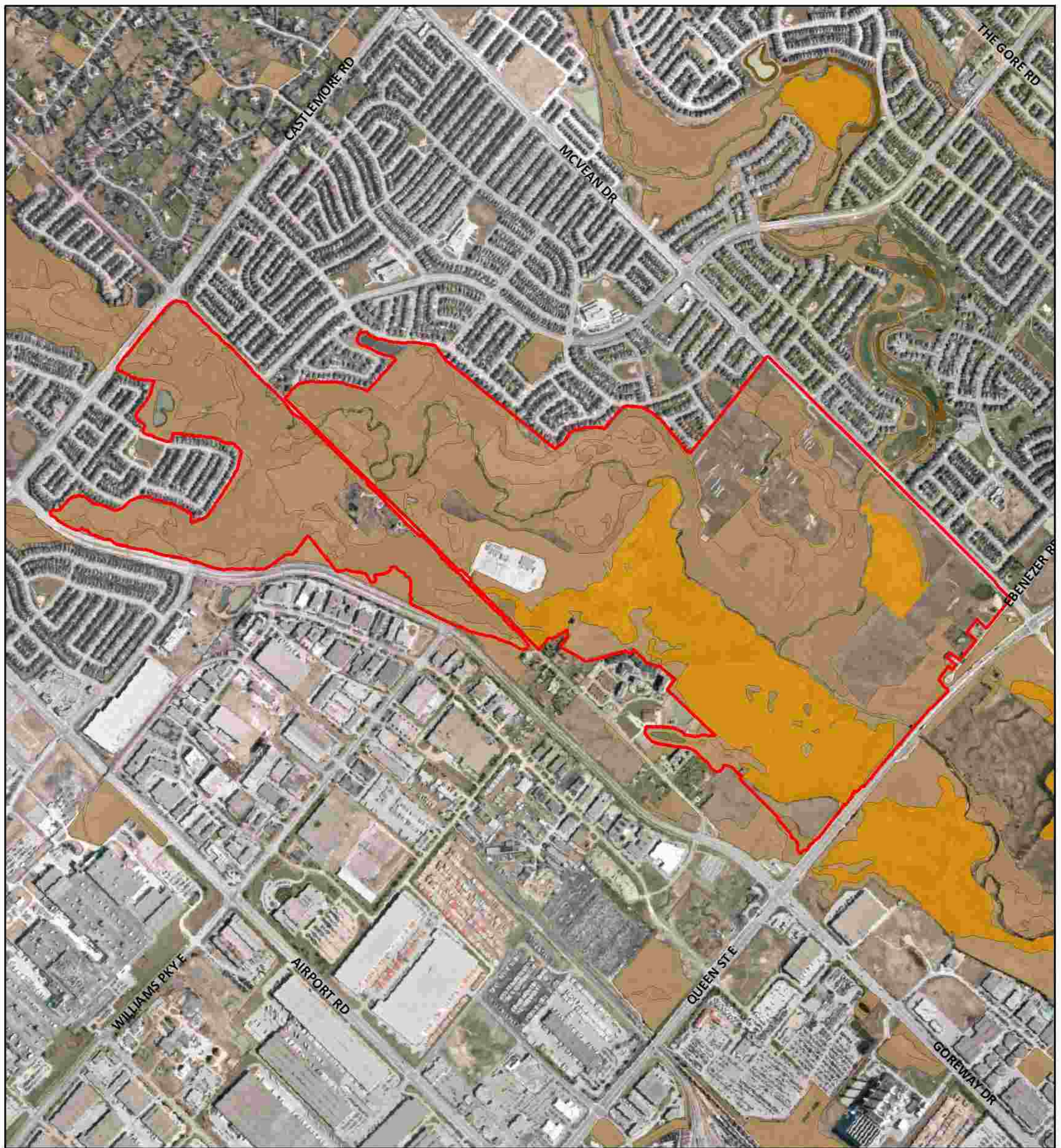
Date: December 2015

Orthophoto: Spring 2014, First Base Solutions

* Landscape analysis based on 2013 Orthophotography

Map 8b: Scores for Matrix Influence and Fauna Sensitivity to Development (Block C)

NOTE: All fauna species with their associated scores for sensitivity to development can be found in Appendix #3.



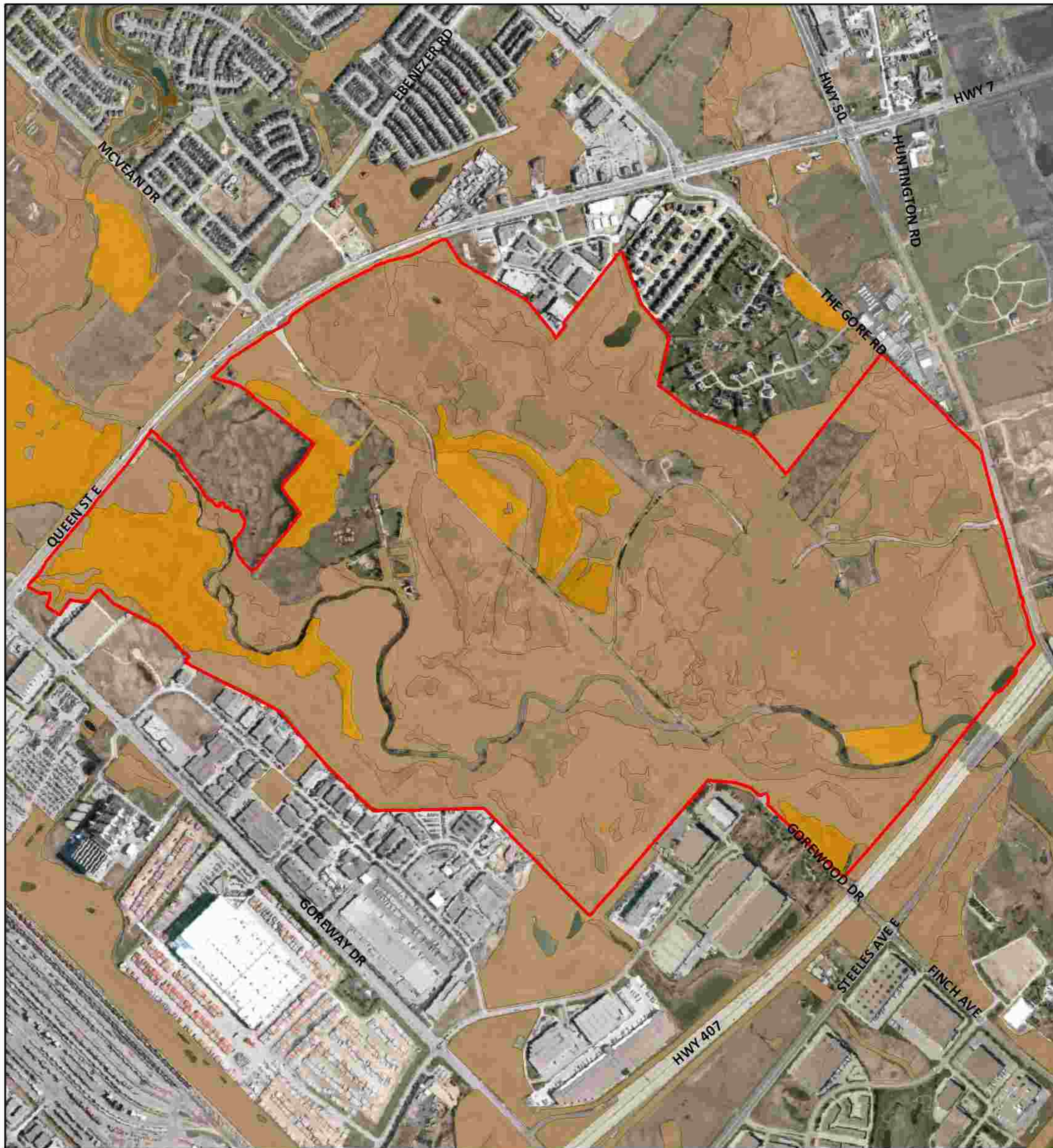
Map 9a: Habitat Patch Quality (Block A and B)

Legend

Habitat Patch Quality *

-  L1 - Excellent
-  L2 - Good
-  L3 - Fair
-  L4 - Poor
-  L5 - Very Poor

 Claireville Study Area Boundary



Toronto and Region
Conservation
for The Living City®



0 125 250 500 750
Meters

Date: December 2015

Orthophoto: Spring 2014, First Base Solutions

* Landscape analysis based on 2013 Orthophotography

Map 9b: Habitat Patch Quality (Block C)

Legend

Habitat Patch Quality *

- L1 - Excellent
- L2 - Good
- L3 - Fair
- L4 - Poor
- L5 - Very Poor

Claireville Study Area Boundary



Toronto and Region
Conservation
for The Living City™



0 125 250 500 750 1,000 Meters

Date: December 2015
Orthophoto: Spring 2014, First Base Solutions

Map 10a: Vegetation Communities with their Associated Local Ranks (Block A and B)

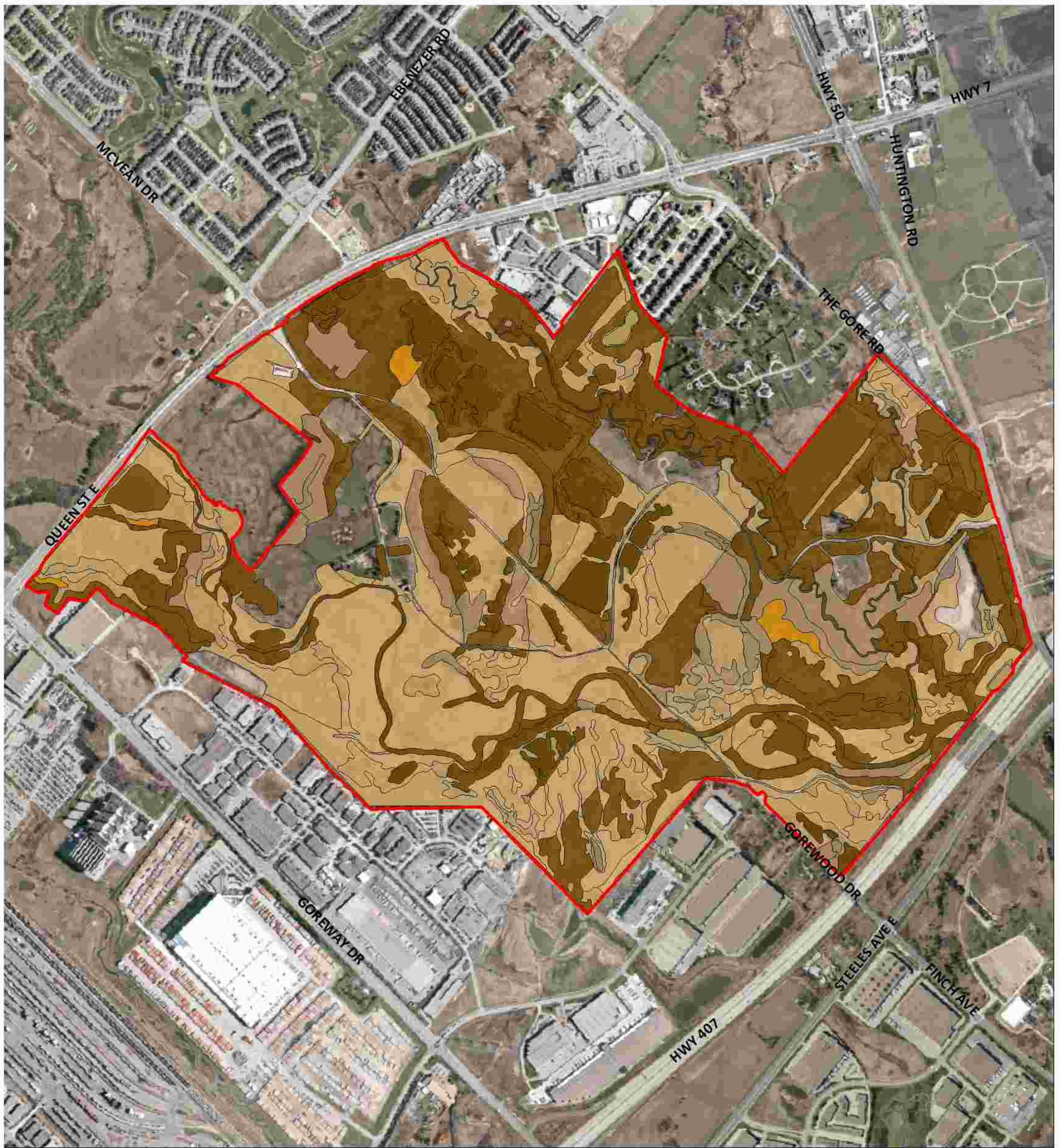
Legend

Vegetation Community Ranks

	L1		L4
	L2		L5
	L3		L+

Claireville Study Area Boundary

NOTE: All vegetation communities with their associated scores and ranks can be found in Appendix #1.



0 125 250 500 750 Meters

Date: December 2015
Orthophoto: Spring 2014, First Base Solutions

Map 10b: Vegetation Communities with their Associated Local Ranks (Block C)

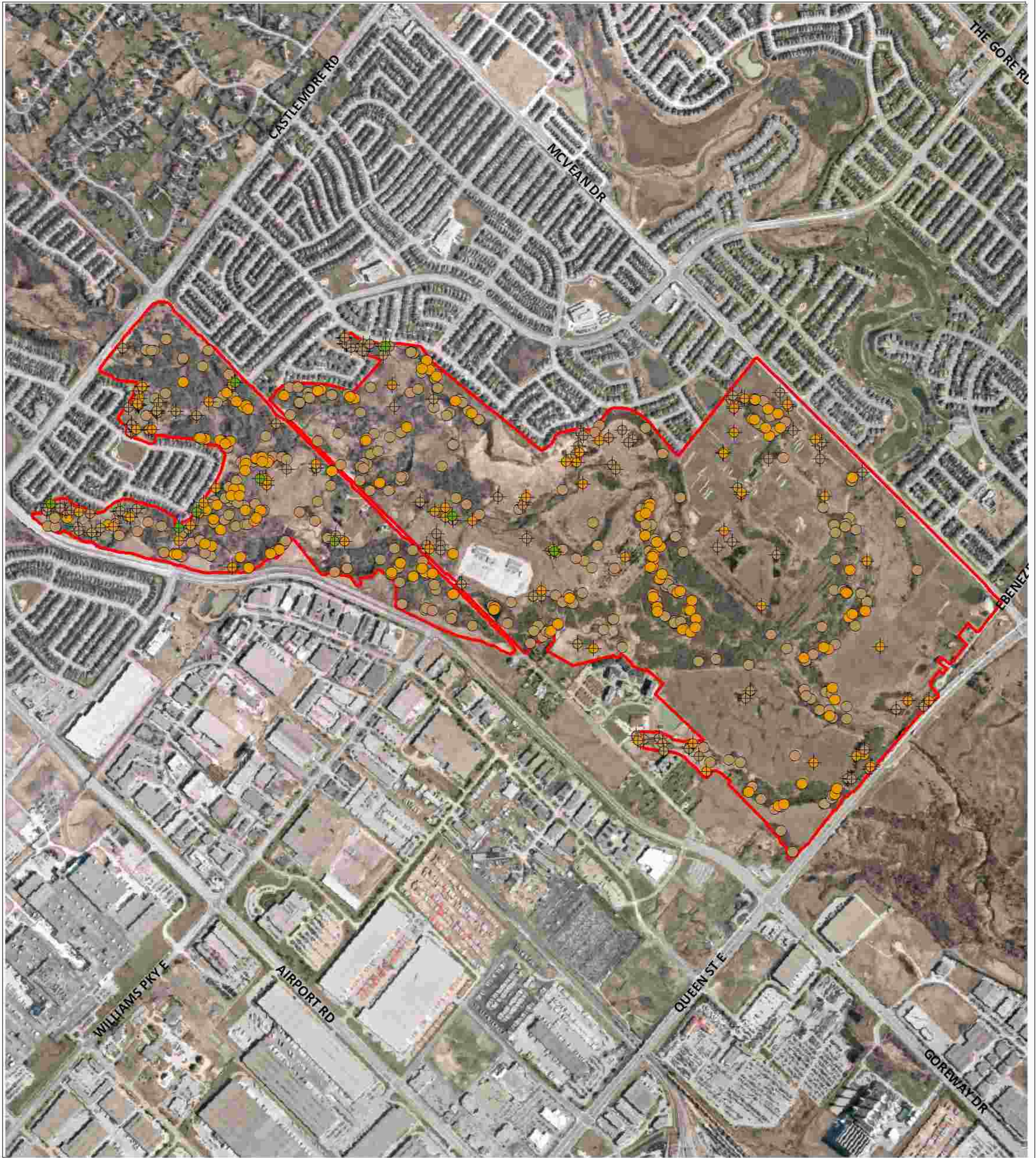
Legend

Vegetation Community Ranks

	L1		L4
	L2		L5
	L3		L+

Claireville Study Area Boundary

NOTE: All vegetation communities with their associated scores and ranks can be found in Appendix #1.



Map 11a: Location of Flora Species of Concern (Block A and B)

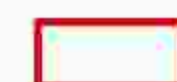
Legend

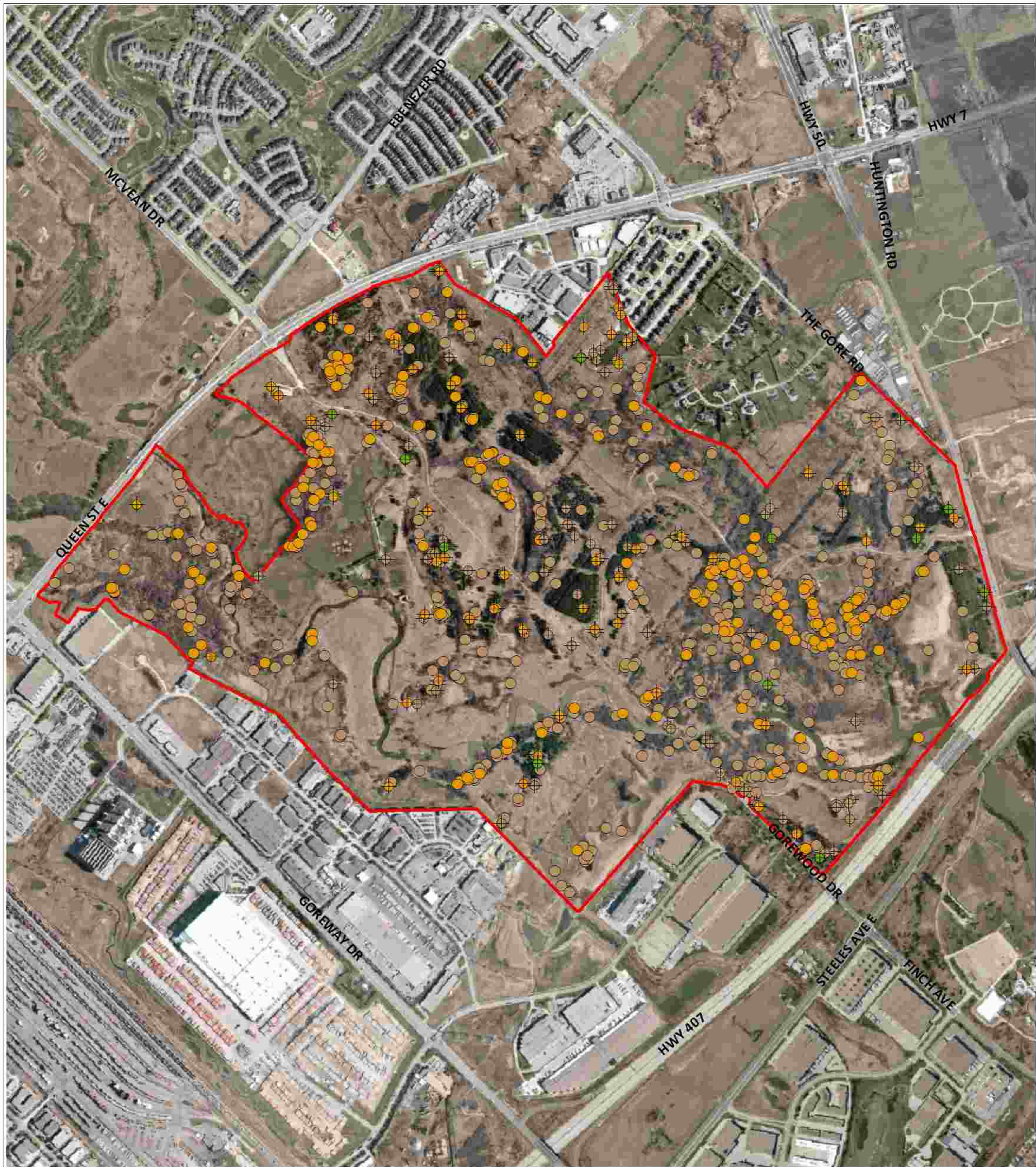
Flora Species of
Concern (L1-L4)

L1 L3
 L2 L4

Planted Flora Species
of Concern (L1-L4)

L1 L3
 L2 L4

 Claireville Study Area Boundary



Map 11b: Location of Flora Species of Concern (Block C)

Legend

Flora Species of
Concern (L1-L4)

L1 L2
 L3 L4

Planted Flora Species
of Concern (L1-L4)

L1 L2
 L3 L4

 Claireville Study Area Boundary



Flora Habitat Dependence Scores

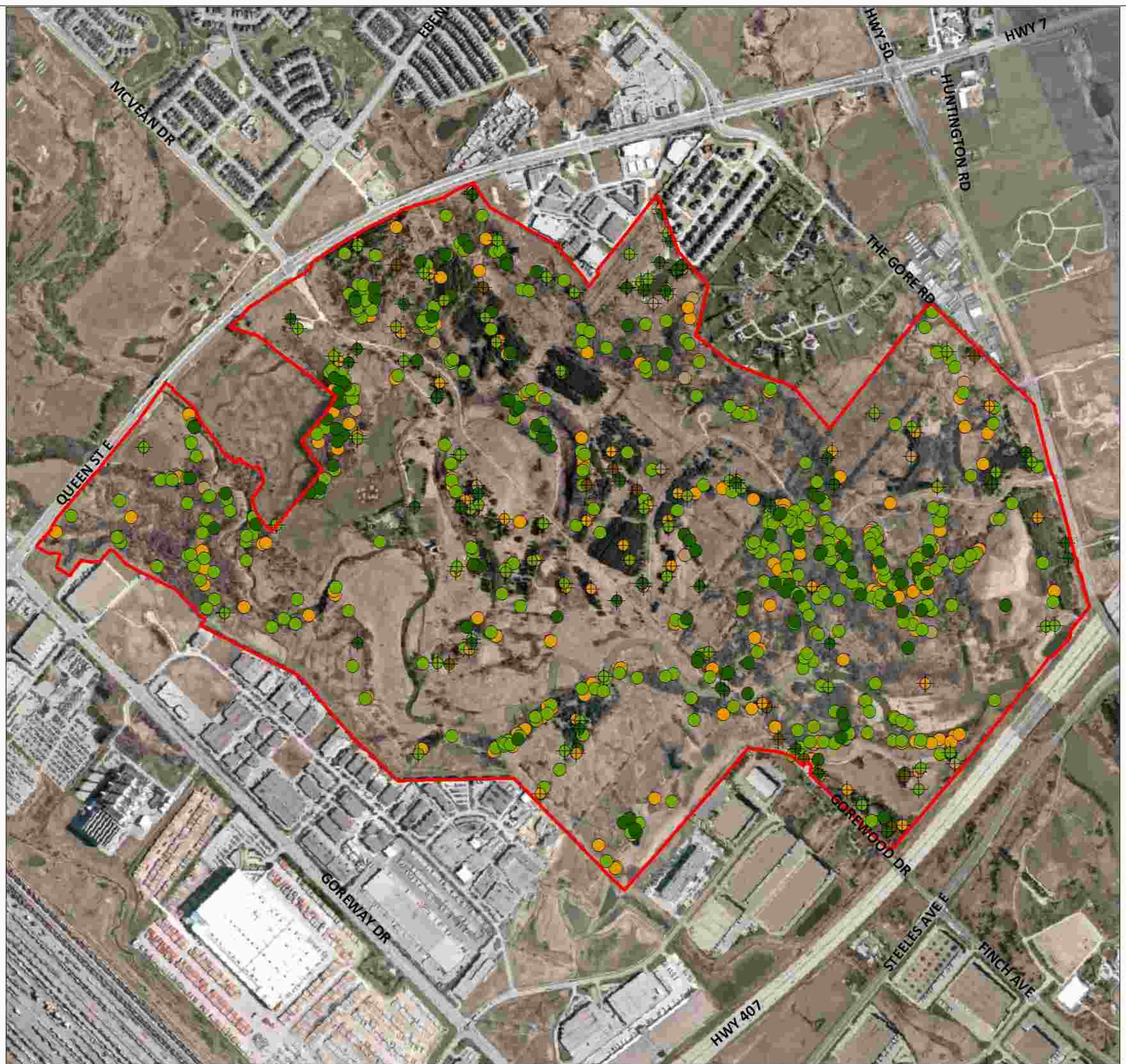
- 5 - Extreme habitat specialist
- 4 - Strong habitat specialist
- 3 - Moderate habitat specialist
- 2 - Moderate habitat generalist
- 1 - Strong habitat generalist
- 0 - Extreme habitat generalist

- Flora Species
- ⊕ Planted Flora Species
- Claireville Study Area Boundary



Map 12a: Flora Species Habitat Dependence Scores (Block A and B)

NOTE: All flora species
 with their associated scores
 for habitat dependence can
 be found in Appendix #2.



Flora Habitat Dependence Scores

- 5 - Extreme habitat specialist
- 4 - Strong habitat specialist
- 3 - Moderate habitat specialist
- 2 - Moderate habitat generalist
- 1 - Strong habitat generalist
- 0 - Extreme habitat generalist

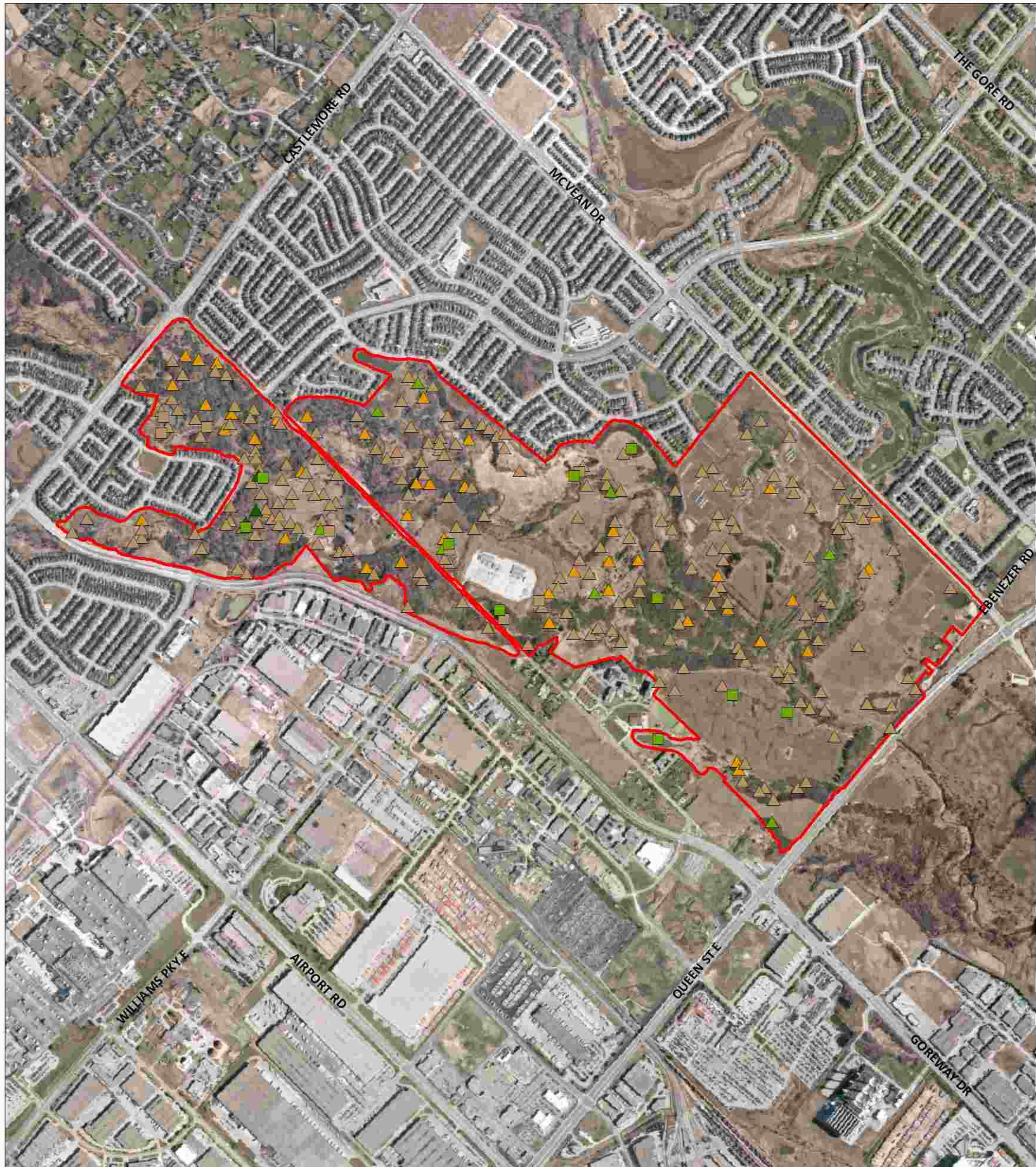
- Flora Species
- ⊕ Planted Flora Species

Claireville Study Area Boundary



Map 12b: Flora Species Habitat Dependence Scores (Block C)

NOTE: All flora species with their associated scores for habitat dependence can be found in Appendix #2.



Map 13a: Locations of Fauna Species of Concern (Block A and B)

Legend

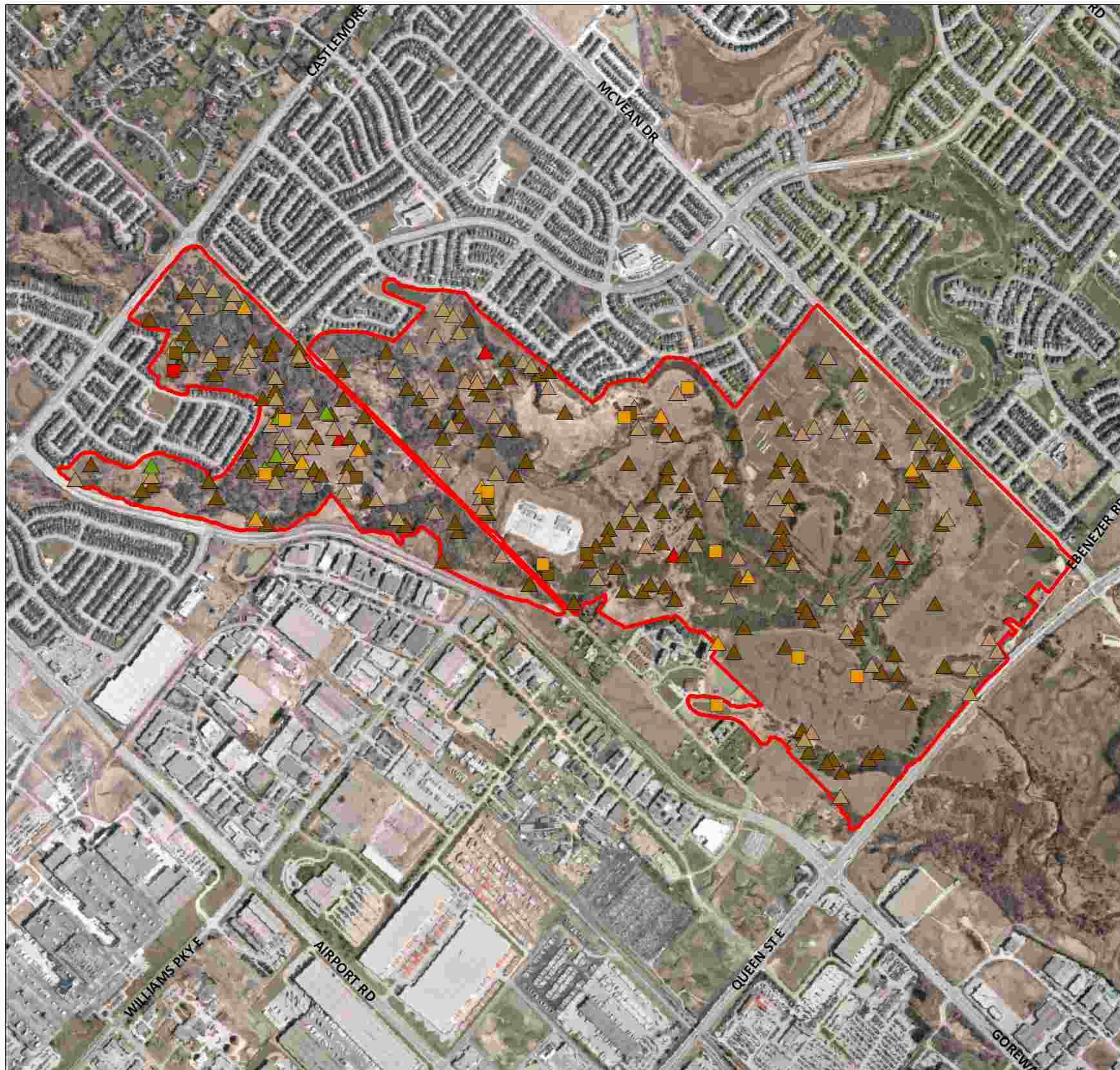
Fauna Species of Concern				Frog Species of Concern			
	L1		L3		L1		L3
	L2		L4		L2		L4
				Claireville Study Area Boundary			



Map 13b: Locations of Fauna Species of Concern (Block C)

Legend

Fauna Species of Concern				Frog Species of Concern			
	L1		L3		L1		L3
	L2		L4		L2		L4
				Claireville Study Area Boundary			



Fauna Habitat Dependence Scores

- ▲ 5 - Extreme habitat specialist
- ▲ 4 - Strong habitat specialist
- ▲ 3 - Moderate habitat specialist
- ▲ 2 - Moderate habitat generalist
- ▲ 1 - Strong habitat generalist
- ▲ 0 - Extreme habitat generalist

△ Fauna Species

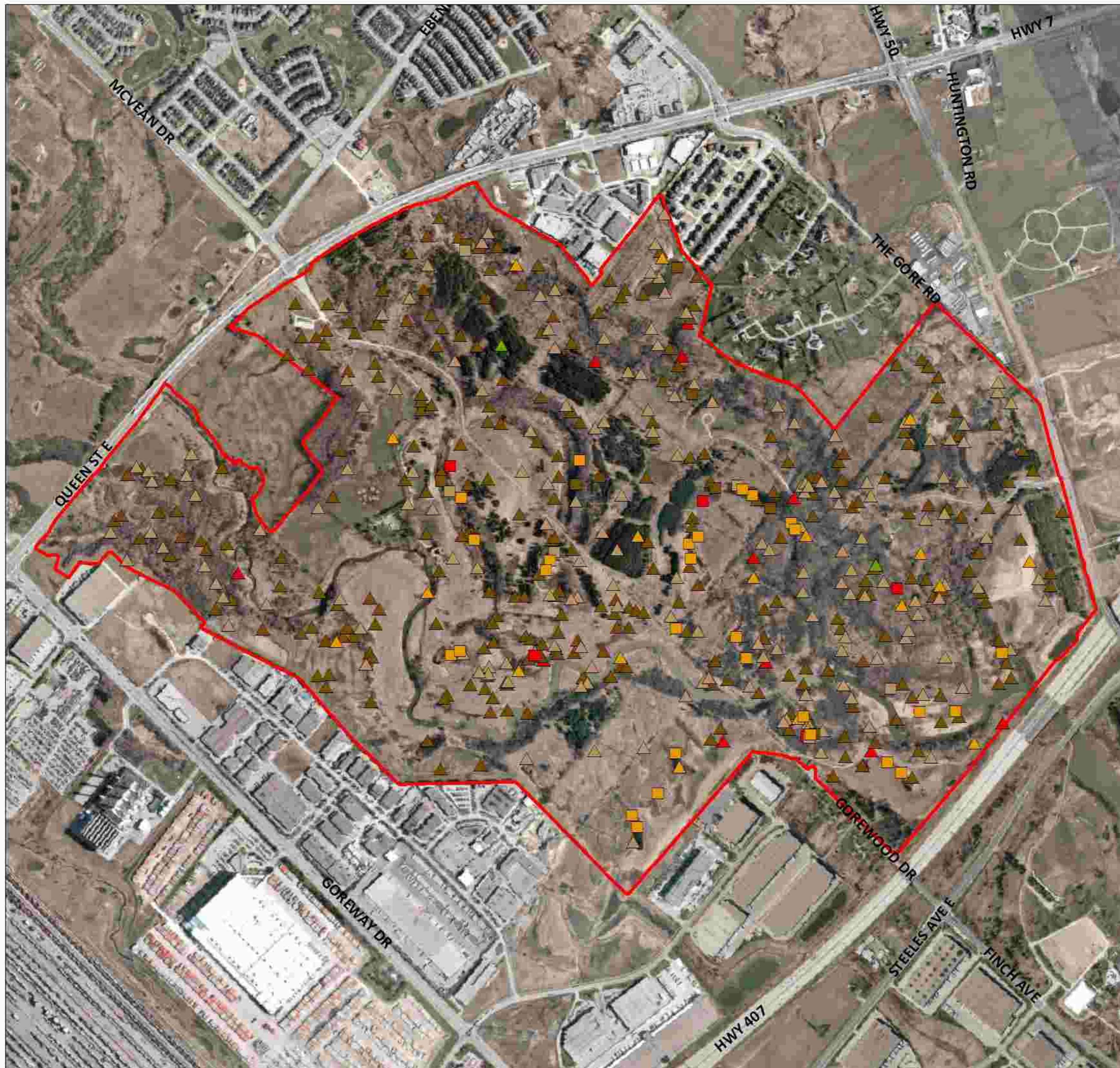
□ Frog Species

□ Claireville Study Area Boundary



Map 14a: Fauna Species Habitat Dependence Scores (Block A and B)

NOTE: All fauna species with their associated scores for habitat dependence can be found in Appendix #3.



Fauna Habitat Dependence Scores

- ▲ 5 - Extreme habitat specialist
- ▲ 4 - Strong habitat specialist
- ▲ 3 - Moderate habitat specialist
- ▲ 2 - Moderate habitat generalist
- ▲ 1 - Strong habitat generalist
- ▲ 0 - Extreme habitat generalist

△ Fauna Species

□ Frog Species

□ Claireville Study Area Boundary



Map 14b: Fauna Species Habitat Dependence Scores (Block C)

NOTE: All fauna species with their associated scores for habitat dependence can be found in Appendix #3.



**Map 15:
Forest Bird Species of Concern
(L1-L3) for 2002 and 2014
Inventories (Block C)**

Legend

 Forest Bird

 Forest-edge Bird

 Claireville Study Area Boundary

Appendix 1: List of Vegetation Communities for Claireville Study Area (2014-2015)

Appendix 1: List of Vegetation Communities for Oakville Study, Area (2014-2016)						
ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	Tot. area # ha	Scores			Local Rank (2014)
			Local Occur.	Geophy. Requir.	Total Score	
	Forest					
FOD1-1	Dry-Fresh Red Oak Deciduous Forest*	-	3.5	4.0	7.5	L2
FOM6-2	Fresh-Moist Hemlock - Hardwood Mixed Forest*	-	2.5	3.0	5.5	L3
FOD2-2	Dry-Fresh Oak - Hickory Deciduous Forest	4.1	3.5	2.0	5.5	L3
FOD9-4	Fresh-Moist Shagbark Hickory Deciduous Forest	8.2	4.0	2.0	6.0	L3
FOD9-5	Fresh-Moist Bitternut Hickory Deciduous Forest	0.2	3.5	2.0	5.5	L3
FOM6-1	Fresh-Moist Sugar Maple - Hemlock Mixed Forest*	-	1.5	2.0	3.5	L4
FOD2-4	Dry-Fresh Oak - Hardwood Deciduous Forest	1.5	2.5	2.0	4.5	L4
FOD4-A	Dry-Fresh Ironwood Deciduous Forest	4.0	3.5	1.0	4.5	L4
FOD5-3	Dry-Fresh Sugar Maple - Oak Deciduous Forest	6.0	1.5	2.0	3.5	L4
FOD5-5	Dry-Fresh Sugar Maple - Hickory Deciduous Forest	3.1	3.5	1.0	4.5	L4
FOD6-2	Fresh-Moist Sugar Maple - Black Maple Deciduous Forest	12.2	2.5	1.0	3.5	L4
FOD7-1	Fresh-Moist White Elm Lowland Deciduous Forest	1.0	2.0	1.0	3.0	L4
FOD7-4	Fresh-Moist Black Walnut Lowland Deciduous Forest*	-	2.5	1.0	3.5	L4
FOD7-5	Fresh-Moist Black Maple Lowland Deciduous Forest	7.8	3.5	1.0	4.5	L4
FOD7-F	Fresh-Moist Basswood Lowland Deciduous Forest	0.3	3.0	1.0	4.0	L4
FOD9-3	Fresh-Moist Bur Oak Deciduous Forest	2.9	3.0	1.0	4.0	L4
FOD4-2	Dry-Fresh White Ash Deciduous Forest*	-	2.5	0.0	2.5	L5
FOD4-H	Dry-Fresh Hawthorn - Apple Deciduous Forest	19.5	2.5	0.0	2.5	L5
FOD5-1	Dry-Fresh Sugar Maple Deciduous Forest	4.3	1.0	0.0	1.0	L5
FOD5-2	Dry-Fresh Sugar Maple - Beech Deciduous Forest	2.0	1.5	0.0	1.5	L5
FOD5-4	Dry-Fresh Sugar Maple - Ironwood Deciduous Forest	3.9	2.5	0.0	2.5	L5
FOD5-6	Dry-Fresh Sugar Maple - Basswood Deciduous Forest	2.9	2.0	0.0	2.0	L5
FOD5-8	Dry-Fresh Sugar Maple - White Ash Deciduous Forest	0.6	1.5	0.0	1.5	L5
FOD6-1	Fresh-Moist Sugar Maple - Ash Deciduous Forest	2.3	2.0	0.0	2.0	L5
FOD6-5	Fresh-Moist Sugar Maple - Hardwood Deciduous Forest	0.4	1.0	0.0	1.0	L5
FOD7-2	Fresh-Moist Ash Deciduous Forest	0.8	1.0	1.0	2.0	L5
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest	8.3	1.5	0.0	1.5	L5
FOD7-a	Fresh-Moist Manitoba Maple Lowland Deciduous Forest	2.0	1.5	0.0	1.5	L5
FOD7-E	Fresh-Moist Hawthorn - Apple Deciduous Forest	1.0	2.5	0.0	2.5	L5
FOD8-1	Fresh-Moist Poplar Deciduous Forest	0.8	1.0	0.0	1.0	L5
CUP1-3	Black Walnut Deciduous Plantation	1.4	3.0	0.0	3.0	L5
CUP1-4	Hybrid Poplar Deciduous Plantation	2.2	2.0	0.0	2.0	L5
CUP1-5	Silver Maple Deciduous Plantation*	-	3.0	0.0	3.0	L5
CUP1-7	Red (Green) Ash Deciduous Plantation	0.7	3.0	0.0	3.0	L5
CUP1-A	Restoration Deciduous Plantation	1.8	2.0	0.0	2.0	L5
CUP1-b	Willow Deciduous Plantation	0.5	3.0	0.0	3.0	L5
CUP2-1A	Black Walnut - Conifer Mixed Plantation	0.3	3.5	0.0	3.5	L5
CUP2-A	Restoration Mixed Plantation	29.7	2.0	0.0	2.0	L5
CUP2-E	Silver Maple - Conifer Mixed Plantation	1.5	3.0	0.0	3.0	L5
CUP2-f	Hybrid Poplar - Conifer Mixed Plantation	3.9	3.0	0.0	3.0	L5
CUP3-2	White Pine Coniferous Plantation	5.5	1.5	0.0	1.5	L5
CUP3-8A	White Spruce - Tamarack Coniferous Plantation	2.2	4.5	0.0	4.5	L5
CUP3-A	Restoration Coniferous Plantation	0.9	2.5	0.0	2.5	L5
CUP3-C	White Spruce Coniferous Plantation	33.8	2.0	0.0	2.0	L5
CUP3-G	White Cedar Coniferous Plantation	1.4	2.5	0.0	2.5	L5
CUP3-H	Mixed Conifer Coniferous Plantation	14.8	1.5	0.0	1.5	L5
FOD4-e	Dry-Fresh Exotic Deciduous Forest	8.2	2.5	0.0	2.5	L+
CUP1-c	Black Locust Deciduous Plantation	3.0	2.0	0.0	2.0	L+
CUP1-d	Horticultural Deciduous Plantation	1.7	3.0	0.0	3.0	L+
CUP1-g	Apple Deciduous Plantation	5.8	3.5	0.0	3.5	L+
CUP2-b	Black Locust - Conifer Mixed Plantation	1.3	3.0	0.0	3.0	L+
CUP3-3	Scots Pine Coniferous Plantation*	-	2.0	0.0	2.0	L+
CUP3-e	Norway Spruce Coniferous Plantation*	-	2.0	0.0	2.0	L+
	Successional					
CUT1-5	Raspberry Deciduous Thicket*	-	3.0	0.0	3.0	L4
CUT1-A1	Native Deciduous Sapling Regeneration Thicket	5.5	2.0	0.0	2.0	L5
CUH1-A	Treed Hedgerow	0.1	1.5	0.0	1.5	L5
CUS1-1	Hawthorn Successional Savannah	28.3	1.5	0.0	1.5	L5
CUS1-A1	Native Deciduous Successional Savannah	1.9	1.5	0.0	1.5	L5
CUW1-A3	Native Deciduous Successional Woodland	21.4	1.0	0.0	1.0	L5
CUW1-D	Hawthorn Successional Woodland	10.5	2.5	0.0	2.5	L5
CUT1-b	Buckthorn Deciduous Thicket	12.0	2.5	0.0	2.5	L+

Appendix 1: List of Vegetation Communities for Claireville Study Area (2014-2015)						
ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	Tot. area # ha	Scores			Local Rank (2014)
			Local Occur.	Geophy. Requir.	Total Score	
CUT1-c	Exotic Deciduous Thicket	19.7	2.0	0.0	2.0	L+
CUH1-d	Exotic Shrub Hedgerow*	-	3.5	0.0	3.5	L+
CUS1-b	Exotic Successional Savannah	2.6	1.5	0.0	1.5	L+
CUW1-b	Exotic Successional Woodland	27.7	1.0	0.0	1.0	L+
Wetland						
MAM2-5	Narrow-leaved Sedge Mineral Meadow Marsh	0.3	3.0	2.0	5.0	L3
MAM2-6	Broad-leaved Sedge Mineral Meadow Marsh*	-	3.0	2.0	5.0	L3
MAS2-4	Broad-leaved Sedge Mineral Shallow Marsh*	-	3.0	2.0	5.0	L3
SWD2-2	Red (Green) Ash Mineral Deciduous Swamp*	-	2.0	2.0	4.0	L4
SWD3-2	Silver Maple Mineral Deciduous Swamp	0.2	2.0	2.0	4.0	L4
SWD3-3	Swamp Maple Mineral Deciduous Swamp	1.8	2.5	2.0	4.5	L4
SWD4-1	Willow Mineral Deciduous Swamp	1.3	2.0	1.0	3.0	L4
SWT2-2	Willow Mineral Thicket Swamp	1.8	2.0	2.0	4.0	L4
MAM2-D	Rice Cut-Grass Mineral Meadow Marsh	0.02	4.0	0.0	4.0	L4
MAS2-1A	Broad-leaved Cattail Mineral Shallow Marsh	5.7	2.0	1.0	3.0	L4
MAS2-2	Bulrush Mineral Shallow Marsh	0.8	3.0	1.0	4.0	L4
MAM2-10	Forb Mineral Meadow Marsh	0.1	1.5	1.0	2.5	L5
MAM2-2	Reed Canary Grass Mineral Meadow Marsh	14.2	1.0	1.0	2.0	L+
MAM2-a	Common Reed Mineral Meadow Marsh*	-	3.0	0.0	3.0	L+
MAM2-b	Purple Loosestrife Mineral Meadow Marsh*	-	3.0	0.0	3.0	L+
MAS2-1b	Narrow-Leaved Cattail Mineral Shallow Marsh	14.8	1.0	0.0	1.0	L+
MAS2-a	Common Reed Mineral Shallow Marsh	1.6	3.0	0.0	3.0	L+
MAS2-b	Purple Loosestrife Mineral Shallow Marsh*	-	3.5	0.0	3.5	L+
MAS2-d	Reed Canary Grass Mineral Shallow Marsh	4.1	2.5	1.0	3.5	L+
Aquatic						
SAS1-1	Pondweed Submerged Shallow Aquatic	0.2	2.0	2.0	4.0	L4
SAS1-3	Stonewort Submerged Shallow Aquatic	0.4	2.0	1.0	3.0	L4
SAS1-A	Coon-tail Submerged Shallow Aquatic	0.1	3.0	1.0	4.0	L4
SAF1-3	Duckweed Floating-leaved Shallow Aquatic	0.7	2.5	1.0	3.5	L4
OA01	Open Aquatic (deep or riverine unvegetated)	12.5	2.0	0.0	2.0	L5
OA01-T	Turbid Open Aquatic (disturbed unvegetated)	8.9	2.0	0.0	2.0	L+
Dynamic (Beach, Bluff, Barren, Prairie, Savannah)						
CBO1	Open Clay Barren*	-	4.0	3.0	7.0	L2
BLT1-B	Deciduous Treed Bluff*	-	3.0	2.0	5.0	L3
CUS1-3B	Bur Oak Non-tallgrass Savannah	1.2	4.5	1.0	5.5	L3
BBS1-2B	Willow Shrub Riparian Bar	0.7	3.0	1.0	4.0	L4
BLO1	Mineral Open Bluff	1.9	2.5	2.0	4.5	L4
TPO2-A	Fresh-Moist Tallgrass Prairie Planting	3.4	3.5	1.0	4.5	L5
BLS1-c	Exotic Shrub Bluff*	0.02	3.5	2.0	5.5	L+
Meadow						
CUM1-A	Native Forb Meadow	83.9	1.0	0.0	1.0	L5
CUM1-b	Exotic Cool-season Grass Graminoid Meadow	93.0	1.0	0.0	1.0	L+
CUM1-c	Exotic Forb Meadow	11.1	1.5	0.0	1.5	L+

Appendix 1: List of Vegetation Communities for Claireville Study Area: Block A (2015)						
ELC Code	Vegetation Type <i>(* indicates present as inclusion and/or complex only)</i>	Tot. area # ha	Scores			Local Rank (2014)
			Local Occur.	Geophy. Requir.	Total Score	
	Forest					
FOD2-2	Dry-Fresh Oak - Hickory Deciduous Forest	0.3	3.5	2.0	5.5	L3
FOD9-4	Fresh-Moist Shagbark Hickory Deciduous Forest	8.2	4.0	2.0	6.0	L3
FOD6-2	Fresh-Moist Sugar Maple - Black Maple Deciduous Forest	2.6	2.5	1.0	3.5	L4
FOD7-5	Fresh-Moist Black Maple Lowland Deciduous Forest	0.9	3.5	1.0	4.5	L4
FOD4-H	Dry-Fresh Hawthorn - Apple Deciduous Forest	0.6	2.5	0.0	2.5	L5
FOD5-1	Dry-Fresh Sugar Maple Deciduous Forest*	-	1.0	0.0	1.0	L5
FOD6-5	Fresh-Moist Sugar Maple - Hardwood Deciduous Forest	0.4	1.0	0.0	1.0	L5
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest	1.6	1.5	0.0	1.5	L5
FOD7-a	Fresh-Moist Manitoba Maple Lowland Deciduous Forest	1.1	1.5	0.0	1.5	L5
CUP1-5	Silver Maple Deciduous Plantation*	-	3.0	0.0	3.0	L5
CUP1-A	Restoration Deciduous Plantation	1.2	2.0	0.0	2.0	L5
CUP1-b	Willow Deciduous Plantation	0.4	3.0	0.0	3.0	L5
CUP2-A	Restoration Mixed Plantation	3.3	2.0	0.0	2.0	L5
CUP3-2	White Pine Coniferous Plantation*	-	1.5	0.0	1.5	L5
FOD4-e	Dry-Fresh Exotic Deciduous Forest	0.6	2.5	0.0	2.5	L+
	Successional					
CUS1-1	Hawthorn Successional Savannah	2.2	1.5	0.0	1.5	L5
CUW1-A3	Native Deciduous Successional Woodland	1.0	1.0	0.0	1.0	L5
CUW1-D	Hawthorn Successional Woodland	4.7	2.5	0.0	2.5	L5
CUT1-b	Buckthorn Deciduous Thicket	1.1	2.5	0.0	2.5	L+
CUT1-c	Exotic Deciduous Thicket	1.0	2.0	0.0	2.0	L+
CUS1-b	Exotic Successional Savannah	0.2	1.5	0.0	1.5	L+
CUW1-b	Exotic Successional Woodland	6.3	1.0	0.0	1.0	L+
	Wetland					
SWD3-3	Swamp Maple Mineral Deciduous Swamp	0.1	2.5	2.0	4.5	L4
SWT2-2	Willow Mineral Thicket Swamp*	-	2.0	2.0	4.0	L4
MAS2-2	Bulrush Mineral Shallow Marsh	0.04	3.0	1.0	4.0	L4
MAM2-2	Reed Canary Grass Mineral Meadow Marsh	0.8	1.0	1.0	2.0	L+
MAM2-b	Purple Loosestrife Mineral Meadow Marsh*	-	3.0	0.0	3.0	L+
MAS2-1b	Narrow-Leaved Cattail Mineral Shallow Marsh	0.9	1.0	0.0	1.0	L+
MAS2-a	Common Reed Mineral Shallow Marsh*	-	3.0	0.0	3.0	L+
MAS2-d	Reed Canary Grass Mineral Shallow Marsh	1.0	2.5	1.0	3.5	L+
	Aquatic					
OA01-T	Turbid Open Aquatic (disturbed unvegetated)	2.3	2.0	0.0	2.0	L+
	Dynamic (Beach, Bluff, Barren, Prairie, Savannah)					
CBO1	Open Clay Barren*	-	4.0	3.0	7.0	L2
BLO1	Mineral Open Bluff	0.3	2.5	2.0	4.5	L4
TPO2-A	Fresh-Moist Tallgrass Prairie Planting	1.7	3.5	1.0	4.5	L5
	Meadow					
CUM1-A	Native Forb Meadow	7.5	1.0	0.0	1.0	L5
CUM1-b	Exotic Cool-season Grass Graminoid Meadow	1.5	1.0	0.0	1.0	L+

Appendix 1: List of Vegetation Communities for Claireville Study Area: Block B (2015)

ELC Code	Vegetation Type <i>(* indicates present as inclusion and/or complex only)</i>	Tot. area # ha	Scores			Local Rank (2014)
			Local Occur.	Geophy. Requir.	Total Score	
	Forest					
FOM6-2	Fresh-Moist Hemlock - Hardwood Mixed Forest*	-	2.5	3.0	5.5	L3
FOD2-2	Dry-Fresh Oak - Hickory Deciduous Forest	1.0	3.5	2.0	5.5	L3
FOD2-4	Dry-Fresh Oak - Hardwood Deciduous Forest	1.5	2.5	2.0	4.5	L4
FOD4-A	Dry-Fresh Ironwood Deciduous Forest	3.8	3.5	1.0	4.5	L4
FOD5-3	Dry-Fresh Sugar Maple - Oak Deciduous Forest	1.2	1.5	2.0	3.5	L4
FOD6-2	Fresh-Moist Sugar Maple - Black Maple Deciduous Forest	0.7	2.5	1.0	3.5	L4
FOD7-5	Fresh-Moist Black Maple Lowland Deciduous Forest	5.3	3.5	1.0	4.5	L4
FOD7-F	Fresh-Moist Basswood Lowland Deciduous Forest	0.2	3.0	1.0	4.0	L4
FOD9-3	Fresh-Moist Bur Oak Deciduous Forest	0.3	3.0	1.0	4.0	L4
FOD4-H	Dry-Fresh Hawthorn - Apple Deciduous Forest	11.1	2.5	0.0	2.5	L5
FOD5-1	Dry-Fresh Sugar Maple Deciduous Forest	0.5	1.0	0.0	1.0	L5
FOD5-2	Dry-Fresh Sugar Maple - Beech Deciduous Forest*	-	1.5	0.0	1.5	L5
FOD6-1	Fresh-Moist Sugar Maple - Ash Deciduous Forest	1.8	2.0	0.0	2.0	L5
FOD7-2	Fresh-Moist Ash Deciduous Forest	0.8	1.0	1.0	2.0	L5
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest	4.1	1.5	0.0	1.5	L5
CUP1-3	Black Walnut Deciduous Plantation	1.1	3.0	0.0	3.0	L5
CUP1-7	Red (Green) Ash Deciduous Plantation	0.7	3.0	0.0	3.0	L5
CUP1-A	Restoration Deciduous Plantation	0.1	2.0	0.0	2.0	L5
CUP1-b	Willow Deciduous Plantation	0.1	3.0	0.0	3.0	L5
CUP2-A	Restoration Mixed Plantation	10.6	2.0	0.0	2.0	L5
CUP3-C	White Spruce Coniferous Plantation	24.5	2.0	0.0	2.0	L5
CUP3-H	Mixed Conifer Coniferous Plantation	0.3	1.5	0.0	1.5	L5
FOD4-e	Dry-Fresh Exotic Deciduous Forest	4.3	2.5	0.0	2.5	L+
CUP1-g	Apple Deciduous Plantation*	-	3.5	0.0	3.5	L+
	Successional					
CUT1-A1	Native Deciduous Sapling Regeneration Thicket	0.2	2.0	0.0	2.0	L5
CUS1-1	Hawthorn Successional Savannah	15.0	1.5	0.0	1.5	L5
CUW1-A3	Native Deciduous Successional Woodland	4.9	1.0	0.0	1.0	L5
CUW1-D	Hawthorn Successional Woodland	4.2	2.5	0.0	2.5	L5
CUT1-b	Buckthorn Deciduous Thicket	4.5	2.5	0.0	2.5	L+
CUT1-c	Exotic Deciduous Thicket	2.0	2.0	0.0	2.0	L+
CUW1-b	Exotic Successional Woodland	8.3	1.0	0.0	1.0	L+
	Wetland					
MAM2-5	Narrow-leaved Sedge Mineral Meadow Marsh	0.3	3.0	2.0	5.0	L3
MAM2-D	Rice Cut-Grass Mineral Meadow Marsh	0.02	4.0	0.0	4.0	L4
MAS2-1A	Broad-leaved Cattail Mineral Shallow Marsh	0.1	2.0	1.0	3.0	L4
MAM2-10	Forb Mineral Meadow Marsh*	-	1.5	1.0	2.5	L5
MAM2-2	Reed Canary Grass Mineral Meadow Marsh	0.8	1.0	1.0	2.0	L+
MAS2-1b	Narrow-Leaved Cattail Mineral Shallow Marsh	3.3	1.0	0.0	1.0	L+
MAS2-a	Common Reed Mineral Shallow Marsh	0.6	3.0	0.0	3.0	L+
MAS2-d	Reed Canary Grass Mineral Shallow Marsh	0.3	2.5	1.0	3.5	L+
	Aquatic					
SAS1-1	Pondweed Submerged Shallow Aquatic	0.2	2.0	2.0	4.0	L4
SAS1-3	Stonewort Submerged Shallow Aquatic	0.2	2.0	1.0	3.0	L4
SAF1-3	Duckweed Floating-leaved Shallow Aquatic	0.03	2.5	1.0	3.5	L4
OA01	Open Aquatic (deep or riverine unvegetated)	0.14	2.0	0.0	2.0	L5
OA01-T	Turbid Open Aquatic (disturbed unvegetated)	5.6	2.0	0.0	2.0	L+
	Dynamic (Beach, Bluff, Barren, Prairie, Savannah)					
CBO1	Open Clay Barren*	-	4.0	3.0	7.0	L2
BLT1-B	Deciduous Treed Bluff*	-	3.0	2.0	5.0	L3
CUS1-3B	Bur Oak Non-tallgrass Savannah	1.2	4.5	1.0	5.5	L3
BBS1-2B	Willow Shrub Riparian Bar	0.7	3.0	1.0	4.0	L4
BLO1	Mineral Open Bluff	1.2	2.5	2.0	4.5	L4
TPO2-A	Fresh-Moist Tallgrass Prairie Planting	1.7	3.5	1.0	4.5	L5
BLS1-c	Exotic Shrub Bluff	0.02	3.5	2.0	5.5	L+
	Meadow					
CUM1-A	Native Forb Meadow	39.1	1.0	0.0	1.0	L5
CUM1-b	Exotic Cool-season Grass Graminoid Meadow	3.9	1.0	0.0	1.0	L+
CUM1-c	Exotic Forb Meadow	1.1	1.5	0.0	1.5	L+

Appendix 1: List of Vegetation Communities for Claireville Study Area: Block C (2014)						
ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	Tot. area # ha	Scores			Local Rank (2014)
			Local Occur.	Geophy. Requir.	Total Score	
	Forest					
FOD1-1	Dry-Fresh Red Oak Deciduous Forest*	-	3.5	4.0	7.5	L2
FOD2-2	Dry-Fresh Oak - Hickory Deciduous Forest	2.8	3.5	2.0	5.5	L3
FOD9-5	Fresh-Moist Bitternut Hickory Deciduous Forest	0.2	3.5	2.0	5.5	L3
FOM6-1	Fresh-Moist Sugar Maple - Hemlock Mixed Forest*	-	1.5	2.0	3.5	L4
FOD4-A	Dry-Fresh Ironwood Deciduous Forest	0.2	3.5	1.0	4.5	L4
FOD5-3	Dry-Fresh Sugar Maple - Oak Deciduous Forest	4.9	1.5	2.0	3.5	L4
FOD5-5	Dry-Fresh Sugar Maple - Hickory Deciduous Forest	3.1	3.5	1.0	4.5	L4
FOD6-2	Fresh-Moist Sugar Maple - Black Maple Deciduous Forest	8.9	2.5	1.0	3.5	L4
FOD7-1	Fresh-Moist White Elm Lowland Deciduous Forest	1.0	2.0	1.0	3.0	L4
FOD7-4	Fresh-Moist Black Walnut Lowland Deciduous Forest*	-	2.5	1.0	3.5	L4
FOD7-5	Fresh-Moist Black Maple Lowland Deciduous Forest	1.6	3.5	1.0	4.5	L4
FOD7-F	Fresh-Moist Basswood Lowland Deciduous Forest	0.2	3.0	1.0	4.0	L4
FOD9-3	Fresh-Moist Bur Oak Deciduous Forest	2.6	3.0	1.0	4.0	L4
FOD4-2	Dry-Fresh White Ash Deciduous Forest*	-	2.5	0.0	2.5	L5
FOD4-H	Dry-Fresh Hawthorn - Apple Deciduous Forest	7.8	2.5	0.0	2.5	L5
FOD5-1	Dry-Fresh Sugar Maple Deciduous Forest	3.8	1.0	0.0	1.0	L5
FOD5-2	Dry-Fresh Sugar Maple - Beech Deciduous Forest	2.0	1.5	0.0	1.5	L5
FOD5-4	Dry-Fresh Sugar Maple - Ironwood Deciduous Forest	3.9	2.5	0.0	2.5	L5
FOD5-6	Dry-Fresh Sugar Maple - Basswood Deciduous Forest	2.9	2.0	0.0	2.0	L5
FOD5-8	Dry-Fresh Sugar Maple - White Ash Deciduous Forest	0.6	1.5	0.0	1.5	L5
FOD6-1	Fresh-Moist Sugar Maple - Ash Deciduous Forest	0.4	2.0	0.0	2.0	L5
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest	2.6	1.5	0.0	1.5	L5
FOD7-a	Fresh-Moist Manitoba Maple Lowland Deciduous Forest	0.9	1.5	0.0	1.5	L5
FOD7-E	Fresh-Moist Hawthorn - Apple Deciduous Forest	1.0	2.5	0.0	2.5	L5
FOD8-1	Fresh-Moist Poplar Deciduous Forest	0.8	1.0	0.0	1.0	L5
CUP1-b	Willow Deciduous Plantation*	-	3.0	0.0	3.0	L5
CUP2-A	Restoration Mixed Plantation	15.8	2.0	0.0	2.0	L5
CUP3-H	Mixed Conifer Coniferous Plantation	14.5	1.5	0.0	1.5	L5
CUP3-C	White Spruce Coniferous Plantation	9.3	2.0	0.0	2.0	L5
CUP3-2	White Pine Coniferous Plantation	5.5	1.5	0.0	1.5	L5
CUP2-f	Hybrid Poplar - Conifer Mixed Plantation	3.9	3.0	0.0	3.0	L5
CUP1-4	Hybrid Poplar Deciduous Plantation	2.2	2.0	0.0	2.0	L5
CUP3-8A	White Spruce - Tamarack Coniferous Plantation	2.2	4.5	0.0	4.5	L5
CUP2-E	Silver Maple - Conifer Mixed Plantation	1.5	3.0	0.0	3.0	L5
CUP3-G	White Cedar Coniferous Plantation	1.4	2.5	0.0	2.5	L5
CUP3-A	Restoration Coniferous Plantation	0.9	2.5	0.0	2.5	L5
CUP1-A	Restoration Deciduous Plantation	0.5	2.0	0.0	2.0	L5
CUP2-1A	Black Walnut - Conifer Mixed Plantation	0.3	3.5	0.0	3.5	L5
CUP1-3	Black Walnut Deciduous Plantation	0.2	3.0	0.0	3.0	L5
CUP3-3	Scots Pine Coniferous Plantation*	-	2.0	0.0	2.0	L+
CUP3-e	Norway Spruce Coniferous Plantation*	-	2.0	0.0	2.0	L+
CUP1-g	Apple Deciduous Plantation	5.8	3.5	0.0	3.5	L+
FOD4-e	Dry-Fresh Exotic Deciduous Forest	3.3	2.5	0.0	2.5	L+
CUP1-c	Black Locust Deciduous Plantation	3.0	2.0	0.0	2.0	L+
CUP1-d	Horticultural Deciduous Plantation	1.7	3.0	0.0	3.0	L+
CUP2-b	Black Locust - Conifer Mixed Plantation	1.3	3.0	0.0	3.0	L+
	Successional					
CUT1-5	Raspberry Deciduous Thicket*	-	3.0	0.0	3.0	L4
CUT1-A1	Native Deciduous Sapling Regeneration Thicket	5.2	2.0	0.0	2.0	L5
CUH1-A	Treed Hedgerow	0.1	1.5	0.0	1.5	L5
CUS1-1	Hawthorn Successional Savannah	11.1	1.5	0.0	1.5	L5
CUS1-A1	Native Deciduous Successional Savannah	1.9	1.5	0.0	1.5	L5
CUW1-A3	Native Deciduous Successional Woodland	15.6	1.0	0.0	1.0	L5
CUW1-D	Hawthorn Successional Woodland	1.6	2.5	0.0	2.5	L5
CUT1-b	Buckthorn Deciduous Thicket	6.4	2.5	0.0	2.5	L+

Appendix 1: List of Vegetation Communities for Claireville Study Area: Block C (2014)						
ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	Tot. area # ha	Scores			Local Rank (2014)
			Local Occur.	Geophy. Requir.	Total Score	
CUT1-c	Exotic Deciduous Thicket	16.6	2.0	0.0	2.0	L+
CUH1-d	Exotic Shrub Hedgerow*	-	3.5	0.0	3.5	L+
CUS1-b	Exotic Successional Savannah	2.4	1.5	0.0	1.5	L+
CUW1-b	Exotic Successional Woodland	13.1	1.0	0.0	1.0	L+
	Wetland					
MAM2-5	Narrow-leaved Sedge Mineral Meadow Marsh*	-	3.0	2.0	5.0	L3
MAM2-6	Broad-leaved Sedge Mineral Meadow Marsh*	-	3.0	2.0	5.0	L3
MAS2-4	Broad-leaved Sedge Mineral Shallow Marsh*	-	3.0	2.0	5.0	L3
SWD2-2	Red (Green) Ash Mineral Deciduous Swamp*	-	2.0	2.0	4.0	L4
SWD3-2	Silver Maple Mineral Deciduous Swamp	0.2	2.0	2.0	4.0	L4
SWD3-3	Swamp Maple Mineral Deciduous Swamp	1.7	2.5	2.0	4.5	L4
SWD4-1	Willow Mineral Deciduous Swamp	1.3	2.0	1.0	3.0	L4
SWT2-2	Willow Mineral Thicket Swamp	1.8	2.0	2.0	4.0	L4
MAS2-1A	Broad-leaved Cattail Mineral Shallow Marsh	5.6	2.0	1.0	3.0	L4
MAS2-2	Bulrush Mineral Shallow Marsh	0.8	3.0	1.0	4.0	L4
MAM2-10	Forb Mineral Meadow Marsh	0.1	1.5	1.0	2.5	L5
MAM2-2	Reed Canary Grass Mineral Meadow Marsh	12.7	1.0	1.0	2.0	L+
MAM2-a	Common Reed Mineral Meadow Marsh*	-	3.0	0.0	3.0	L+
MAS2-1b	Narrow-Leaved Cattail Mineral Shallow Marsh	10.6	1.0	0.0	1.0	L+
MAS2-a	Common Reed Mineral Shallow Marsh	1.0	3.0	0.0	3.0	L+
MAS2-b	Purple Loosestrife Mineral Shallow Marsh*	-	3.5	0.0	3.5	L+
MAS2-d	Reed Canary Grass Mineral Shallow Marsh	2.9	2.5	1.0	3.5	L+
	Aquatic					
SAS1-3	Stonewort Submerged Shallow Aquatic	0.2	2.0	1.0	3.0	L4
SAS1-A	Coon-tail Submerged Shallow Aquatic	0.1	3.0	1.0	4.0	L4
SAF1-3	Duckweed Floating-leaved Shallow Aquatic	0.7	2.5	1.0	3.5	L4
OA01	Open Aquatic (deep or riverine unvegetated)	12.4	2.0	0.0	2.0	L5
OA01-T	Turbid Open Aquatic (disturbed unvegetated)	1.0	2.0	0.0	2.0	L+
	Dynamic (Beach, Bluff, Barren, Prairie, Savannah)					
CBO1	Open Clay Barren*	-	4.0	3.0	7.0	L2
BBS1-2B	Willow Shrub Riparian Bar*	-	3.0	1.0	4.0	L4
BLO1	Mineral Open Bluff	0.4	2.5	2.0	4.5	L4
TPO2-A	Fresh-Moist Tallgrass Prairie Planting*	-	3.5	1.0	4.5	L5
	Meadow					
CUM1-A	Native Forb Meadow	37.3	1.0	0.0	1.0	L5
CUM1-b	Exotic Cool-season Grass Graminoid Meadow	87.6	1.0	0.0	1.0	L+
CUM1-c	Exotic Forb Meadow	10.0	1.5	0.0	1.5	L+

Appendix 2: List of Flora Species found at Claireville Study Area (2014-2015)

Scientific Name	Common Name	Local	Popn.	Hab.	Sens.	Total	Local	Plant	Block A (2015)	Block B (2015)	Block C (2014)
		Occur. 1-5	Trend 1-5	Dep. 0-5	Dev. 0-5	Score 2-20	Rank (2015)				
									(298 spp)	(359 spp)	(438 spp)
<i>Acorus americanus</i>	sweet flag	3	3	5	4	15	L3	FO			x
<i>Anemone acutiloba</i>	sharp-lobed hepatica	1	4	4	5	14	L3	FO		x	x
<i>Anemone cylindrica</i>	long-fruited thimbleweed	3	4	3	4	14	L3	FO			x
<i>Anemone quinquefolia</i> var. <i>quinquefolia</i>	wood-anemone	2	4	3	5	14	L3	FO	x	x	x
<i>Antennaria parlinii</i> ssp. <i>fallax</i>	plantain-leaved pussytoes	3	4	3	4	14	L3	FO	x	x	x
<i>Cardamine concatenata</i>	cut-leaved toothwort	2	3	5	4	14	L3	FO	x	x	x
<i>Carex albursina</i>	white bear sedge	2	3	5	4	14	L3	SE	x	x	x
<i>Carex alopecoidea</i>	foxtail wood sedge	2	3	5	4	14	L3	SE	x		x
<i>Carex crinita</i>	fringed sedge	2	4	4	4	14	L3	SE			x
<i>Carex digitalis</i>	slender wood sedge	3	4	4	3	14	L3	SE			x
<i>Carex grayi</i>	Gray's sedge	3	5	4	4	16	L3	SE			x
<i>Carex laevivaginata</i>	smooth-sheathed sedge	2	4	4	4	14	L3	SE			x
<i>Carex leptoneuria</i>	few-nerved wood sedge	2	4	4	4	14	L3	SE	x	x	
<i>Carex plantaginea</i>	plantain-leaved sedge	2	4	5	4	15	L3	SE			x
<i>Carex tenera</i> var. <i>tenera</i>	straw sedge	4	2	4	4	14	L3	SE	x		x
<i>Carex trichocarpa</i>	hairy-fruited sedge	3	3	5	4	15	L3	SE			cf
<i>Carex woodii</i>	purple-tinged sedge	4	3	5	3	15	L3	SE		x	x
<i>Carya ovata</i>	shagbark hickory	2	4	4	4	14	L3	TR	x	x	x
<i>Celastrus scandens</i>	American bittersweet	2	4	3	5	14	L3	VW		cf	
<i>Chelone glabra</i>	turtlehead	2	3	4	5	14	L3	FO	x		x
<i>Claytonia virginica</i>	narrow-leaved spring beauty	2	4	4	5	15	L3	FO	x	x	x
<i>Dicentra canadensis</i>	squirrel-corn	2	4	5	4	15	L3	FO	x	x	x
<i>Dicentra cucullaria</i>	Dutchman's breeches	2	4	4	5	15	L3	FO	x	x	x
<i>Eleocharis obtusa</i>	blunt spike-rush	3	4	5	2	14	L3	SE			x
<i>Equisetum scirpoides</i>	dwarf scouring-rush	2	4	5	5	16	L3	FE		x	
<i>Erythronium albidum</i>	white trout-lily	4	3	4	4	15	L3	FO			cf
<i>Euonymus obovatus</i>	running strawberry-bush	2	4	4	4	14	L3	SH	x	x	x
<i>Galium boreale</i>	northern bedstraw	3	4	4	3	14	L3	FO			x
<i>Hydrophyllum canadense</i>	Canada waterleaf	2	3	5	4	14	L3	FO		x	x
<i>Hypopitys monstrosa</i>	pinelap	2	4	5	5	16	L3	FO			x
<i>Iris versicolor</i>	blue flag	2	5	4	5	16	L3	FO			x
<i>Juglans cinerea</i>	butternut	1	5	4	4	14	L3	TR	x	x	x
<i>Lemna trisulca</i>	star duckweed	2	4	5	3	14	L3	FO		x	
<i>Menispermum canadense</i>	moonseed	2	4	4	4	14	L3	VW			x
<i>Mitella diphylla</i>	mitrewort	2	3	4	5	14	L3	FO			x
<i>Persicaria hydropiperoides</i>	mild water-pepper	4	2	5	3	14	L3	FO		x	
<i>Prunus nigra</i>	Canada plum	2	4	4	4	14	L3	SH		x	
<i>Sanicula odorata</i>	clustered sanicle	4	3	4	3	14	L3	FO		x	x
<i>Scirpus pendulus</i>	drooping bulrush	3	4	5	4	16	L3	SE			x
<i>Sparganium eurycarpum</i>	great bur-reed	2	4	5	4	15	L3	FO		p	x
<i>Teucrium canadense</i> ssp. <i>canadense</i>	wood-sage	3	3	4	4	14	L3	FO			x
<i>Triosteum aurantiacum</i>	wild coffee	3	5	4	3	15	L3	FO		x	
<i>Uvularia grandiflora</i>	large-flowered bellwort	1	4	5	5	15	L3	FO		x	x
<i>Viburnum opulus</i> ssp. <i>trilobum</i>	American highbush cranberry	3	5	4	4	16	L3	SH			x
<i>Wolffia borealis</i>	dotted water-meal	3	4	5	2	14	L3	FO		x	
<i>Abies balsamea</i>	balsam fir	1	3	4	5	13	L4	TR			x
<i>Acer rubrum</i>	red maple	1	4	1	5	11	L4	TR	p	p	x
<i>Acer saccharinum</i>	silver maple	1	2	5	3	11	L4	TR	p	p	x
<i>Acer saccharum</i> ssp. <i>nigrum</i>	black maple	2	3	4	2	11	L4	TR	x	x	x
<i>Acer x freemanii</i>	hybrid swamp maple	2	3	5	2	12	L4	TR	x	x	x
<i>Actaea pachypoda</i>	white baneberry	1	3	4	3	11	L4	FO			x
<i>Allium tricoccum</i>	wild leek	1	3	4	4	12	L4	FO	x	x	x
<i>Amelanchier arborea</i>	downy serviceberry	2	2	4	3	11	L4	SH			x
<i>Amelanchier laevis</i>	smooth serviceberry	2	2	4	3	11	L4	SH	x	x	x
<i>Aquilegia canadensis</i>	wild columbine	1	4	3	5	13	L4	FO			x
<i>Asclepias incarnata</i> ssp. <i>incarnata</i>	swamp milkweed	1	3	4	4	12	L4	FO		x	x
<i>Betula alleghaniensis</i>	yellow birch	1	4	3	5	13	L4	TR		x	
<i>Bidens vulgata</i>	tall beggar's-ticks	2	2	3	4	11	L4	FO	x		
<i>Boehmeria cylindrica</i>	false nettle	2	4	4	3	13	L4	FO	x	x	x
<i>Caltha palustris</i>	marsh marigold	1	4	3	4	12	L4	FO	x		x
<i>Cardamine diphylla</i>	broad-leaved toothwort	1	3	4	4	12	L4	FO		x	x
<i>Cardamine maxima</i>	hybrid toothwort	2	3	3	3	11	L4	FO	x	x	x
<i>Cardamine pensylvanica</i>	bitter cress	2	2	4	4	12	L4	FO	x		
<i>Carex aurea</i>	golden-fruited sedge	2	2	4	4	12	L4	SE			x
<i>Carex cephaloidea</i>	thin-leaved sedge	2	3	5	3	13	L4	SE	x		
<i>Carex cephalophora</i>	oval-headed sedge	2	3	4	4	13	L4	SE	x		x
<i>Carex communis</i>	fibrous-rooted sedge	2	4	3	3	12	L4	SE		x	
<i>Carex deweyana</i>	Dewey's sedge	1	4	3	3	11	L4	SE	x	x	
<i>Carex hirtifolia</i>	hairy wood sedge	2	3	4	3	12	L4	SE	x	x	x
<i>Carex hitchcockiana</i>	Hitchcock's sedge	2	3	5	3	13	L4	SE			x
<i>Carex hystericina</i>	porcupine sedge	1	3	2	5	11	L4	SE			x
<i>Carex intumescens</i>	bladder sedge	2	4	4	2	12	L4	SE			x
<i>Carex lacustris</i>	lake-bank sedge	2	3	3	4	12	L4	SE			x
<i>Carex lupulina</i>	hop sedge	1	4	4	4	13	L4	SE	x		x
<i>Carex peckii</i>	Peck's sedge	2	3	4	3	12	L4	SE			x
<i>Carex pellita</i>	woolly sedge	2	3	4	3	12	L4	SE			x
<i>Carex pensylvanica</i>	Pennsylvania sedge	1	4	3	4	12	L4	SE		x	x

Appendix 2: List of Flora Species found at Claireville Study Area (2014-2015)

Scientific Name	Common Name	Local	Popn.	Hab.	Sens.	Total	Local	Plant	Block A (2015)	Block B (2015)	Block C (2014)
		Occur. 1-5	Trend 1-5	Dep. 0-5	Dev. 0-5	Score 2-20	Rank (2015)				
									(298 spp)	(359 spp)	(438 spp)
<i>Carex projecta</i>	necklace sedge	3	2	4	3	12	L4	SE			x
<i>Carex pseudocyperus</i>	pseudocyperus sedge	1	3	3	4	11	L4	SE			x
<i>Carex retrorsa</i>	retorse sedge	1	3	3	4	11	L4	SE	x	x	x
<i>Carex sparganioides</i>	bur-reed sedge	2	2	5	2	11	L4	SE			x
<i>Carex sprengei</i>	long-beaked sedge	2	4	4	2	12	L4	SE			x
<i>Carpinus caroliniana</i> ssp. <i>virginiana</i>	blue beech	1	3	4	3	11	L4	SH	x	x	x
<i>Carya cordiformis</i>	bitternut hickory	1	4	4	2	11	L4	TR	x	x	x
<i>Caulophyllum thalictroides</i>	long-styled blue cohosh	1	3	4	4	12	L4	FO	x	x	x
<i>Ceratophyllum demersum</i>	coontail	1	3	5	3	12	L4	FO			x
<i>Cicuta bulbifera</i>	bulblet-bearing water-hemlock	2	3	4	3	12	L4	FO			x
<i>Cornus amomum</i> ssp. <i>obliqua</i>	silky dogwood	2	3	5	3	13	L4	SH	p	p	x
<i>Crataegus coccinea</i> var. <i>coccinea</i>	scarlet hawthorn	3	2	3	3	11	L4	TR	x	x	
<i>Crataegus macracantha</i>	long-spined hawthorn	2	2	4	3	11	L4	SH	x	x	x
<i>Crataegus submollis</i>	Emerson's hawthorn	2	3	4	3	12	L4	SH	x		
<i>Cuscuta gronovii</i>	swamp dodder	2	3	3	3	11	L4	FO	x	x	x
<i>Elodea canadensis</i>	common water-weed	1	3	5	3	12	L4	FO	x		
<i>Elymus hystrix</i>	bottle-brush grass	2	3	4	3	12	L4	GR		x	x
<i>Elymus riparius</i>	riverbank wild rye	2	2	4	4	12	L4	GR		x	x
<i>Eupatorium perfoliatum</i>	boneset	1	3	4	3	11	L4	FO	x	x	x
<i>Fagus grandifolia</i>	American beech	1	4	3	4	12	L4	TR	x	x	x
<i>Fraxinus nigra</i>	black ash	1	4	4	3	12	L4	TR			x
<i>Geranium maculatum</i>	wild geranium	2	3	4	3	12	L4	FO		x	x
<i>Geum fragarioides</i>	barren strawberry	2	4	4	3	13	L4	FO	x	x	x
<i>Juncus effusus</i>	soft rush	1	4	4	3	12	L4	RU	x	x	x
<i>Juncus nodosus</i>	knotted rush	2	2	5	3	12	L4	RU		p?	x
<i>Juncus torreyi</i>	Torrey's rush	2	3	4	2	11	L4	RU	x	p	x
<i>Juniperus virginiana</i>	red cedar	2	2	4	3	11	L4	TR		p	x
<i>Leersia virginica</i>	white grass	3	2	5	3	13	L4	GR			x
<i>Lemna turionifera</i>	turion duckweed	4	2	3	3	12	L4	FO		x	
<i>Lilium michiganense</i>	Michigan lily	1	4	3	5	13	L4	FO	x	x	x
<i>Lycopus americanus</i>	cut-leaved water-horehound	1	4	3	3	11	L4	FO		x	x
<i>Maianthemum canadense</i>	Canada May-flower	1	4	1	5	11	L4	FO		x	x
<i>Mimulus ringens</i>	square-stemmed monkey-flower	2	3	3	4	12	L4	FO	x	x	x
<i>Myosotis laxa</i>	smaller forget-me-not	2	4	3	4	13	L4	FO	x	x	x
<i>Penthorum sedoides</i>	ditch stonecrop	2	2	4	3	11	L4	FO	x	x	x
<i>Persicaria amphibia</i> var. <i>stipulacea</i>	water smartweed	3	2	4	3	12	L4	FO			x
<i>Persicaria pensylvanica</i>	Pennsylvania smartweed	2	2	4	3	11	L4	FO		x	x
<i>Polygonatum pubescens</i>	downy Solomon's seal	1	4	2	5	12	L4	FO		x	x
<i>Populus grandidentata</i>	large-toothed aspen	1	3	4	3	11	L4	TR	p?	x	
<i>Potamogeton foliosus</i>	leafy pondweed	1	3	5	4	13	L4	FO	p	x	p
<i>Quercus macrocarpa</i>	bur oak	1	4	3	3	11	L4	TR	x	x	x
<i>Quercus rubra</i>	red oak	1	4	2	4	11	L4	TR	p	x	x
<i>Ranunculus hispidus</i> var. <i>caricetorum</i>	swamp buttercup	2	4	4	3	13	L4	FO	x	x	x
<i>Rosa blanda</i>	smooth wild rose	2	3	3	4	12	L4	SH			x
<i>Rudbeckia hirta</i>	black-eyed Susan	1	4	4	3	12	L4	FO	p	x	p
<i>Sagittaria latifolia</i>	common arrowhead	1	2	5	4	12	L4	FO	x	x	x
<i>Salix amygdaloides</i>	peach-leaved willow	1	2	5	3	11	L4	TR	x	x	x
<i>Salix discolor</i>	pussy willow	1	3	4	3	11	L4	SH		x	x
<i>Schoenoplectus tabernaemontani</i>	soft-stemmed bulrush	1	2	5	3	11	L4	SE	p	x	x
<i>Scirpus cyperinus</i>	woolly bulrush	2	3	3	5	13	L4	SE			x
<i>Sium suave</i>	water-parsnip	2	2	4	4	12	L4	FO			x
<i>Spiraea alba</i>	wild spiraea	2	4	4	3	13	L4	SH	p	x	p
<i>Spirodela polyrrhiza</i>	greater duckweed	1	4	5	3	13	L4	FO			x
<i>Symphyotrichum oolentangiense</i>	sky-blue aster	2	1	4	4	11	L4	FO		x	x
<i>Symphyotrichum urophyllum</i>	arrow-leaved aster	2	3	4	4	13	L4	FO	x	x	x
<i>Thuja occidentalis</i>	white cedar	1	4	1	5	11	L4	TR	p	x	p
<i>Tiarella cordifolia</i>	foam-flower	1	3	3	4	11	L4	FO			x
<i>Trillium erectum</i>	red trillium	1	4	3	5	13	L4	FO	x		x
<i>Trillium grandiflorum</i>	white trillium	1	3	4	5	13	L4	FO	x	x	x
<i>Tsuga canadensis</i>	eastern hemlock	1	4	3	5	13	L4	TR	x	x	x
<i>Typha latifolia</i>	broad-leaved cattail	1	4	4	4	13	L4	FO	p	x	x
<i>Veronica americana</i>	American speedwell	2	3	4	4	13	L4	FO			x
<i>Viola cucullata</i>	marsh blue violet	2	3	4	4	13	L4	FO	x	x	x
<i>Viola sororia</i> var. <i>affinis</i>	Le Conte's violet	2	4	4	3	13	L4	FO	x	x	x
<i>Wolffia columbiana</i>	Columbia water-meal	2	4	5	2	13	L4	FO		x	x
<i>Acalypha rhomboidea</i>	three-seeded mercury	2	1	2	0	5	L5	FO		x	
<i>Acer saccharum</i> ssp. <i>saccharum</i>	sugar maple	1	3	0	2	6	L5	TR	x	x	x
<i>Achillea millefolium</i> ssp. <i>lanulosa</i>	woolly yarrow	1	2	0	1	4	L5	FO	x	x	x
<i>Actaea rubra</i> ssp. <i>rubra</i>	red baneberry	1	3	1	3	8	L5	FO	x	x	x
<i>Ageratina altissima</i> var. <i>altissima</i>	white snakeroot	1	2	2	1	6	L5	FO		x	x
<i>Agrimonia gryposepala</i>	agrimony	1	2	0	2	5	L5	FO	x	x	x
<i>Alisma triviale</i>	common water-plantain	1	2	4	2	9	L5	FO	x	x	x
<i>Ambrosia artemisiifolia</i>	common ragweed	1	1	3	0	5	L5	FO		x	x
<i>Ambrosia trifida</i>	giant ragweed	3	1	4	0	8	L5	FO			x
<i>Amphicarpaea bracteata</i>	hog-peanut	2	2	2	2	8	L5	VI	x	x	x
<i>Anemone canadensis</i>	Canada anemone	1	2	2	2	7	L5	FO	x	x	x

Appendix 2: List of Flora Species found at Claireville Study Area (2014-2015)

Scientific Name	Common Name	Local	Popn.	Hab.	Sens.	Total	Local	Plant	Block A (2015)	Block B (2015)	Block C (2014)
		Occur. 1-5	Trend 1-5	Dep. 0-5	Dev. 0-5	Score 2-20	Rank (2015)				
									(298 spp)	(359 spp)	(438 spp)
<i>Anemone virginiana</i>	common thimbleweed	1	3	0	3	7	L5	FO	x	x	x
<i>Apocynum androsaemifolium</i>	spreading dogbane	1	3	2	4	10	L5	FO		x	x
<i>Apocynum cannabinum</i>	hemp dogbane (sensu lato)	2	2	2	2	8	L5	FO			x
<i>Apocynum cannabinum</i> var. <i>hypericifolium</i>	clasping-leaved hemp dogbane	2	2	3	2	9	L5	FO			x
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	1	3	2	3	9	L5	FO	x	x	x
<i>Asclepias syriaca</i>	common milkweed	1	2	0	2	5	L5	FO	x	x	x
<i>Athyrium filix-femina</i> var. <i>angustum</i>	northeastern lady fern	1	3	1	3	8	L5	FE	x	x	
<i>Bidens cernua</i>	nodding bur-marigold	1	2	3	3	9	L5	FO	x	x	x
<i>Bidens frondosa</i>	common beggar's-ticks	1	1	4	0	6	L5	FO	x	x	x
<i>Bidens tripartita</i>	three-parted beggar's-ticks	2	2	4	2	10	L5	FO		x	x
<i>Calystegia sepium</i>	hedge bindweed (sensu lato)	2	2	3	2	9	L5	FO			x
<i>Carex arctata</i>	nodding wood sedge	1	4	2	3	10	L5	SE	x	x	x
<i>Carex bebbii</i>	Bebb's sedge	1	2	3	3	9	L5	SE		x	x
<i>Carex blanda</i>	common wood sedge	1	2	1	2	6	L5	SE	x	x	x
<i>Carex cristatella</i>	crested sedge	1	2	4	1	8	L5	FO	x	x	x
<i>Carex gracillima</i>	graceful sedge	1	3	4	2	10	L5	SE	x	x	x
<i>Carex granularis</i>	meadow sedge	1	2	1	3	7	L5	SE	x	x	x
<i>Carex pedunculata</i>	early-flowering sedge	1	3	3	3	10	L5	SE	x	x	x
<i>Carex radiata</i>	straight-styled sedge	1	2	2	2	7	L5	SE	x	x	x
<i>Carex rosea</i>	curly-styled sedge	1	2	3	2	8	L5	SE	x	x	x
<i>Carex stipata</i>	awl-fruited sedge	2	3	2	3	10	L5	SE	x		x
<i>Carex vulpinoidea</i>	fox sedge	1	2	4	1	8	L5	SE	x	x	x
<i>Cicuta maculata</i>	spotted water-hemlock	1	2	2	2	7	L5	FO		x	x
<i>Circaea canadensis</i> ssp. <i>canadensis</i>	enchanter's nightshade	1	1	1	1	4	L5	FO	x	x	x
<i>Clematis virginiana</i>	virgin's bower	1	2	2	3	8	L5	VW		x	x
<i>Clinopodium vulgare</i>	wild basil	2	3	1	3	9	L5	FO	x		x
<i>Cornus alternifolia</i>	alternate-leaved dogwood	1	2	1	2	6	L5	SH	x	x	x
<i>Cornus foemina</i> ssp. <i>racemosa</i>	grey dogwood	2	2	3	2	9	L5	SH		x	
<i>Cornus stolonifera</i>	red osier dogwood	1	2	0	3	6	L5	SH	p	x	x
<i>Crataegus punctata</i>	dotted hawthorn	1	2	3	3	9	L5	TR	x	x	x
<i>Cryptotaenia canadensis</i>	honorwort	2	2	4	1	9	L5	FO	x	x	x
<i>Diervilla lonicera</i>	bush honeysuckle	1	3	2	4	10	L5	SH	x	x	
<i>Dryopteris carthusiana</i>	spinulose wood fern	1	3	2	2	8	L5	FE	x	x	x
<i>Echinochloa muricata</i> var. <i>microstachya</i>	small-spiked barnyard grass	3	2	4	0	9	L5	GR		x	x
<i>Echinocystis lobata</i>	wild cucumber	1	2	3	1	7	L5	VI	x	x	x
<i>Eleocharis erythropoda</i>	creeping spike-rush	1	2	4	1	8	L5	SE	x	x	x
<i>Elymus virginicus</i> var. <i>virginicus</i>	Virginia wild rye	2	2	3	2	9	L5	GR		x	x
<i>Epilobium ciliatum</i> ssp. <i>ciliatum</i>	sticky willow-herb	1	2	2	2	7	L5	FO			x
<i>Epilobium coloratum</i>	purple-leaved willow-herb	1	3	4	2	10	L5	FO	x	x	
<i>Equisetum arvense</i>	field horsetail	1	2	1	1	5	L5	FE	x	x	x
<i>Equisetum hyemale</i> ssp. <i>affine</i>	scouring-rush	2	2	2	2	8	L5	FE		x	
<i>Erigeron annuus</i>	daisy fleabane	1	2	0	1	4	L5	FO	x	x	x
<i>Erigeron canadensis</i>	horse-weed	2	1	2	0	5	L5	FO		x	
<i>Erigeron philadelphicus</i> var. <i>philadelphicus</i>	Philadelphia fleabane	1	2	0	1	4	L5	FO	x	x	x
<i>Erigeron strigosus</i>	rough fleabane	2	2	1	1	6	L5	FO			x
<i>Erythronium americanum</i> ssp. <i>americanum</i>	yellow trout-lily	1	3	3	2	9	L5	FO	x	x	x
<i>Eurybia macrophylla</i>	big-leaved aster	1	3	2	4	10	L5	FO	x	x	x
<i>Euthamia graminifolia</i>	grass-leaved goldenrod	1	1	4	1	7	L5	FO		x	x
<i>Eutrochium maculatum</i> var. <i>maculatum</i>	spotted Joe-Pye weed	1	2	3	3	9	L5	FO	x	x	x
<i>Fragaria virginiana</i> ssp. <i>virginiana</i>	common wild strawberry	2	2	0	2	6	L5	FO	x	x	x
<i>Fraxinus americana</i>	white ash	1	2	0	3	6	L5	TR	x	x	x
<i>Fraxinus pennsylvanica</i>	red ash	1	2	0	3	6	L5	TR	x	x	x
<i>Galium aparine</i>	cleavers	2	1	3	2	8	L5	FO		x	
<i>Galium palustre</i>	marsh bedstraw	1	2	3	3	9	L5	FO	x	x	x
<i>Galium triflorum</i>	sweet-scented bedstraw	2	2	2	2	8	L5	FO			x
<i>Geum aleppicum</i>	yellow avens	1	3	3	2	9	L5	FO		x	x
<i>Geum canadense</i>	white avens	1	2	1	2	6	L5	FO	x	x	x
<i>Glyceria grandis</i>	tall manna grass	1	3	4	2	10	L5	GR			x
<i>Glyceria striata</i>	fowl manna grass	1	2	1	2	6	L5	GR	x		x
<i>Hackelia virginiana</i>	Virginia stickseed	1	2	0	2	5	L5	FO	x	x	x
<i>Helianthus tuberosus</i>	Jerusalem artichoke	2	1	2	0	5	L5	FO		x	
<i>Heracleum maximum</i>	cow-parsnip	2	2	3	2	9	L5	FO			x
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	1	2	1	2	6	L5	FO	x	x	x
<i>Impatiens capensis</i>	orange touch-me-not	1	2	0	2	5	L5	FO	x	x	x
<i>Juglans nigra</i>	black walnut	1	1	2	1	5	L5	TR		x	x
<i>Juncus articulatus</i>	jointed rush	1	2	4	2	9	L5	RU	x	x	x
<i>Juncus bufonius</i>	toad rush	2	1	4	1	8	L5	RU			x
<i>Juncus dudleyi</i>	Dudley's rush	1	2	3	1	7	L5	RU	x	x	x
<i>Juncus tenuis</i>	path rush	1	2	1	1	5	L5	RU		x	x
<i>Laportea canadensis</i>	wood nettle	1	3	2	2	8	L5	FO	x		x
<i>Leersia oryzoides</i>	rice cut grass	1	2	3	2	8	L5	GR		x	x
<i>Lemna minor</i>	common duckweed	1	2	4	2	9	L5	FO			x
<i>Lycopus uniflorus</i>	northern water-horehound	1	3	3	3	10	L5	FO	x	x	x
<i>Lysimachia ciliata</i>	fringed loosestrife	1	2	2	2	7	L5	FO	x	x	x
<i>Maianthemum racemosum</i> ssp. <i>racemosum</i>	false Solomon's seal	1	3	2	3	9	L5	FO	x	x	x
<i>Maianthemum stellatum</i>	starry false Solomon's seal	1	2	1	3	7	L5	FO	x	x	x
<i>Matteuccia struthiopteris</i> var. <i>pennsylvanica</i>	ostrich fern	1	2	2	2	7	L5	FE	x	x	x

Appendix 2: List of Flora Species found at Claireville Study Area (2014-2015)

Scientific Name	Common Name	Local Occur.	Popn. Trend	Hab. Dep.	Sens. Dev.	Total Score	Local Rank	Plant Type	Block A (2015)	Block B (2015)	Block C (2014)
		1-5	1-5	0-5	0-5	2-20	(2015)		(298 spp)	(359 spp)	(438 spp)
<i>Mentha arvensis</i> ssp. <i>borealis</i>	wild mint	1	2	3	2	8	L5	FO	x	x	x
<i>Monarda fistulosa</i>	wild bergamot	2	3	2	3	10	L5	FO	x	x	x
<i>Muhlenbergia mexicana</i> var. <i>mexicana</i>	common muhly grass	2	2	0	1	5	L5	GR		x	
<i>Nabulus altissimus</i>	tall wood lettuce	1	3	2	2	8	L5	FO			x
<i>Oenothera biennis</i>	common evening-primrose	1	1	1	1	4	L5	FO	x	x	x
<i>Onoclea sensibilis</i>	sensitive fern	1	3	1	3	8	L5	FE	x		x
<i>Ostrya virginiana</i>	ironwood	1	3	2	2	8	L5	TR	x	x	x
<i>Oxalis stricta</i>	common yellow wood-sorrel	1	1	1	1	4	L5	FO	x	x	x
<i>Panicum capillare</i>	panic grass	2	1	4	1	8	L5	GR			x
<i>Parthenocissus inserta</i>	thicket creeper	1	2	0	1	4	L5	VW	x	x	x
<i>Persicaria lapathifolia</i>	pale smartweed	2	1	4	0	7	L5	FO		x	x
<i>Phryma leptostachya</i>	lopseed	2	2	3	2	9	L5	FO			x
<i>Physalis heterophylla</i>	clammy ground-cherry	2	2	3	3	10	L5	FO			x
<i>Pilea pumila</i>	dwarf clearweed	1	2	1	1	5	L5	FO	x		x
<i>Plantago rugelii</i>	red-stemmed plantain	1	2	0	1	4	L5	FO	x	x	x
<i>Poa palustris</i>	fowl meadow-grass	1	2	3	2	8	L5	GR			x
<i>Podophyllum peltatum</i>	May-apple	1	3	3	2	9	L5	FO	x	x	x
<i>Populus balsamifera</i>	balsam poplar	1	2	3	2	8	L5	TR	x	x	x
<i>Populus tremuloides</i>	trembling aspen	1	3	1	3	8	L5	TR	x	x	x
<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>	heal-all (native)	1	2	3	2	8	L5	FO			x
<i>Prunus serotina</i>	black cherry	1	2	0	2	5	L5	TR	x	x	x
<i>Prunus virginiana</i> var. <i>virginiana</i>	choke cherry	1	2	0	1	4	L5	SH	x	x	x
<i>Ranunculus abortivus</i>	kidney-leaved buttercup	1	3	1	2	7	L5	FO	x	x	x
<i>Ranunculus recurvatus</i> var. <i>recurvatus</i>	hooked buttercup	1	3	2	3	9	L5	FO			x
<i>Ranunculus sceleratus</i>	cursed crowfoot	2	2	3	2	9	L5	FO	x	x	x
<i>Rhus typhina</i>	staghorn sumach	1	1	2	2	6	L5	SH	x	x	x
<i>Ribes americanum</i>	wild black currant	1	3	2	2	8	L5	SH	x	x	
<i>Ribes cynosbati</i>	prickly gooseberry	1	3	2	2	8	L5	SH	x	x	x
<i>Rubus allegheniensis</i>	common blackberry	1	3	0	1	5	L5	SH			x
<i>Rubus idaeus</i> ssp. <i>strigosus</i>	wild red raspberry	1	1	0	1	3	L5	SH	x	x	x
<i>Rubus occidentalis</i>	wild black raspberry	1	1	0	1	3	L5	SH	x	x	x
<i>Salix eriocephala</i>	narrow heart-leaved willow	1	1	3	1	6	L5	SH	p	x	x
<i>Salix interior</i>	sandbar willow	1	1	5	2	9	L5	SH	x	x	p
<i>Sambucus canadensis</i>	common elderberry	1	3	2	2	8	L5	SH	p	p	x
<i>Sambucus racemosa</i> ssp. <i>pubens</i>	red-berried elder	1	3	2	2	8	L5	SH	x	x	x
<i>Sanguinaria canadensis</i>	bloodroot	1	3	0	3	7	L5	FO	x	x	x
<i>Scirpus atrovirens</i>	black-fruited bulrush	1	2	4	2	9	L5	SE	x	x	x
<i>Scirpus microcarpus</i>	barber-pole bulrush	1	2	4	3	10	L5	SE	x	x	x
<i>Scutellaria galericulata</i>	common skullcap	2	2	3	2	9	L5	FO	x		
<i>Scutellaria lateriflora</i>	mad-dog skullcap	2	2	3	3	10	L5	FO			x
<i>Smilax herbacea</i>	carrion-flower	2	3	2	2	9	L5	VI		x	x
<i>Solidago altissima</i>	tall goldenrod	1	2	0	0	3	L5	FO	x	x	x
<i>Solidago caesia</i>	blue-stemmed goldenrod	1	2	4	2	9	L5	FO		x	x
<i>Solidago canadensis</i> var. <i>canadensis</i>	Canada goldenrod	1	2	0	1	4	L5	FO		x	x
<i>Solidago flexicaulis</i>	zig-zag goldenrod	1	1	3	2	7	L5	FO	x	x	x
<i>Solidago gigantea</i>	late goldenrod	1	1	1	1	4	L5	FO	x	x	x
<i>Solidago nemoralis</i> ssp. <i>nemoralis</i>	grey goldenrod	2	2	2	2	8	L5	FO		x	x
<i>Symphyotrichum cordifolium</i>	heart-leaved aster	1	1	0	2	4	L5	FO	x	x	x
<i>Symphyotrichum ericoides</i> var. <i>ericoides</i>	heath aster	1	1	2	1	5	L5	FO	x	x	x
<i>Symphyotrichum lanceolatum</i> var. <i>lanceolatum</i>	panicled aster	1	2	3	1	7	L5	FO	x	x	x
<i>Symphyotrichum lateriflorum</i> var. <i>lateriflorum</i>	calico aster	1	2	3	2	8	L5	FO	x	x	x
<i>Symphyotrichum novae-angliae</i>	New England aster	1	2	2	1	6	L5	FO	x	x	x
<i>Symphyotrichum puniceum</i> var. <i>puniceum</i>	swamp aster	1	2	2	2	7	L5	FO	x		x
<i>Symphyotrichum x amethystinum</i>	amethyst aster	3	2	2	2	9	L5	FO		x	x
<i>Thalictrum dioicum</i>	early meadow rue	1	3	3	2	9	L5	FO		x	x
<i>Thalictrum pubescens</i>	tall meadow rue	1	3	2	2	8	L5	FO	x	x	x
<i>Tilia americana</i>	basswood	1	3	2	3	9	L5	TR	x	x	x
<i>Toxicodendron radicans</i> var. <i>radicans</i>	poison ivy (vine form)	2	2	4	2	10	L5	VW			x
<i>Toxicodendron radicans</i> var. <i>rydbergii</i>	poison ivy (shrub form)	1	2	0	2	5	L5	SH	x	x	x
<i>Ulmus americana</i>	white elm	1	4	0	2	7	L5	TR	x	x	x
<i>Urtica dioica</i> ssp. <i>gracilis</i>	American stinging nettle	1	3	2	2	8	L5	FO	x	x	x
<i>Verbena hastata</i>	blue vervain	1	2	4	2	9	L5	FO		x	x
<i>Verbena urticifolia</i>	white vervain	1	2	2	2	7	L5	FO	x	x	x
<i>Viburnum lentago</i>	nannyberry	1	3	1	2	7	L5	SH	x	x	x
<i>Viola labradorica</i>	dog violet	1	2	0	2	5	L5	FO	x	x	x
<i>Viola pubescens</i>	stemmed yellow violet (sensu lato)	1	3	1	2	7	L5	FO	x		
<i>Viola pubescens</i> var. <i>pubescens</i>	downy yellow violet	3	4	1	2	10	L5	FO		x	x
<i>Viola sororia</i> var. <i>sororia</i>	common blue violet	1	2	0	2	5	L5	FO	x	x	x
<i>Vitis riparia</i>	riverbank grape	1	1	0	0	2	L5	VW	x	x	x
<i>Xanthium strumarium</i>	clotbur	2	1	4	0	7	L5	FO		x	x
<i>Acer negundo</i>	Manitoba maple	1	ns	ns	2	3	L+?	TR	x	x	x
<i>Agrostis stolonifera</i>	creeping bent grass	1	ns	ns	ns	1	L+?	GR	x	x	x
<i>Geranium robertianum</i>	herb Robert	1	ns	ns	ns	1	L+?	FO	x	x	x
<i>Persicaria hydropiper</i>	water-pepper	2	ns	ns	ns	2	L+?	FO		x	
<i>Phalaris arundinacea</i>	reed canary grass	1	ns	ns	ns	1	L+?	GR	x	x	x
<i>Potentilla norvegica</i>	rough cinquefoil	2	ns	ns	ns	2	L+?	FO			x
<i>Rosa virginiana</i>	Virginia rose	4	ns	ns	ns	4	L+?	SH		x	p

Appendix 2: List of Flora Species found at Claireville Study Area (2014-2015)

Scientific Name	Common Name	Local	Popn.	Hab.	Sens.	Total	Local	Plant	Block A (2015)	Block B (2015)	Block C (2014)
		Occur. 1-5	Trend 1-5	Dep. 0-5	Dev. 0-5	Score 2-20	Rank (2015)				
									(298 spp)	(359 spp)	(438 spp)
<i>Sporobolus neglectus</i>	overlooked dropseed	4	ns	ns	ns	4	L+?	GR		x	
<i>Acer platanoides</i>	Norway maple	1	ns	ns	ns	1	L+	TR			x
<i>Achillea millefolium</i> ssp. <i>millefolium</i>	European yarrow	3	ns	ns	ns	3	L+	FO			x
<i>Aegopodium podagraria</i>	goutweed	2	ns	ns	ns	2	L+	FO		x	x
<i>Agrostis gigantea</i>	redtop	1	ns	ns	ns	1	L+	GR	x	x	x
<i>Ajuga reptans</i>	common bugle	3	ns	ns	ns	3	L+	FO	x	x	
<i>Alliaria petiolata</i>	garlic mustard	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Alnus glutinosa</i>	European alder	2	ns	ns	ns	2	L+	TR	x	x	
<i>Alopecurus pratensis</i>	meadow foxtail	2	ns	ns	ns	2	L+	GR			x
<i>Arctium lappa</i>	great burdock	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Arctium minus</i>	common burdock	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Artemisia vulgaris</i>	common mugwort	3	ns	ns	ns	3	L+	FO	cf	cf	x
<i>Asparagus officinalis</i>	asparagus	2	ns	ns	ns	2	L+	FO			x
<i>Barbarea vulgaris</i>	winter cress	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Berberis thunbergii</i>	Japanese barberry	2	ns	ns	ns	2	L+	SH			x
<i>Bromus inermis</i>	smooth brome grass	1	ns	ns	ns	1	L+	GR	x	x	x
<i>Campanula rapunculoides</i>	creeping bellflower	2	ns	ns	ns	2	L+	FO	x	x	
<i>Caragana arborescens</i>	Siberian pea-shrub	3	ns	ns	ns	3	L+	SH			x
<i>Carduus acanthoides</i>	plumeless thistle	3	ns	ns	ns	3	L+	FO	x	x	x
<i>Carduus nutans</i> ssp. <i>nutans</i>	nodding thistle	2	ns	ns	ns	2	L+	FO			x
<i>Carex spicata</i>	spiked sedge	2	ns	ns	ns	2	L+	SE	x	x	x
<i>Catalpa speciosa</i>	northern catalpa	3	ns	ns	ns	3	L+	TR		x	
<i>Celastrus orbiculatus</i>	oriental bittersweet	2	ns	ns	ns	2	L+	VW			x
<i>Centaurea jacea</i>	brown knapweed	3	ns	ns	ns	3	L+	FO	x	x	x
<i>Centaurea stoebe</i> ssp. <i>micranthos</i>	spotted knapweed	2	ns	ns	ns	2	L+	FO		x	
<i>Cerastium arvense</i> ssp. <i>arvense</i>	field chickweed	3	ns	ns	ns	3	L+	FO	x	cf	x
<i>Cerastium fontanum</i>	mouse-ear chickweed	1	ns	ns	ns	1	L+	FO		x	x
<i>Chenopodium album</i>	lamb's quarters	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Cichorium intybus</i>	chicory	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Cirsium arvense</i>	creeping thistle	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Cirsium vulgare</i>	bull thistle	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Convallaria majalis</i>	lily-of-the-valley	1	ns	ns	ns	1	L+	FO		x	
<i>Convolvulus arvensis</i>	field bindweed	2	ns	ns	ns	2	L+	VI	x	x	x
<i>Cotoneaster acutifolius</i>	Peking cotoneaster	3	ns	ns	ns	3	L+	SH		x	
<i>Crataegus monogyna</i>	English hawthorn	1	1	4	ns	6	L+	TR	x	x	x
<i>Crataegus monogyna</i> x <i>punctata</i>	English - dotted hybrid hawthorn	3	ns	4	ns	7	L+	SH			x
<i>Cynanchum rossicum</i>	dog-strangling vine	1	ns	ns	ns	1	L+	VI	x	x	x
<i>Cynoglossum officinale</i>	hound's tongue	2	ns	ns	ns	2	L+	FO	x	x	
<i>Dactylis glomerata</i>	orchard grass	1	ns	ns	ns	1	L+	GR	x	x	x
<i>Daucus carota</i>	Queen Anne's lace	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Dianthus armeria</i>	Deptford pink	3	ns	ns	ns	3	L+	FO			x
<i>Digitaria ischaemum</i>	smooth crab grass	3	ns	ns	ns	3	L+	GR			x
<i>Digitaria sanguinalis</i>	hairy crab grass	3	ns	ns	ns	3	L+	GR		x	
<i>Dipsacus fullonum</i>	teasel	2	ns	ns	ns	2	L+	FO	x	x	x
<i>Echinochloa crus-galli</i>	barnyard grass	2	ns	ns	ns	2	L+	GR		x	
<i>Echium vulgare</i>	viper's bugloss	2	ns	ns	ns	2	L+	FO		x	x
<i>Elaeagnus angustifolia</i>	Russian olive	2	ns	ns	ns	2	L+	SH		x	x
<i>Elaeagnus umbellata</i>	autumn olive	2	ns	ns	ns	2	L+	SH			x
<i>Elymus repens</i>	quack grass	1	ns	ns	ns	1	L+	GR			x
<i>Epilobium hirsutum</i>	European willow-herb	2	ns	ns	ns	2	L+	FO			x
<i>Epilobium parviflorum</i>	small-flowered willow-herb	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Epipactis helleborine</i>	helleborine	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Fallopia convolvulus</i>	black bindweed	2	ns	ns	ns	2	L+	VI			x
<i>Festuca rubra</i> ssp. <i>rubra</i>	red fescue	1	ns	ns	ns	1	L+	GR		x	x
<i>Galeopsis tetrahit</i>	hemp-nettle	2	ns	ns	ns	2	L+	FO	x	x	x
<i>Galium mollugo</i>	white bedstraw	2	ns	ns	ns	2	L+	FO	x	x	x
<i>Galium verum</i>	yellow bedstraw	2	ns	ns	ns	2	L+	FO		x	x
<i>Geum urbanum</i>	urban avens	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Glechoma hederacea</i>	creeping Charlie	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Hemerocallis fulva</i>	orange day-lily	1	ns	ns	ns	1	L+	FO			x
<i>Hesperis matronalis</i>	dame's rocket	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Hippophae rhamnoides</i>	sea-buckthorn	4	ns	ns	ns	4	L+	SH			x
<i>Hordeum jubatum</i> ssp. <i>jubatum</i>	squirrel-tail barley	2	ns	ns	ns	2	L+	GR		x	
<i>Humulus japonicus</i>	Japanese hops	5	ns	ns	ns	5	L+	VI	x		
<i>Hypericum perforatum</i>	common St. John's-wort	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Inula helenium</i>	elecampane	2	ns	ns	ns	2	L+	FO	x	x	x
<i>Iris pseudacorus</i>	yellow flag	2	ns	ns	ns	2	L+	FO	x		x
<i>Lactuca serriola</i>	prickly lettuce	1	ns	ns	ns	1	L+	FO		x	
<i>Lamium maculatum</i>	spotted dead-nettle	3	ns	ns	ns	3	L+	FO			x
<i>Lamium purpureum</i>	purple dead-nettle	4	ns	ns	ns	4	L+	FO		cf	
<i>Leonurus cardiaca</i> ssp. <i>cardiaca</i>	motherwort	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Leucanthemum vulgare</i>	ox-eye daisy	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Linaria vulgaris</i>	butter-and-eggs	2	ns	ns	ns	2	L+	FO			x
<i>Lithospermum officinale</i>	Eurasian gromwell	2	ns	ns	ns	2	L+	FO	x	x	x
<i>Lolium perenne</i>	perennial rye	2	ns	ns	ns	2	L+	GR			x
<i>Lonicera morrowii</i>	Morrow's honeysuckle	1	ns	ns	ns	1	L+	SH	x	x	x
<i>Lonicera tatarica</i>	Tartarian honeysuckle	1	ns	ns	ns	1	L+	SH	x	x	x

Appendix 2: List of Flora Species found at Claireville Study Area (2014-2015)

Scientific Name	Common Name	Local	Popn.	Hab.	Sens.	Total	Local	Plant	Block A (2015)	Block B (2015)	Block C (2014)
		Occur. 1-5	Trend 1-5	Dep. 0-5	Dev. 0-5	Score 2-20	Rank (2015)				
									(298 spp)	(359 spp)	(438 spp)
<i>Lonicera x bella</i>	shrub honeysuckle	1	ns	ns	ns	1	L+	SH	x	x	x
<i>Lotus corniculatus</i>	bird's foot trefoil	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Lycopus europaeus</i>	European water-horehound	2	ns	ns	ns	2	L+	FO		x	x
<i>Lysimachia nummularia</i>	moneywort	2	ns	ns	ns	2	L+	FO	x	x	x
<i>Lythrum salicaria</i>	purple loosestrife	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Malus baccata</i>	Siberian crab-apple	4	ns	ns	ns	4	L+	TR		x	
<i>Malus pumila</i>	apple	1	ns	ns	ns	1	L+	TR	x	x	x
<i>Matricaria discoidea</i>	pineappleweed	2	ns	ns	ns	2	L+	FO			x
<i>Medicago lupulina</i>	black medick	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Medicago sativa</i> ssp. <i>sativa</i>	alfalfa	2	ns	ns	ns	2	L+	FO	x	x	x
<i>Melilotus albus</i>	white sweet clover	1	ns	ns	ns	1	L+	FO		x	x
<i>Melilotus officinalis</i>	yellow sweet clover	2	ns	ns	ns	2	L+	FO	x	x	x
<i>Mentha spicata</i>	spear mint	2	ns	ns	ns	2	L+	FO			x
<i>Nasturtium microphyllum</i>	small-leaved watercress	2	ns	ns	ns	2	L+	FO	x		x
<i>Nepeta cataria</i>	catnip	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Pastinaca sativa</i>	wild parsnip	2	ns	ns	ns	2	L+	FO	x	x	x
<i>Persicaria maculosa</i>	lady's thumb	2	ns	ns	ns	2	L+	FO		x	x
<i>Phleum pratense</i>	Timothy grass	1	ns	ns	ns	1	L+	GR	x	x	x
<i>Phragmites australis</i> ssp. <i>australis</i>	common reed	1	ns	5	ns	6	L+	GR	x	x	x
<i>Physalis alkekengi</i>	Chinese lantern	4	ns	ns	ns	4	L+	FO		x	
<i>Pilosella aurantiaca</i>	orange hawkweed	3	ns	ns	ns	3	L+	FO			x
<i>Pilosella caespitosa</i>	yellow hawkweed	1	ns	ns	ns	1	L+	FO			x
<i>Pilosella officinarum</i>	mouse-ear hawkweed	3	ns	ns	ns	3	L+	FO	x		
<i>Plantago lanceolata</i>	English plantain	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Plantago major</i>	common plantain	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Poa compressa</i>	flat-stemmed blue grass	1	ns	ns	ns	1	L+	GR		x	x
<i>Poa nemoralis</i>	woodland spear grass	2	ns	ns	ns	2	L+	GR	x	x	
<i>Poa pratensis</i> ssp. <i>pratensis</i>	Kentucky blue grass	1	ns	ns	ns	1	L+	GR	x	x	x
<i>Populus x canadensis</i>	Carolina poplar	2	ns	ns	ns	2	L+	TR			x
<i>Potamogeton crispus</i>	curly pondweed	2	ns	ns	ns	2	L+	FO	x	x	
<i>Potentilla argentea</i>	silvery cinquefoil	3	ns	ns	ns	3	L+	FO			x
<i>Potentilla recta</i>	sulphur cinquefoil	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Prunus avium</i>	mazzard cherry	2	ns	ns	ns	2	L+	TR	x		
<i>Pyrus communis</i>	pear	2	ns	ns	ns	2	L+	TR		x	x
<i>Ranunculus acris</i>	tall buttercup	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Ranunculus repens</i>	creeping buttercup	2	ns	ns	ns	2	L+	FO	x	x	x
<i>Rhamnus cathartica</i>	common buckthorn	1	ns	ns	ns	1	L+	SH	x	x	x
<i>Ribes rubrum</i>	garden red currant	1	ns	ns	ns	1	L+	SH	x	x	x
<i>Robinia pseudoacacia</i>	black locust	1	ns	ns	ns	1	L+	TR	x	x	x
<i>Rosa canina</i>	dog rose	3	ns	ns	ns	3	L+	SH		cf	x
<i>Rosa multiflora</i>	multiflora rose	1	ns	ns	ns	1	L+	SH	x	x	x
<i>Rosa rubiginosa</i> var. <i>rubiginosa</i>	sweet brier rose	4	ns	ns	ns	4	L+	SH			x
<i>Rudbeckia triloba</i>	brown-eyed Susan	2	ns	ns	ns	2	L+	FO			x
<i>Rumex crispus</i>	curly dock	1	ns	ns	ns	1	L+	FO	x		x
<i>Rumex obtusifolius</i>	bitter dock	2	ns	ns	ns	2	L+	FO			x
<i>Salix alba</i>	white willow	2	ns	ns	ns	2	L+	TR	x	x	x
<i>Salix caprea</i>	goat willow	4	ns	ns	ns	4	L+	SH		x	
<i>Salix x fragilis</i>	crack willow	1	ns	ns	ns	1	L+	TR	x	x	x
<i>Salix x sepulcralis</i>	weeping willow	1	ns	ns	ns	1	L+	TR	x	x	x
<i>Saponaria officinalis</i>	bouncing Bet	2	ns	ns	ns	2	L+	FO		x	
<i>Schedonorus arundinaceus</i>	tall fescue	2	ns	ns	ns	2	L+	GR	x	x	x
<i>Schedonorus pratensis</i>	meadow fescue	1	ns	ns	ns	1	L+	GR	x		x
<i>Securigera varia</i>	crown vetch	1	ns	ns	ns	1	L+	FO		x	x
<i>Setaria faberi</i>	giant foxtail	3	ns	ns	ns	3	L+	GR			x
<i>Setaria pumila</i> ssp. <i>pumila</i>	yellow foxtail	2	ns	ns	ns	2	L+	GR		x	x
<i>Setaria viridis</i>	green foxtail	2	ns	ns	ns	2	L+	GR			x
<i>Sinapis arvensis</i>	charlock	2	ns	ns	ns	2	L+	FO		x	
<i>Solanum dulcamara</i>	bittersweet nightshade	1	ns	ns	ns	1	L+	VW	x	x	x
<i>Sonchus arvensis</i> ssp. <i>arvensis</i>	glandular perennial sow-thistle	1	ns	ns	ns	1	L+	FO		x	x
<i>Sorbaria sorbifolia</i>	false spiraea	3	ns	ns	ns	3	L+	SH			x
<i>Sorbus aucuparia</i>	European mountain-ash	1	ns	ns	ns	1	L+	TR			x
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	western snowberry	2	ns	ns	ns	2	L+	SH	x	x	x
<i>Symphytum officinale</i>	common comfrey	2	ns	ns	ns	2	L+	FO	x	x	x
<i>Syringa vulgaris</i>	common lilac	1	ns	ns	ns	1	L+	SH	x	x	x
<i>Tanacetum vulgare</i>	tansy	2	ns	ns	ns	2	L+	FO			x
<i>Taraxacum erythrospermum</i>	red-seeded dandelion	5	ns	ns	ns	5	L+	FO	x		
<i>Taraxacum officinale</i>	dandelion	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Torilis japonica</i>	hedge-parsley	2	ns	ns	ns	2	L+	FO	x	x	x
<i>Tragopogon dubius</i>	lemon-yellow goat's beard	1	ns	ns	ns	1	L+	FO			x
<i>Tragopogon pratensis</i>	meadow goat's beard	2	ns	ns	ns	2	L+	FO			x
<i>Trifolium campestre</i>	large hop-clover	5	ns	ns	ns	5	L+	FO			x
<i>Trifolium pratense</i>	red clover	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Trifolium repens</i>	white clover	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Tripleurospermum inodorum</i>	scentless chamomile	2	ns	ns	ns	2	L+	FO	x		
<i>Tussilago farfara</i>	coltsfoot	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Typha angustifolia</i>	narrow-leaved cattail	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Typha x glauca</i>	hybrid cattail	1	ns	ns	ns	1	L+	FO	x	x	x

Appendix 2: List of Flora Species found at Claireville Study Area (2014-2015)

Scientific Name	Common Name	Local Occur.	Popn. Trend	Hab. Dep.	Sens. Dev.	Total Score	Local Rank	Plant Type	Block A (2015)	Block B (2015)	Block C (2014)
		1-5	1-5	0-5	0-5	2-20	(2015)				
									(298 spp)	(359 spp)	(438 spp)
<i>Urtica dioica</i> ssp. <i>dioica</i>	European stinging nettle	2	ns	ns	ns	2	L+	FO	x		
<i>Verbascum thapsus</i>	common mullein	1	ns	ns	ns	1	L+	FO		x	x
<i>Veronica officinalis</i>	common speedwell	2	ns	ns	ns	2	L+	FO	x	x	x
<i>Veronica serpyllifolia</i> ssp. <i>serpyllifolia</i>	thyme-leaved speedwell	1	ns	ns	ns	1	L+	FO	x	x	x
<i>Viburnum lantana</i>	wayfaring tree	2	ns	ns	ns	2	L+	SH	x	x	
<i>Viburnum opulus</i> ssp. <i>opulus</i>	European highbush cranberry	1	ns	ns	ns	1	L+	SH	x	x	x
<i>Vicia cracca</i>	cow vetch	1	ns	ns	ns	1	L+	VI	x	x	x
<i>Salsola kali</i>	Russian thistle						L+	FO	x		x
<i>Sanguisorba</i> sp.	burnet sp.						L+		x		x
<i>Aronia melanocarpa</i>	black choke-berry	3	5	5	4	17	L2	SH		p	
<i>Heliopsis helianthoides</i>	ox-eye	5	5	4	4	18	L2	FO			p
<i>Picea mariana</i>	black spruce	3	4	5	5	17	L2	TR			p?
<i>Pinus resinosa</i>	red pine	2	5	5	5	17	L2	TR	p		p
<i>Schizachyrium scoparium</i>	little bluestem	4	4	5	5	18	L2	GR	p		
<i>Sorghastrum nutans</i>	Indian grass	5	4	5	4	18	L2	GR	p	p	
<i>Alnus incana</i> ssp. <i>rugosa</i>	speckled alder	1	4	4	5	14	L3	SH	p		p
<i>Andropogon gerardii</i>	big bluestem	3	3	4	4	14	L3	GR	p	p	
<i>Bolboschoenus fluviatilis</i>	river bulrush	3	2	5	4	14	L3	SE			p
<i>Cephalanthus occidentalis</i>	buttonbush	3	4	4	3	14	L3	SH			p
<i>Doellingeria umbellata</i> var. <i>umbellata</i>	flat-topped aster	3	4	3	4	14	L3	FO	p		
<i>Ilex verticillata</i>	winterberry	2	4	4	5	15	L3	SH		p	p
<i>Larix laricina</i>	tamarack	2	4	4	4	14	L3	TR	p		p
<i>Lobelia siphilitica</i>	great blue lobelia	2	3	4	5	14	L3	FO		p	
<i>Panicum virgatum</i>	switch grass	3	2	5	5	15	L3	GR	p	p	p
<i>Physocarpus opulifolius</i>	ninebark	3	2	5	4	14	L3	SH	x		p
<i>Picea glauca</i>	white spruce	1	5	4	4	14	L3	TR	p	p	p
<i>Pycnanthemum virginianum</i>	Virginia mountain-mint	5	2	5	3	15	L3	FO		p	
<i>Salix lucida</i>	shining willow	2	4	5	3	14	L3	SH	p	p	
<i>Amelanchier sanguinea</i>	round-leaved serviceberry	3	2	3	4	12	L4	SH	p		
<i>Betula papyrifera</i>	paper birch	1	4	2	4	11	L4	TR	p		p
<i>Elymus canadensis</i>	Canada wild rye	3	2	5	3	13	L4	GR	p	p	p
<i>Pinus strobus</i>	white pine	1	4	3	4	12	L4	TR	p	p	p
<i>Rudbeckia laciniata</i>	cut-leaved coneflower	3	2	4	2	11	L4	FO		p	p
<i>Salix bebbiana</i>	Bebb's willow	1	3	3	4	11	L4	SH			p
<i>Salix petiolaris</i>	slender willow	2	3	5	3	13	L4	SH			p
<i>Schoenoplectus pungens</i> var. <i>pungens</i>	three-square	3	2	5	3	13	L4	SE			p
<i>Stuckenia pectinata</i>	sago pondweed	2	2	5	3	12	L4	FO		p	
<i>Desmodium canadense</i>	showy tick-trefoil	2	2	3	3	10	L5	FO	p		
<i>Populus deltoides</i>	cottonwood	1	1	4	1	7	L5	TR	p?	p	pr
<i>Helianthus giganteus</i>	tall sunflower	5	2	4	3	14	LX	FO		p	
<i>Acer tataricum</i> ssp. <i>ginnala</i>	Amur maple	3	ns	ns	2	5	L+	SH			pr
<i>Amelanchier alnifolia</i>							L+		p		
<i>Avena sativa</i>	oats	5	ns	ns	ns	5	L+	GR			p
<i>Betula pendula</i>	European white birch	2	ns	ns	ns	2	L+	TR		p	
<i>Bidens coronata</i>							L+		p		
<i>Cannabis sativa</i>	marijuana	5	ns	ns	ns	5	L+	FO		p	
<i>Celtis occidentalis</i>	hackberry	4	ns	ns	ns	4	L+	TR	p		p
<i>Coreopsis tripteris</i>	tall tickseed	5	ns	ns	ns	5	L+	FO		p	
<i>Gleditsia triacanthos</i>	honey locust	3	ns	ns	ns	3	L+	TR	p		p
<i>Larix decidua</i>	European larch	3	ns	ns	ns	3	L+	TR	p		p
<i>Picea abies</i>	Norway spruce	3	ns	ns	ns	3	L+	TR		p	p
<i>Picea pungens</i>	Colorado spruce	5	ns	ns	ns	5	L+	TR		p	p
<i>Pinus banksiana</i>	Jack pine	5	ns	ns	ns	5	L+	TR			p
<i>Pinus nigra</i>	Austrian pine	4	ns	ns	ns	4	L+	TR	p		
<i>Pinus sylvestris</i>	Scots pine	2	ns	ns	ns	2	L+	TR			pr
<i>Persicaria orientalis</i>	prince's feather	4	ns	ns	ns	4	L+	FO		p	
<i>Rhus aromatica</i>	fragrant sumach	4	ns	ns	ns	4	L+	SH		p	p
<i>Salix matsudana</i>	corkscrew willow	3	ns	ns	ns	3	L+	TR		p	
<i>Salix purpurea</i>	purple-osier willow	3	ns	ns	ns	3	L+	SH		p	
<i>Spiraea x vanhouttei</i>	bridalwreath spiraea	4	ns	ns	ns	4	L+	SH	p		
<i>Viburnum recognitum</i>	southern arrow-wood	5	ns	ns	ns	5	L+	SH	p	p	
<i>Liriodendron tulipifera</i>	tulip tree						L+	TR	p		

Common Name	Scientific Name	Code	LO	PTn	PTt	AS	PIS	StD	HD	+	TS	L-Rank
-------------	-----------------	------	----	-----	-----	----	-----	-----	----	---	----	--------

Survey Species: species for which the TRCA protocol effectively surveys.

Birds

black and white warbler	<i>Mniotilta varia</i>	BAWW	2	3	3	4	2	5	2	1	22	L2
bobolink	<i>Dolichonyx oryzivorus</i>	BOBO	1	4	4	3	1	5	1	1	20	L2
ovenbird	<i>Seiurus aurocapillus</i>	OVEN	1	1	3	4	2	5	4	1	21	L2
ruffed grouse	<i>Bonasa umbellus</i>	RUGR	1	2	3	3	3	5	2	1	20	L2
American redstart	<i>Setophaga ruticilla</i>	AMRE	0	3	2	3	1	4	2	0	15	L3
American woodcock	<i>Scolopax minor</i>	AMWO	0	2	2	3	2	4	2	0	15	L3
bank swallow	<i>Riparia riparia</i>	BANS	1	5	2	1	1	3	3	0	16	L3
black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	BBCU	1	2	3	3	1	3	3	0	16	L3
brown creeper	<i>Certhia americana</i>	BRCR	1	2	2	3	2	4	2	0	16	L3
brown thrasher	<i>Toxostoma rufum</i>	BRTH	0	4	3	2	2	4	1	0	16	L3
clay-coloured sparrow	<i>Spizella pallida</i>	CCSP	2	4	2	2	1	4	1	0	16	L3
eastern meadowlark	<i>Sturnella magna</i>	EAME	0	2	3	3	1	5	1	1	16	L3
eastern towhee	<i>Pipilo erythrophthalmus</i>	EATO	2	4	2	2	2	4	1	0	17	L3
hooded merganser	<i>Lophodytes cucullatus</i>	HOME	2	2	1	4	2	2	2	0	15	L3
horned lark	<i>Eremophila alpestris</i>	HOLA	1	4	2	2	1	3	2	0	15	L3
marsh wren	<i>Cistothorus palustris</i>	MAWR	3	2	2	3	3	3	3	0	19	L3
mourning warbler	<i>Geothlypis philadelphia</i>	MOWA	1	4	3	2	2	4	2	0	18	L3
pileated woodpecker	<i>Dryocopus pileatus</i>	PIWO	0	2	2	4	1	3	3	0	15	L3
sedge wren	<i>Cistothorus platensis</i>	SEWR	3	1	2	3	3	4	1	0	17	L3
vesper sparrow	<i>Poocetes gramineus</i>	VESP	1	3	2	2	2	5	1	1	17	L3
Virginia rail	<i>Rallus limicola</i>	VIRA	1	2	2	2	3	4	3	0	17	L3
wild turkey	<i>Meleagris gallopavo</i>	WITU	0	1	0	4	3	3	4	0	15	L3
wood thrush	<i>Hylocichla mustelina</i>	WOTH	0	4	2	3	2	4	2	0	17	L3
American kestrel	<i>Falco sparverius</i>	AMKE	2	2	2	1	1	0	2	0	10	L4
barn swallow	<i>Hirundo rustica</i>	BARS	0	4	2	1	1	1	2	0	11	L4
belted kingfisher	<i>Ceryle alcyon</i>	BEKI	0	3	2	2	1	2	2	0	12	L4
blue-grey gnatcatcher	<i>Poliophtila caerulea</i>	BGGN	0	1	1	3	1	3	1	0	10	L4
common yellowthroat	<i>Geothlypis trichas</i>	COYE	0	3	2	1	2	4	1	0	13	L4
Cooper's hawk	<i>Accipiter cooperii</i>	COHA	0	2	2	4	1	2	3	0	13	L4
eastern bluebird	<i>Sialia sialis</i>	EABL	2	1	1	2	1	2	2	0	11	L4
eastern kingbird	<i>Tyrannus tyrannus</i>	EAKI	0	4	2	2	1	3	1	0	13	L4
eastern screech-owl	<i>Megascops asio</i>	EASO	0	2	2	1	2	3	3	0	13	L4
eastern wood-pewee	<i>Contopus virens</i>	EAWP	0	4	2	2	1	3	1	0	13	L4
field sparrow	<i>Spizella pusilla</i>	FISP	0	2	3	2	1	4	1	0	13	L4
great-crested flycatcher	<i>Myiarchus crinitus</i>	GCFL	0	2	2	3	1	2	2	0	12	L4
great-horned owl	<i>Bubo virginianus</i>	GHOW	0	2	2	2	2	2	1	0	11	L4

Appendix 3: List of Fauna Species within Study Area

Common Name	Scientific Name	Code	LO	PTn	PTt	AS	PIS	StD	HD	+	TS	L-Rank
green heron	<i>Butorides virescens</i>	GRHE	0	3	2	2	1	4	2	0	14	L4
grey catbird	<i>Dumetella carolinensis</i>	GRCA	0	3	2	1	1	3	1	0	11	L4
hairy woodpecker	<i>Picoides villosus</i>	HAWO	0	2	2	3	1	2	2	0	12	L4
indigo bunting	<i>Passerina cyanea</i>	INBU	0	3	2	1	1	4	2	0	13	L4
northern flicker	<i>Colaptes auratus</i>	NOFL	0	4	2	1	1	3	2	0	13	L4
northern rough-winged swallow	<i>Stelgidoptery x serripennis</i>	NRWS	0	3	2	1	1	2	3	0	12	L4
pine warbler	<i>Setophaga pinus</i>	PIWA	0	1	2	4	1	3	3	0	14	L4
red-bellied woodpecker	<i>Melanerpes carolinus</i>	RBWO	1	1	1	3	1	2	2	0	11	L4
red-breasted nuthatch	<i>Sitta canadensis</i>	RBNU	0	1	2	3	1	2	1	0	10	L4
red-eyed vireo	<i>Vireo olivaceus</i>	REVI	0	1	2	2	1	3	1	0	10	L4
rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	RBGR	0	3	2	3	1	3	2	0	14	L4
savannah sparrow	<i>Passerculus sandwichensis</i>	SAVS	0	4	2	1	1	4	1	0	13	L4
spotted sandpiper	<i>Actitis macularia</i>	SPSA	0	3	2	1	2	4	1	0	13	L4
swamp sparrow	<i>Melospiza georgiana</i>	SWSP	0	1	2	1	2	5	1	1	13	L4
tree swallow	<i>Tachycineta bicolor</i>	TRES	0	4	2	1	1	2	2	0	12	L4
turkey vulture	<i>Cathartes aura</i>	TUVU	2	1	1	1	1	1	2	0	9	L4
white-breasted nuthatch	<i>Sitta carolinensis</i>	WBNU	0	2	2	3	1	2	2	0	12	L4
willow flycatcher	<i>Empidonax traillii</i>	WIFL	0	4	2	1	1	3	1	0	12	L4
wood duck	<i>Aix sponsa</i>	WODU	0	2	1	3	2	4	2	0	14	L4
American Crow	<i>Corvus brachyrhynchos</i>	AMCR	0	1	2	1	1	0	0	0	5	L5
American goldfinch	<i>Carduelis tristis</i>	AMGO	0	3	2	1	1	1	0	0	8	L5
American robin	<i>Turdus migratorius</i>	AMRO	0	1	2	1	1	1	0	0	6	L5
Baltimore oriole	<i>Icterus galbula</i>	BAOR	0	4	2	1	1	1	0	0	9	L5
black-capped chickadee	<i>Parus atricapillus</i>	BCCH	0	1	2	1	1	1	0	0	6	L5
blue jay	<i>Cyanocitta cristata</i>	BLJA	0	3	2	1	1	1	0	0	8	L5
brown-headed cowbird	<i>Molothrus ater</i>	BHCO	0	3	2	1	1	1	0	0	8	L5
Canada goose	<i>Branta canadensis</i>	CANG	0	0	2	1	2	0	1	0	6	L5
cedar waxwing	<i>Bombycilla cedrorum</i>	CEDW	0	1	2	1	1	1	0	0	6	L5
chipping sparrow	<i>Spizella passerina</i>	CHSP	0	3	2	1	1	2	0	0	9	L5
cliff swallow	<i>Petrochelidon pyrrhonota</i>	CLSW	1	1	2	1	1	1	2	0	9	L5
common grackle	<i>Quiscalus quiscula</i>	COGR	0	4	2	1	1	1	0	0	9	L5
downy woodpecker	<i>Picoides pubescens</i>	DOWO	0	1	2	1	1	1	1	0	7	L5
eastern phoebe	<i>Sayornis phoebe</i>	EAPH	0	1	2	1	1	1	2	0	8	L5
house wren	<i>Troglodytes aedon</i>	HOWR	0	1	2	1	2	1	1	0	8	L5
killdeer	<i>Charadrius vociferus</i>	KILL	0	2	2	1	2	2	0	0	9	L5
mallard	<i>Anas platyrhynchos</i>	MALL	0	1	2	1	2	1	0	0	7	L5
mourning dove	<i>Zenaida macroura</i>	MODO	0	3	2	1	1	0	0	0	7	L5
northern cardinal	<i>Cardinalis cardinalis</i>	NOCA	0	1	2	1	1	2	1	0	8	L5

Appendix 3: List of Fauna Species within Study Area

Common Name	Scientific Name	Code	LO	PTn	PTt	AS	PIS	StD	HD	+	TS	L-Rank
northern mockingbird	<i>Mimus polyglottos</i>	NOMO	0	3	2	1	1	1	1	0	9	L5
orchard oriole	<i>Icterus spurius</i>	OROR	0	3	1	1	1	1	0	0	7	L5
red-tailed hawk	<i>Buteo jamaicensis</i>	RTHA	0	2	2	2	1	1	1	0	9	L5
red-winged blackbird	<i>Agelaius phoeniceus</i>	RWBL	0	3	2	1	1	2	0	0	9	L5
song sparrow	<i>Melospiza melodia</i>	SOSP	0	3	2	1	1	2	0	0	9	L5
warbling vireo	<i>Vireo gilvus</i>	WAVI	0	1	2	1	1	2	1	0	8	L5
yellow warbler	<i>Setophaga petechia</i>	YWAR	0	3	2	1	1	2	0	0	9	L5
European starling	<i>Sturnus vulgaris</i>	EUST		4								L+
house finch	<i>Carpodacus mexicanus</i>	HOFI		1								L+
house sparrow	<i>Passer domesticus</i>	HOSP	1	4								L+
rock dove	<i>Columba livia</i>	ROPI	0	4								L+

Herpetofauna

western chorus frog	<i>Pseudacris triseriata</i>	MICF	3	3	3	2	4	5	3	1	24	L2
wood frog	<i>Lithobates sylvatica</i>	WOFR	0	2	2	3	4	5	3	1	20	L2
northern leopard frog	<i>Lithobates pipiens</i>	LEFR	0	3	2	1	4	5	2	1	18	L3
American toad	<i>Anaxyrus americanus</i>	AMTO	0	3	2	1	4	4	0	0	14	L4
green frog	<i>Lithobates clamitans</i>	GRFR	0	2	2	1	3	4	1	0	13	L4

Incidental Species: species that are reported on as incidental to the TRCA protocol.

Mammals

fisher	<i>Blarina brevicauda</i>	FISH										L2
meadow jumping mouse	<i>Zapus hudsonius</i>	MJMO	3	2	2	2	3	3	2	0	17	L3
northern short-tailed shrew	<i>Blarina brevicauda</i>	NSTS	3	2	2	1	2	4	2	0	16	L3
beaver	<i>Castor canadensis</i>	BEAV	0	2	2	2	3	3	1	0	13	L4
deer mouse	<i>Peromyscus maniculatus</i>	DEMO	3	2	2	1	2	1	0	0	11	L4
eastern chipmunk	<i>Tamias striatus</i>	EACH	0	2	2	2	3	3	1	0	13	L4
eastern cottontail	<i>Sylvilagus floridanus</i>	EACO	0	2	2	1	3	2	1	0	11	L4
mink	<i>Mustela vison</i>	MINK	1	2	2	3	3	3	0	0	14	L4
muskrat	<i>Ondatra zibethicus</i>	MUSK	0	2	2	1	3	3	1	0	12	L4
red squirrel	<i>Tamiasciurus hudsonicus</i>	RESQ	0	2	2	1	3	2	1	0	11	L4
white-footed mouse	<i>Peromyscus leucopus</i>	WFMO	4	2	2	1	2	1	0	0	12	L4
white-tailed deer	<i>Odocoileus virginianus</i>	WTDE	0	2	1	3	2	1	2	0	11	L4
grey squirrel	<i>Sciurus carolinensis</i>	GRSQ	0	2	2	1	3	0	0	0	8	L5
raccoon	<i>Procyon lotor</i>	RACC	0	2	2	1	3	0	1	0	9	L5
striped skunk	<i>Mephitis mephitis</i>	STSK	1	2	2	1	3	0	0	0	9	L5

Appendix 3: List of Fauna Species within Study Area

Common Name	Scientific Name	Code	LO	PTn	PTt	AS	PIS	StD	HD	+	TS	L-Rank
-------------	-----------------	------	----	-----	-----	----	-----	-----	----	---	----	--------

Herpetofauna

spotted salamander	<i>Ambystoma maculatum</i>	YSSA	3	3	2	3	5	5	4	2	27	L1
red-bellied snake	<i>Storeria occipitomaculata occipitomaculata</i>	RBSN	2	2	2	2	3	5	1	1	18	L3
Dekay's brownsnake	<i>Storeria dekayi</i>	BRSN	2	2	2	1	3	4	0	0	14	L4
eastern gartersnake	<i>Thamnophis sirtalis sirtalis</i>	EAGA	0	2	2	1	3	3	0	0	11	L4

Invertebrates

"chimney" crayfish	<i>Fallicambarus fodiens</i>	CHCR	1	3	2	1	4	5	2	1	19	L3
--------------------	------------------------------	------	---	---	---	---	---	---	---	---	----	----

LEGEND

LO = local occurrence	PIS = Patch Isolation Sensitivity
PTn = Continental population trend	STD = sensitivity to development
PTt = TRCA population trend	+ = additional points
HD = habitat dependence	TS = total score
AS = area sensitivity	L-rank = TRCA Rank, October, 2008

L1 - Unable to withstand disturbance; many criteria are limiting factors; generally occur in high-quality natural areas in natural matrix; almost certainly rare in the TRCA jurisdiction; of concern regionally.

L2 - Unable to withstand disturbance; some criteria are very limiting factors; generally occur in high-quality natural areas, in natural matrix; probably rare in the TRCA jurisdiction; of concern regionally.

L3 - Able to withstand minor disturbance; generally secure in natural matrix; considered to be of regional concern.

L4 - Able to withstand some disturbance; generally secure in rural matrix; of concern in urban matrix.

L5 - Able to withstand high levels of disturbance; generally secure throughout the jurisdiction, including the urban matrix. May be of very localized concern in highly degraded areas.

L+ - non-native, introduced species

Common Name	Code	1999	2001	2007	2011	2012	2013	2014	2015	L-Rank
number of individual territories										

Survey Species: species for which the TRCA protocol effectively surveys.

Birds

American redstart	AMRE								8	L3
eastern meadowlark	EAME	(1)	1							L3
wild turkey	WITU						1		1	L3
wood thrush	WOTH		(2)						4	L3
barn swallow	BARS				1				2	L4
belted kingfisher	BEKI								1	L4
blue-grey gnatcatcher	BGGN	1			1				1	L4
common yellowthroat	COYE				(1)				5	L4
Cooper's hawk	COHA								1	L4
eastern kingbird	EAKI				(1)		(1)	(1)	3	L4
eastern wood-pewee	EAWP								3	L4
field sparrow	FISP				(1)		(1)	(1)	2	L4
great-crested flycatcher	GCFL				(1)				1	L4
grey catbird	GRCA								14	L4
hairy woodpecker	HAWO				1					L4
indigo bunting	INBU				(1)	(1)			1	L4
northern flicker	NOFL				(1)	(1)		(1)	3	L4
northern rough-winged swallow	NRWS								3	L4
red-eyed vireo	REVI						(1)		4	L4
rose-breasted grosbeak	RBGR	1				(1)			3	L4
savannah sparrow	SAVS				(1)				1	L4
tree swallow	TRES								3	L4
white-breasted nuthatch	WBNU								3	L4
willow flycatcher	WIFL	3							1	L4
American Crow	AMCR									L5
American goldfinch	AMGO									L5
American robin	AMRO									L5
Baltimore oriole	BAOR									L5
black-capped chickadee	BCCH									L5
blue jay	BLJA									L5
brown-headed cowbird	BHCO									L5
cedar waxwing	CEDW									L5
chipping sparrow	CHSP									L5
cliff swallow	CLSW								1	L5
common grackle	COGR									L5
downy woodpecker	DOWO									L5
eastern phoebe	EAPH								1	L5
house wren	HOWR									L5
mallard	MALL									L5
mourning dove	MODO									L5
northern cardinal	NOCA									L5
northern mockingbird	NOMO									L5
orchard oriole	OROR				(1)	1				L5
red-tailed hawk	RTHA									L5
red-winged blackbird	RWBL									L5
song sparrow	SOSP									L5
warbling vireo	WAVI									L5
yellow warbler	YWAR									L5
European starling	EUST									L+
house sparrow	HOSP									L+

Common Name	Code	1999	2001	2007	2011	2012	2013	2014	2015	L-Rank
		number of individual territories								
rock dove	ROPI									L+

Herpetofauna

wood frog	WOFR			(2)					2	L2
American toad	AMTO								1	L4
green frog	GRFR								3	L4

Incidental Species: species that are reported on as incidental to the TRCA protocol.

Mammals

meadow jumping mouse	MJMO								1	L3
beaver	BEAV								1	L4
eastern chipmunk	EACH								1	L4
white-tailed deer	WTDE								1	L4
grey squirrel	GRSQ									L5
raccoon	RACC									L5

Herpetofauna

spotted salamander	YSSA			2	1					L1
eastern gartersnake	EAGA								1	L4

Invertebrates

"chimney" crayfish	CHCR								2	L2
--------------------	------	--	--	--	--	--	--	--	---	----

numbers in parentheses refer to territories that have been re-encountered in subsequent years.

L1 - Unable to withstand disturbance; many criteria are limiting factors; generally occur in high-quality natural areas in natural matrix; almost certainly rare in the TRCA jurisdiction; of concern regionally.

L2 - Unable to withstand disturbance; some criteria are very limiting factors; generally occur in high-quality natural areas, in natural matrix; probably rare in the TRCA jurisdiction; of concern regionally.

L3 - Able to withstand minor disturbance; generally secure in natural matrix; considered to be of regional concern.

L4 - Able to withstand some disturbance; generally secure in rural matrix; of concern in urban matrix.

L5 - Able to withstand high levels of disturbance; generally secure throughout the jurisdiction, including the urban matrix. May be of very localized concern in highly degraded areas.

L+ - non-native, introduced species

Common Name	Code	1995	1999	2000	2001	2007	2015	L-Rank
number of individual territories								

Survey Species: species for which the TRCA protocol effectively surveys.

Birds

ruffed grouse	RUGR			1				L2
American redstart	AMRE						4	L3
American woodcock	AMWO						3	L3
black-billed cuckoo	BBCU	1					1	L3
brown thrasher	BRTN						4	L3
clay-coloured sparrow	CCSP						4	L3
eastern meadowlark	EAME				2			L3
eastern towhee	EATO						1	L3
horned lark	HOLA					3		L3
mourning warbler	MOWA						2	L3
Virginia rail	VIRA					1		L3
wood thrush	WOTH				3			L3
American kestrel	AMKE						1	L4
barn swallow	BARS						3	L4
belted kingfisher	BEKI						2	L4
common yellowthroat	COYE				2		7	L4
eastern bluebird	EABL						1	L4
eastern kingbird	EAKI						13	L4
eastern wood-pewee	EAWP						3	L4
field sparrow	FISP						10	L4
great-crested flycatcher	GCFL				2		1	L4
great-horned owl	GHOW						1	L4
grey catbird	GRCA						28	L4
hairy woodpecker	HAWO				1		2	L4
indigo bunting	INBU						1	L4
northern flicker	NOFL						8	L4
northern rough-winged swallow	NRWS						3	L4
red-eyed vireo	REVI						5	L4
rose-breasted grosbeak	RBGR				1		2	L4
savannah sparrow	SAVS						12	L4
spotted sandpiper	SPSA						4	L4
tree swallow	TRES						9	L4
turkey vulture	TUVU						2	L4
white-breasted nuthatch	WBNU						3	L4
willow flycatcher	WIFL	1					6	L4
American Crow	AMCR							L5
American goldfinch	AMGO							L5
American robin	AMRO							L5
Baltimore oriole	BAOR							L5
black-capped chickadee	BCCH							L5
blue jay	BLJA							L5
brown-headed cowbird	BHCO							L5
Canada goose	CANG							L5
cedar waxwing	CEDW							L5
cliff swallow	CLSW						1	L5
common grackle	COGR							L5
downy woodpecker	DOWO							L5

Common Name	Code	1995	1999	2000	2001	2007	2015	L-Rank
number of individual territories								
eastern phoebe	EAPH						1	L5
house wren	HOWR							L5
killdeer	KILL							L5
mallard	MALL							L5
mourning dove	MODO							L5
northern cardinal	NOCA							L5
northern mockingbird	NOMO						1	L5
orchard oriole	OROR						6	L5
red-tailed hawk	RTHA							L5
red-winged blackbird	RWBL							L5
song sparrow	SOSP							L5
warbling vireo	WAVI							L5
yellow warbler	YWAR							L5
European starling	EUST							L+
house finch	HOFI							L+
house sparrow	HOSP							L+
rock dove	ROPI							L+

Herpetofauna

wood frog	WOFR		1				7	L2
green frog	GRFR						4	L4

Incidental Species: species that are reported on as incidental to the TRCA protocol.

Mammals

beaver	BEAV						2	L4
eastern chipmunk	EACH						3	L4
eastern cottontail	EACO						2	L4
white-tailed deer	WTDE						1	L4
grey squirrel	GRSQ							L5
raccoon	RACC							L5

Herpetofauna

eastern gartersnake	EAGA						3	L4
---------------------	------	--	--	--	--	--	---	----

Invertebrates

"chimney" crayfish	CHCR						6	L2
--------------------	------	--	--	--	--	--	---	----

numbers in parentheses refer to territories that have been re-encountered in subsequent years.

L1 - Unable to withstand disturbance; many criteria are limiting factors; generally occur in high-quality natural areas in natural matrix; almost certainly rare in the TRCA jurisdiction; of concern regionally.

L2 - Unable to withstand disturbance; some criteria are very limiting factors; generally occur in high-quality natural areas, in natural matrix; probably rare in the TRCA jurisdiction; of concern regionally.

L3 - Able to withstand minor disturbance; generally secure in natural matrix; considered to be of regional concern.

L4 - Able to withstand some disturbance; generally secure in rural matrix; of concern in urban matrix.

L5 - Able to withstand high levels of disturbance; generally secure throughout the jurisdiction, including the urban matrix. May be of very localized concern in highly degraded areas.

L+ - non-native, introduced species

Common Name	Code	1997	2002	2007	2008	2009	2010	2011	2012	2013	2014	2015	L-Rank
number of individual territories													

Survey Species: species for which the TRCA protocol effectively surveys.

Birds

black and white warbler	BAWW					1							L2
bobolink	BOBO		3+(3)				(1)	(2)			6+(3)	4	L2
ovenbird	OVEN		1		1			1					L2
ruffed grouse	RUGR	1999											L2
American redstart	AMRE				2		(1)	(1)			3	1	L3
American woodcock	AMWO										1		L3
bank swallow	BANS										1		L3
brown creeper	BRCR		1	1									L3
brown thrasher	BRTH		1							(1)	4		L3
clay-coloured sparrow	CCSP										3		L3
eastern meadowlark	EAME		5										L3
hooded merganser	HOME										2		L3
marsh wren	MAWR			1									L3
mourning warbler	MOWA		1										L3
pileated woodpecker	PIWO			(1)				1					L3
sedge wren	SEWR		2										L3
vesper sparrow	VESP				1								L3
Virginia rail	VIRA									1			L3
wood thrush	WOTH	(1)	13+(1)		1								L3
American kestrel	AMKE										2		L4
barn swallow	BARS										2		L4
belted kingfisher	BEKI						(1)				1		L4
blue-grey gnatcatcher	BGGN					(1)	(1)	1		1+(1)	4		L4
common yellowthroat	COYE		6+(8)		1	(2)		(1)	1+(1)	1+(1)	43	3	L4
Cooper's hawk	COHA					(1)		(1)			1	1	L4
eastern bluebird	EABL										2		L4
eastern kingbird	EAKI		(1)		(1)	(3)	(2)		(2)	(1)	19+(1)	2	L4
eastern screech-owl	EASO		1										L4
eastern wood-pewee	EAWP		3+(3)		(2)			(2)	1	(1)	5	2	L4
field sparrow	FISP		4+(4)		4+(2)	(1)				1	24		L4
great-crested flycatcher	GCFL		2+(7)		(2)	(1)	(2)	1+(3)	1+(1)	(2)	13+(1)	1	L4
great-horned owl	GHOW		1									1	L4

Appendix 3c: Block C Fauna by Year.

Common Name	Code	1997	2002	2007	2008	2009	2010	2011	2012	2013	2014	2015	L-Rank
number of individual territories													
green heron	GRHE										1		L4
grey catbird	GRCA						1		(1)	2+(1)	33+(1)	4	L4
hairy woodpecker	HAWO				(2)	(2)	1+(1)	(1)			5	1	L4
indigo bunting	INBU		2+(5)		(1)	(1)	(2)			(1)	36		L4
northern flicker	NOFL		1+(1)		(1)		(3)	(1)	1+(1)		11		L4
northern rough-winged swallow	NRWS						1		1		7		L4
pine warbler	PIWA										1		L4
red-bellied woodpecker	RBWO									1	1	1	L4
red-breasted nuthatch	RBNU		1								2		L4
red-eyed vireo	REVI		1+(3)		(6)	(4)	(3)	(4)	2+(4)	1+(3)	9+(3)	2	L4
rose-breasted grosbeak	RBGR		1		1+(2)	1			(3)		7+(1)	1	L4
savannah sparrow	SAVS		8+(6)		1	(1)		(1)		1	11		L4
spotted sandpiper	SPSA		2+(2)			(1)		1+(1)			3		L4
swamp sparrow	SWSP						(2)	(2)		(1)	12+(1)	1	L4
tree swallow	TRES				(1)	(2)	1+(2)	(2)	1+(1)		5+(1)	2	L4
turkey vulture	TUVU										1		L4
white-breasted nuthatch	WBNU					1+(1)	(1)				2	1	L4
willow flycatcher	WIFL		5+(2)				1+(1)				7	1	L4
wood duck	WODU										2		L4
American Crow	AMCR										x		L5
American goldfinch	AMGO										x		L5
American robin	AMRO										x		L5
Baltimore oriole	BAOR										x		L5
black-capped chickadee	BCCH										x		L5
blue jay	BLJA										x		L5
brown-headed cowbird	BHCO										x		L5
Canada goose	CANG										x		L5
cedar waxwing	CEDW										x		L5
chipping sparrow	CHSP										x		L5
cliff swallow	CLSW										(20c)		L5
common grackle	COGR										x		L5
downy woodpecker	DOWO										x		L5
eastern phoebe	EAPH		1+(2)								4		L5
house wren	HOWR										x		L5
killdeer	KILL										x		L5

Common Name	Code	1997	2002	2007	2008	2009	2010	2011	2012	2013	2014	2015	L-Rank
number of individual territories													
mallard	MALL										x		L5
mourning dove	MODO										x		L5
northern cardinal	NOCA										x		L5
northern mockingbird	NOMO		3										L5
orchard oriole	OROR						2+(1)			(1)	4	2	L5
red-tailed hawk	RTHA										x		L5
red-winged blackbird	RWBL										x		L5
song sparrow	SOSP										x		L5
warbling vireo	WAVI										x		L5
yellow warbler	YWAR										x		L5
European starling	EUST										x		L+
house finch	HOFI										x		L+

Herpetofauna

western chorus frog	MICF	1+(3)	3+(6)			(2)	(1)	(2)	(1)	(2)	10+(1)	1	L2
wood frog	WOFR	2	1			(1)		(2)	(1)	(1)	9+(1)	1	L2
northern leopard frog	LEFR								(1)	(1)	5+(1)	1	L3
American toad	AMTO					1		1	1		2		L4
green frog	GRFR		(1)					(1)		1	7		L4

Incidental Species: species that are reported on as incidental to the TRCA protocol.

Mammals

fisher	FISH								1				L2
northern short-tailed shrew	NSTS										1		L3
beaver	BEAV										1		L4
deer mouse	DEMO										1		L4
eastern chipmunk	EACH		4								1		L4
eastern cottontail	EACO										1		L4
mink	MINK										1		L4
muskrat	MUSK										1		L4
red squirrel	RESQ										2		L4
white-footed mouse	WFMO										1		L4
white-tailed deer	WTDE		3								3		L4
grey squirrel	GRSQ										x		L5

Appendix 3c: Block C Fauna by Year.

Common Name	Code	1997	2002	2007	2008	2009	2010	2011	2012	2013	2014	2015	L-Rank
		number of individual territories											
raccoon	RACC										x		L5
striped skunk	STSK										x		L5

Herpetofauna

red-bellied snake	RBSN										1		L3
Dekay's brownsnake	BRSN										1		L4
eastern gartersnake	EAGA					1					6		L4

Invertebrates

"chimney" crayfish	CHCR					(1)					14	1	L3
--------------------	------	--	--	--	--	-----	--	--	--	--	----	---	----

numbers in parentheses refer to territories that have been re-encountered in subsequent years.

L1 - Unable to withstand disturbance; many criteria are limiting factors; generally occur in high-quality natural areas in natural matrix; almost certainly rare in the TRCA jurisdiction; of concern regionally.

L2 - Unable to withstand disturbance; some criteria are very limiting factors; generally occur in high-quality natural areas, in natural matrix; probably rare in the TRCA jurisdiction; of concern regionally.

L3 - Able to withstand minor disturbance; generally secure in natural matrix; considered to be of regional concern.

L4 - Able to withstand some disturbance; generally secure in rural matrix; of concern in urban matrix.

L5 - Able to withstand high levels of disturbance; generally secure throughout the jurisdiction, including the urban matrix. May be of very localized concern in highly degraded areas.

L+ - non-native, introduced species

Appendix 4: Table Showing Habitat Guilds (Habitat Dependencies) for all breeding bird species in Toronto.

Common Name	Code	L	forest	edge	wetld	mead	gen	cav	low	mid	upr	text summary
whip-poor-will	WPWI	L1										A) forest low-level nester
worm-eating warbler	WEWA	L1										A) forest low-level nester
black and white warbler	BAWW	L2										A) forest low-level nester
canada warbler	CAWA	L2										A) forest low-level nester
ruffed grouse	RUGR	L2										A) forest low-level nester
hermit thrush	HETH	L3										A) forest low-level nester
ovenbird	OVEN	L3										A) forest low-level nester
veery	VEER	L3										A) forest low-level nester
winter wren	WIWR	L3										A) forest low-level nester
hooded warbler	HOWA	L2										B) forest mid-level nester
black-throated blue warbler	BTBW	L3										B) forest mid-level nester
brown creeper	BRCR	L3										B) forest mid-level nester
magnolia warbler	MAWA	L3										B) forest mid-level nester
wood thrush	WOTH	L3										B) forest mid-level nester
red-eyed vireo	REVI	L4										C) forest upper-level nester
barred owl	BADO	L2										C) forest upper-level nester
broad-winged hawk	BWHA	L2										C) forest upper-level nester
cerulean warbler	CERW	L2										C) forest upper-level nester
merlin	MERL	L2										C) forest upper-level nester
nothern goshawk	NOGO	L2										C) forest upper-level nester
olive-sided flycatcher	OSFL	L2										C) forest upper-level nester
red-shouldered hawk	RSHA	L2										C) forest upper-level nester
Acadian flycatcher	ACFL	L3										C) forest upper-level nester
Blackburnian warbler	BLBW	L3										C) forest upper-level nester
black-throated green warbler	BTNW	L3										C) forest upper-level nester
blue-headed vireo	BHVI	L3										C) forest upper-level nester
golden-crowned kinglet	GCKI	L3										C) forest upper-level nester
long-eared owl	LEOW	L3										C) forest upper-level nester
northern saw-whet owl	NSWO	L3										C) forest upper-level nester
pileated woodpecker	PIWO	L3										C) forest upper-level nester
pine siskin	PISI	L3										C) forest upper-level nester
pine warbler	PIWA	L3										C) forest upper-level nester
ruby-crowned kinglet	RCKI	L3										C) forest upper-level nester
scarlet tanager	SCTA	L3										C) forest upper-level nester
sharp-shinned hawk	SSHA	L3										C) forest upper-level nester
white-winged crossbill	WWCR	L3										C) forest upper-level nester

Appendix 4: Table Showing Habitat Guilds (Habitat Dependencies) for all breeding bird species in Toronto.

Common Name	Code	L	forest	edge	wetld	mead	gen	cav	low	mid	upr	text summary
wood duck	WODU	L3										C) forest upper-level nester
yellow-bellied sapsucker	YBSA	L3										C) forest upper-level nester
yellow-throated vireo	YTVI	L3										C) forest upper-level nester
blue-grey gnatcatcher	BGGN	L4										C) forest upper-level nester
Cooper's hawk	COHA	L4										C) forest upper-level nester
eastern screech-owl	EASO	L4										C) forest upper-level nester
eastern wood-pewee	EAWP	L4										C) forest upper-level nester
great-crested flycatcher	GCFL	L4										C) forest upper-level nester
hairy woodpecker	HAWO	L4										C) forest upper-level nester
red-breasted nuthatch	RBNU	L4										C) forest upper-level nester
white-breasted nuthatch	WBNU	L4										C) forest upper-level nester
blue-winged warbler	BWWA	L2										D) forest-edge low-level nester
golden-winged warbler	GWWA	L2										D) forest-edge low-level nester
American woodcock	AMWO	L3										D) forest-edge low-level nester
mourning warbler	MOWA	L3										D) forest-edge low-level nester
Nashville warbler	NAWA	L3										D) forest-edge low-level nester
white-throated sparrow	WTSP	L3										D) forest-edge low-level nester
wild turkey	WITU	L3										D) forest-edge low-level nester
ring-necked pheasant	RINP	L+										D) forest-edge low-level nester
yellow-breasted chat	YBCH	L2										E) forest-edge mid-level nester
American redstart	AMRE	L3										E) forest-edge mid-level nester
brown thrasher	BRTH	L3										E) forest-edge mid-level nester
chestnut-sided warbler	CSWA	L3										E) forest-edge mid-level nester
eastern towhee	EATO	L3										E) forest-edge mid-level nester
eastern bluebird	EABL	L4										E) forest-edge mid-level nester
indigo bunting	INBU	L4										E) forest-edge mid-level nester
rose-breasted grosbeak	RBGR	L4										E) forest-edge mid-level nester
ruby-throated hummingbird	RTHU	L4										E) forest-edge mid-level nester
downy woodpecker	DOWO	L5										E) forest-edge mid-level nester
red-headed woodpecker	RHWO	L3										F) forest-edge upper-level nester
yellow-rumped warbler	YRWA	L3										F) forest-edge upper-level nester
least flycatcher	LEFL	L4										F) forest-edge upper-level nester
purple finch	PUFI	L4										F) forest-edge upper-level nester
red-bellied woodpecker	RBWO	L4										F) forest-edge upper-level nester
American bittern	AMBI	L2										J) wetland low-level nester
American coot	AMCO	L2										J) wetland low-level nester

Appendix 4: Table Showing Habitat Guilds (Habitat Dependencies) for all breeding bird species in Toronto.

Common Name	Code	L	forest	edge	wetld	mead	gen	cav	low	mid	upr	text summary
blue-winged teal	BWTE	L2										J) wetland low-level nester
canvasback	CANV	L2										J) wetland low-level nester
green-winged teal	AGWT	L2										J) wetland low-level nester
least bittern	LEBI	L2										J) wetland low-level nester
redhead	REDH	L2										J) wetland low-level nester
Caspian tern	CATE	L3										J) wetland low-level nester
common moorhen	COMO	L3										J) wetland low-level nester
common tern	COTE	L3										J) wetland low-level nester
great black-backed gull	GBBG	L3										J) wetland low-level nester
herring gull	HERG	L3										J) wetland low-level nester
pied-billed grebe	PBGR	L3										J) wetland low-level nester
sora	SORA	L3										J) wetland low-level nester
Virginia Rail	VIRA	L3										J) wetland low-level nester
Wilson's snipe	WISN	L3										J) wetland low-level nester
common yellowthroat	COYE	L4										J) wetland low-level nester
gadwall	GADW	L4										J) wetland low-level nester
ring-billed gull	RBGU	L4										J) wetland low-level nester
swamp sparrow	SWSP	L4										J) wetland low-level nester
Canada goose	CANG	L5										J) wetland low-level nester
mallard	MALL	L5										J) wetland low-level nester
black tern	BLTE	LX										J) wetland low-level nester
mute swan	MUSW	L+										J) wetland low-level nester
trumpeter swan	TRUS	L+										J) wetland low-level nester
marsh wren	MAWR	L3										K) wetland mid-level nester
alder flycatcher	ALFL	L4										K) wetland mid-level nester
black-crowned night heron	BCNH	L3										L) wetland upper-level nester
double-crested cormorant	DCCO	L3										L) wetland upper-level nester
great blue heron	GBHE	L3										L) wetland upper-level nester
great egret	GREG	L3										L) wetland upper-level nester
hooded merganser	HOME	L3										L) wetland upper-level nester
osprey	OSPR	L3										L) wetland upper-level nester
green heron	GRHE	L4										L) wetland upper-level nester
grasshopper sparrow	GRSP	L2										G) meadow low-level nester
upland sandpiper	UPSA	L2										G) meadow low-level nester
bobolink	BOBO	L3										G) meadow low-level nester
clay-coloured sparrow	CCSP	L3										G) meadow low-level nester

Appendix 4: Table Showing Habitat Guilds (Habitat Dependencies) for all breeding bird species in Toronto.

Common Name	Code	L	forest	edge	wetld	mead	gen	cav	low	mid	upr	text summary
northern harrier	NOHA	L3										G) meadow low-level nester
sedge wren	SEWR	L3										G) meadow low-level nester
short-eared owl	SEOW	L3										G) meadow low-level nester
vesper sparrow	VESP	L3										G) meadow low-level nester
western meadowlark	WEME	L3										G) meadow low-level nester
eastern meadowlark	EAME	L4										G) meadow low-level nester
field sparrow	FISP	L4										G) meadow low-level nester
horned lark	HOLA	L4										G) meadow low-level nester
savannah sparrow	SAVS	L4										G) meadow low-level nester
spotted sandpiper	SPSA	L4										G) meadow low-level nester
Henslow's sparrow	HESP	LX										G) meadow low-level nester
willow flycatcher	WIFL	L4										H) meadow mid-level nester
loggerhead shrike	LOSH	LX										H) meadow mid-level nester
eastern kingbird	EAKI	L4										I) meadow upper-level nester
American black duck	ABDU	L3										M) generalist low-level nester
common nighthawk	CONI	L3										M) generalist low-level nester
killdeer	KILL	L5										M) generalist low-level nester
song sparrow	SOSP	L5										M) generalist low-level nester
black-billed cuckoo	BBCU	L3										N) generalist mid-level nester
yellow-billed cuckoo	YBCU	L3										N) generalist mid-level nester
barn swallow	BARS	L4										N) generalist mid-level nester
Carolina wren	CARW	L4										N) generalist mid-level nester
grey catbird	GRCA	L4										N) generalist mid-level nester
tree swallow	TRES	L4										N) generalist mid-level nester
American goldfinch	AMGO	L5										N) generalist mid-level nester
American robin	AMRO	L5										N) generalist mid-level nester
black-capped chickadee	BCCH	L5										N) generalist mid-level nester
cedar waxwing	CEDW	L5										N) generalist mid-level nester
chipping sparrow	CHSP	L5										N) generalist mid-level nester
common grackle	COGR	L5										N) generalist mid-level nester
eastern phoebe	EAPH	L5										N) generalist mid-level nester
house wren	HOWR	L5										N) generalist mid-level nester
mourning dove	MODO	L5										N) generalist mid-level nester
northern cardinal	NOCA	L5										N) generalist mid-level nester
northern mockingbird	NOMO	L5										N) generalist mid-level nester
red-winged blackbird	RWBL	L5										N) generalist mid-level nester

Appendix 4: Table Showing Habitat Guilds (Habitat Dependencies) for all breeding bird species in Toronto.

Common Name	Code	L	forest	edge	wetld	mead	gen	cav	low	mid	upr	text summary
yellow warbler	YWAR	L5										N) generalist mid-level nester
European starling	EUST	L+										N) generalist mid-level nester
house finch	HOFI	L+										N) generalist mid-level nester
house sparrow	HOSP	L+										N) generalist mid-level nester
rock dove	ROPI	L+										N) generalist mid-level nester
American kestrel	AMKE	L4										O) generalist upper-level nester
chimney swift	CHSW	L4										O) generalist upper-level nester
cliff swallow	CLSW	L4										O) generalist upper-level nester
great-horned owl	GHOW	L4										O) generalist upper-level nester
northern flicker	NOFL	L4										O) generalist upper-level nester
peregrine falcon	PEFA	L4										O) generalist upper-level nester
American Crow	AMCR	L5										O) generalist upper-level nester
Baltimore oriole	BAOR	L5										O) generalist upper-level nester
blue jay	BLJA	L5										O) generalist upper-level nester
orchard oriole	OROR	L5										O) generalist upper-level nester
red-tailed hawk	RTHA	L5										O) generalist upper-level nester
warbling vireo	WAVI	L5										O) generalist upper-level nester

prothonotary warbler	PROW	L2										P) swamp mid-level nester
northern waterthrush	NOWA	L3										Q) swamp low-level nester
bank swallow	BANS	L4										special case
belted kingfisher	BEKI	L4										special case
northern rough-winged swallow	NRWS	L4										special case
purple martin	PUMA	L4										special case
turkey vulture	TUVU	L4										special case
brown-headed cowbird	BHCO	L5										special case

note that the given habitat is that in which the species places the nest.

forest-edge can also be used to indicate thicket habitat

low = on or very near to ground-level. <0.5m = low level

mid = lower shrub layer (in forest), or generally in shrubs (open country). 0.5 to 3m = mid level

upr = middle or upper canopy in forest habitat - small to large trees. > 3m = upper level

forest = forest nesting species

Appendix 4: Table Showing Habitat Guilds (Habitat Dependencies) for all breeding bird species in Toronto.

Common Name	Code	L	forest	edge	wetld	mead	gen	cav	low	mid	upr	text summary
-------------	------	---	--------	------	-------	------	-----	-----	-----	-----	-----	--------------

edge = forest or woodland edge habitat nesting species, e.g. as woodland transitions into meadow.

wetld = wetland nesting species

mead = meadow nesting species

gen = generalist species

cav = cavity nesting species