1351745 ONTARIO LTD. DEVELOPMENT
DRAFT PLAN OF SUBDIVISION 14T-06001-R
COBOURG EAST COMMUNITY SECONDARY PLAN AREA
ELGIN STREET EAST/COUNTY ROAD 20
PART LOTS 11, 12 AND 13, CONCESSIONS A AND 1
BLOCK D, PLAN 277
TOWN OF COBOURG

ENVIRONMENTAL IMPACT STUDY

Prepared for: **1351745 Ontario Ltd.**

Submitted by: **Niblett Environmental Associates Inc.**
File: **PN 14-056**

Date: **October 2017**

Niblett Environmental Associates Inc.
Biological Consultants

05 October 2017 PN 14-056

Mr. Richard Rondeau
1351745 Ontario Ltd.
513 Westney Rd. S., Unit 4
Ajax, ON L1S 6W8

SUBJECT: 1351745 ONTARIO LTD. DEVELOPMENT
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ENVIRONMENTAL IMPACT STUDY

Dear Mr. Rondeau:

We are pleased to submit our Environmental Impact Study report in support of your draft plan of subdivision application.

After a thorough review of our field data and existing literature we have assessed the impacts of the proposed subdivision on the natural features in the area. We have made several recommendations to mitigate any potential impacts.

This revised EIS is the same as the May 18, 2016 version with some minor changes in the proposed development and impact sections (5.0 and 6.0).

If you have any questions or comments, we would be please to provide additional assistance as needed.

Sincerely,

Chris Ellingwood
President and Sr. Terrestrial/Wetland Biologist

55 Mary Street West, Suite 112, Lindsay, Ontario K9V 5Z6 Tel: (705) 878-9399 Fax: (705) 878-9390
Email: mail@niblett.ca Website: www.niblett.ca

ACKNOWLEDGEMENTS

The following NEA staff contributed to this project:

Project Co-ordinators: Chris Ellingwood, Sr. Terrestrial and Wetland Biologist
Amanda Smith (H. BSc), Fisheries and Aquatic Biologist

Authors: Chris Ellingwood, Sr. Terrestrial and Wetland Biologist
Amanda Smith (H. BSc), Fisheries and Aquatic Biologist
Stacey Zwiers, Fisheries Technologist
Ernie Silhanek (EP), Terrestrial and Wetland Biologist
Katherine Ryan (H. BSc), Terrestrial and Wetland Biologist

Field Crew: Chris Ellingwood, Sr. Terrestrial and Wetland Biologist
Amanda Smith, Fisheries and Aquatic Biologist
Stacey Zwiers, Fisheries Technologist
Ernie Silhanek, Terrestrial and Wetland Biologist
Katherine Ryan, Terrestrial and Wetland Biologist

Graphics: Will Pridham, GIS Specialist and Cartographer

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ENVIRONMENTAL IMPACT STUDY

1.0 Introduction

1.1 Background

Niblett Environmental Associates Inc. (NEA) was retained by 1351745 Ontario Ltd. to complete an Environmental Impact Study (EIS) for a proposed Draft Plan of subdivision on the subject properties. Previous reports have been completed by NEA for the same properties in 2007 and 2009 (NEA, 2007) (NEA, 2009) under a different proponent. The majority of the property is located within the Cobourg East Community Secondary Plan area in the Town of Cobourg in the County of Northumberland.

1.2 Property Description

The subject properties encompass a total of approximately 107.3 ha (267 acres). The property is bounded on the south by Elgin Street East (County Road 20), Greer Road on the east and Danforth Road to the north. The property consists of Part Lots 11, 12 and 13, Concession 1 and Part lot 13, concession A.

The Bell property (17 ha/42 acres) is located south of Elgin Street East and west of Brook Road. Highway 401 lies just north (within 500 m) of the northern limit of study site.

The study area extended approximately 100m on all sides of the property and further along the two creeks to better define the role of adjacent communities (Figure 1).

1.3 Study Rationale

The Town of Cobourg has released a Secondary Plan and accompanying schedules detailing the land use plan for the area (Meridian Planning Consultants Inc., 2005). Portions of the lands are designated as Environmental Protection Areas and Special Study Area Overlay. A natural heritage system with valleys and interconnected woodlands is one of the main focuses of the secondary plan. No development is permitted in areas designated as environmental protection; however, the boundaries can be refined through an Environmental Impact Study (EIS). Three sections of the properties have been designated as Environmental Protection (high constraint):

- Central woodland
- Midtown Creek valley
- North-western portion of the Bell property

The northern outer edge of the central woodland and hedgerows to the west and the central portion of the Bell property have been designated as Special Study Area (moderate constraint). An EIS is required when development is proposed within the Special Study Area Overlay.

The Town of Cobourg Official Plan (2010) (s. 4.2.6) requires the following information in an Environmental Impact Study report:

- *an inventory and analysis of all natural heritage features and ecological functions on the site including vegetation, wildlife habitat, fish habitat, wetlands, steep slopes, habitat of endangered and threatened species, significant areas of natural and scientific interest, groundwater discharge areas and contribution to maintenance of fluvial processes.*
- *regard shall be had for the relationship between the lands for which the environmental audit is being undertaken and the lands within the neighbouring Environmental Constraint Area.*
- *where the environmental audit identifies significant natural environmental features and/or ecological systems, such areas shall be preserved and enhanced and consideration given to including them in the Environmental constraint Area designation*
- *submission of a detailed site plan, landscaping and grading plans will be required as the basis of the approval of any development...*

s. 15.4.5 Environmental Area

s. 15.4.5.4 Reductions to Environmental Area Designation

Reductions to the spatial extent and/or the ecological function of a significant natural heritage feature within the Environmental Area shall not be permitted. The boundaries of lands within the Environmental Area designation can be refined through the development process without an Official Plan Amendment subject to the approval by the Town, in consultation with the appropriate Conservation Authority, of an Environmental Impact Study.

15.4.5.5 Special Study Area Overlay

a) Location

Certain areas have been identified as being within the Special Study Area Overlay on Schedule 'XI'. These areas are considered to be sensitive to development. In addition, these lands may also act as a buffer between more sensitive environmental areas and development areas.

b) Development Permissions

Development may be permitted in these areas provided an Environmental Impact Study has been completed and is considered to be satisfactory to the Town. If this occurs, the subject lands may be developed in accordance with the underlying land use designation.

c) Requirements for Environmental Impact Study
All Environmental Impact Studies (EIS) shall be prepared by experts qualified in the fields of ecology, hydrogeology and/or environmental planning and shall be prepared in accordance with a work plan that has been approved by the Town in consultation with the Ganaraska Region Conservation Authority.

The work plan shall identify the boundaries of the area to be studied and may include lands beyond the area for which the EIS is being carried out.
The objective of the EIS is to identify and assess the potential impacts of a specific development proposal on the key environmental functions, attributes and linkages of the potentially affected area and to ensure that the proposed development complies with the policies and intent of the Secondary Plan with respect to protection of the natural environment.

Components of an EIS shall generally include:

i) A detailed study area description, including an assessment of the terrain conditions, hydrogeology, surface water, biological setting and hazard lands;

ii) A characterization of existing natural heritage features and functions on-site and adjacent to the subject lands, including the roles of vegetation, surface water and groundwater;

iii) A detailed description of the proposed development or land use activities, including servicing and grading plans and the locations of building envelopes where appropriate;

iv) A prediction of the potential direct, indirect, and cumulative effects of the proposed development on the natural and physical environment;

v) An identification and evaluation of options to avoid or mitigate impacts, including recommendations for the establishment of buffers/setbacks, erosion and sediment control, surface and sub-surface drainage, and habitat maintenance, restoration and enhancement;

vi) A strategy for implementing the recommended mitigation measures; and,

vii) A summary of predicted net effects following mitigation.

2.0 Methodology

2.1 General Approach

Our approach to preparation of the EIS consisted of three distinct phases.

In the first phase all available information on the study site and site vicinity was collected and reviewed. This included reviewing previously completed NEA reports in the study area (NEA, 2007) (NEA, 2009), recent aerial photography, OMNRF GIS layers (2008-2011), OMNRF 'Make-a-map Natural Heritage Features' mapping, wetland mapping, Town of Cobourg Official Plan schedules (2004, 2010) and the Cobourg East Community Secondary Plan (Meridian Planning Consultants Inc., 2005).

Our second phase consisted of a series of site visits by our terrestrial and wetland biologists and fisheries biologists. As this project has been off and on over a number of years, the surveys have been conducted from 2005 to 2011. Surveys are conducted to confirm the data collected in the literature review and to collect additional information on species present including vegetation, herpetozoa, birds, fish and mammals. The most recent site visits were conducted on September 17th, 2014; and May 7th, 2015. These visits entailed searching for the presence of significant species including Species at Risk (SAR) and delineating the boundaries of any wetland communities.

The final phase consisted of preparation of the EIS report based upon data from both the literature and field surveys. Previous information collected from field visits in 2005, 2006 and 2011 formed the basis of the report along with supplemental information gained from the 2014 and 2015 visits. The report includes an assessment of the effects of the proposed development on natural heritage features and functions, establishment of buffers/setbacks and mitigation measures.

This report includes figures that show the location of all of the natural features, the development Concept Plan (The Planning Partnership, May 25, 2016, Drawing No. A) and recommended setbacks and buffers.

2.2 Detailed Methodology

2.2.1 Vegetation

Background information was collected from the Ontario Ministry of Natural Resources and Forestry (OMNRF) 'Make-a-map Natural Heritage Features mapping and forest resource inventory mapping. Prior to field visits the vegetation communities, linkages and corridors were delineated on air photos. The vegetation community descriptions in the Background Natural Heritage Assessment by Gartner Lee (May 2004) were reviewed and mapping of environmental constraint areas consulted. Their boundaries and the area of high, moderate and low constraint were confirmed in the field in 2005.

In the second stage, field inventories were conducted on September 19th, 2005; May 19th, June 30th, 2006; and August 16th, September 19th and November 25th 2011. Detailed inventories were made of the plant species present in each community within the study area. Community boundaries and descriptions delineated on air photos were ground-truthed. The location of wetland communities was determined for the property and adjacent properties to the north and south. Specimens were collected of species requiring verification. Adjacent properties were visited to ascertain the extent of community boundaries beyond the plan area and to inventory the species present.

Additional surveys were conducted on September 17th, 2014 to conduct Butternut Health Assessments on the trees that were located on the property and to further delineate additional wetland communities found on the property.

General notes on disturbance, topography, soil types, soil moisture and state of each community were also compiled.

Naming of the vegetation community types was based on the Ecological Land Classification for Southern Ontario (Lee et. al., 1998).

The presence of rare, significant or unusual species was noted. Species significance or rarity on a national, provincial, regional and local level was based on published literature and standard status lists. These included COSEWIC (2017), COSSARO (2017), Argus et al (1982-90), OMNR (2013), NHIC (2015), ESA (2007), SARA (2017) and Riley (1989).

2.2.2 Birds

Breeding bird surveys were conducted during the breeding season on May 19th, June 30th, 2006; and July 18th 2011. Surveys were timed to coincide with the dawn chorus and within acceptable weather parameters. The surveys were modeled after the Ontario Breeding Bird Atlas (2nd) point count methodologies (2001) and used standardized data collection forms. The surveys were a combination of point counts and wandering transects and covered all portions of the property.

A breeding bird species list was generated from the Atlas of the Breeding Birds of Ontario (Cadman et. al., 1987 and Bird Studies Canada, 2005) for the 10 x 10 km atlas square that contains the study area (17QJ27). The data was reviewed to determine if any sensitive or significant breeding species have been recorded in the area of the development. Records of any special concern, threatened or endangered species were also collected from the MNRF Natural Heritage database.

Bird species significance on a national, provincial, regional and local level was based on published literature and current status lists. These included COSEWIC (2017), COSSARO (2017), Ontario Endangered Species Act (2007), OMNR (wetland manual, version 3.2, 2013) and SARA (2017).

2.2.3 Wildlife: Mammals, Reptiles and Amphibians

Amphibian surveys were conducted on April 1th, 2006 following the methodology of the Marsh Monitoring Program (BSC, 2001). As standing water is limited on this site, the amphibian surveys focussed on two vernal pools in the central woodland and the wetland communities. Species significance on a national, provincial, regional and local level was based on COSEWIC (2017), COSSARO (2017), SARA (2017) and Oldham (1996).

Species significance on a national, provincial, regional and local level was based on COSEWIC (2017), COSSARO (2017) SARA (2017), Dobbyn (1994), and Sunderland (1994).

In addition, observations of mammals, amphibians and reptiles were made whenever biologists were on site. Observations included direct sightings and indirect evidence such as calls, tracks, scat, burrows, dens and browse.

2.2.4 Fish and Aquatic Habitat

2.2.4.1. Aquatic Habitat

Biophysical habitat characteristics of the unnamed tributaries of Brook Creek and Midtown Creek located in the study area were assessed on May 14th, June 12th and 20th 2006 (NEA, 2007).

Aquatic habitat was quantified and characterized by determining the existing habitat types and potential function based on substrate composition, riparian habitat, percent in-stream cover, flow influence and condition, sediment transport, groundwater indicators, barrier presence and form, landscape influences, human modifications and unique features. Assessments were conducted using standardized provincial aquatic protocol methods from OSAP, MTO and following the "*Manual of Instruction: Aquatic Habitat Inventory Surveys*" (Dodge, Tilt, MacRitchie, Goodchild, & Waldrif, 1987) protocol (NEA, 2007). The fish and aquatic habitat impact assessments were based on acquired fisheries data (OMNRF, GRCA and DFO) and NEA's biophysical habitat data collected on site.

2.2.4.2. Fish Community

Fish community surveys were conducted in the unnamed tributary of Brook Creek and Midtown Creek on May 14th, June 12th and 20th 2006 (NEA, 2007) and May 7th 2015.

Fish community sampling was conducted using a Smith-Root Model 24 backpack electrofisher employing the single pass technique outlined in the Ontario Stream Assessment Protocol (Stanfield, 2010). Electrofishing was conducted on June 12th 2006 and May 7th 2015 in both tributaries. The single pass survey technique allowed biologists to characterize the fish community and provide a qualitative assessment of species abundance at the site. This method requires a high shocking intensity (7-15 sec/m^2) and typically captures 60% of the population when all habitats are sampled (Stanfield, 2010).

Additional sampling gear was used in 2006 where electrofishing was not feasible due to water levels. Five minnow traps were set for approximately 24 hours on May 14th and June 20th 2006 within both tributaries (NEA, 2007) (Figure 2).

The Ontario Endangered Species Act (ESA) was enacted in 2007. To ensure the project meets the strict policies of this act, NEA completed a background literature review from OMNRF-NHIC and GRCA.

2.2.4.3. Surface Water Quality

Surface water quality was collected in the unnamed tributary of Brook Creek and Midtown Creek in 2015 by NEA biologists. Measured parameters included, dissolved oxygen (mg/L), conductivity (mS), total dissolved solids (mg/L), and water temperature (°C) using a handled YSI Pro2030 System. The pH was recorded with a handheld waterproof pH meter and turbidity was recorded with a handheld LaMotte2020. The Canadian Water Quality Guidelines for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment, 2002) and the Provincial Water Quality Objectives (PWQO) were used to interpret water quality data (Energy, 1994).

2.2.5 Wetlands

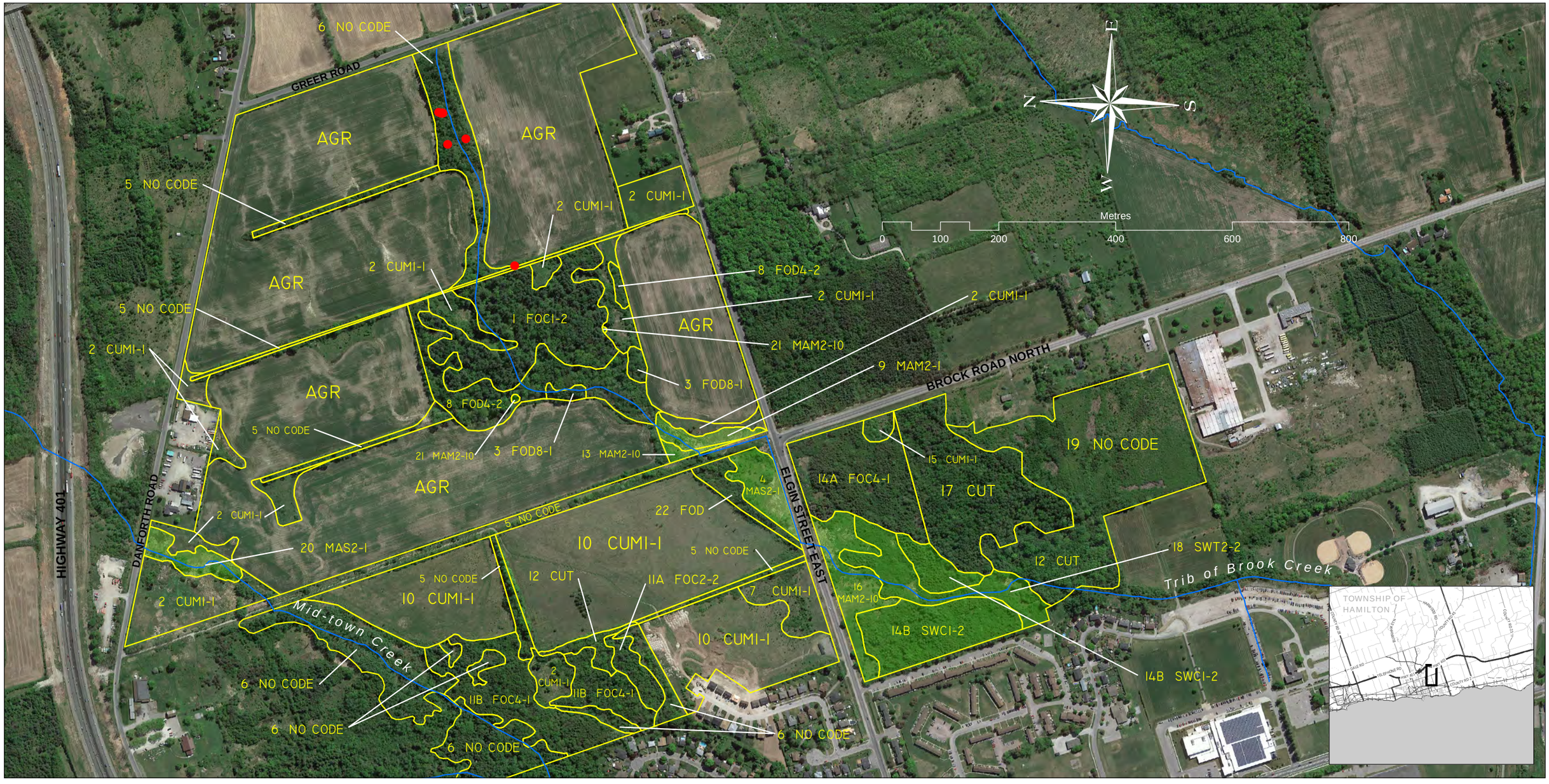
The property was screened for the presence of wetland communities using NHIC, LIO database, MNRF GIS database and other mapping and schedules. The wetlands boundaries and communities were confirmed in the field using the Ontario Wetland Evaluation System manual, Southern Ontario, Third Edition (MNRF, 1997 and later with the 2013 version 3.2). The method includes detailed plant inventories, soil cores and assessment of hydrological characteristics. Wetland boundaries were delineated and GPS readings taken. Wetlands were also confirmed using the definitions in the GRCA regulations and policy manuals.

2.2.6 Significant Wildlife Habitat

A review of the criteria for Significant Wildlife Habitat was completed. Targeted surveys were completed for those criteria that may be candidate. The SWH Technical Guide (2013) was used for the screening and surveys completed as per established protocols.

2.2.7 Species At Risk

The Ontario Endangered Species Act (ESA) was enacted in 2007. To ensure the project meets the strict policies of this Act, NEA completed a background literature review from DFO and OMNRF-NHIC. All Endangered and Threatened species receive individual protection under Section 9 of the ESA and receive general habitat protection under Section 10 of the ESA, 2007. Special Concern species are covered under the Significant Wildlife Habitat criteria of the Provincial Policy Statement. A screening level review was completed of existing data sources. Targeted surveys were completed for Species At Risk that may find habitat within the study area. Searches for butternut trees were undertaken and trees assessed by our MNRF certified Butternut Health Assessor (BHA).



LEGEND

- Retainable Butternut
- Watercourse
- Property Boundary
- Vegetation Community
- Parcel Fabric
- Wetland Community

Composite imagery acquired in May 2015. DigitalGlobe WorldView-2. 30 cm Resolution.

ELC TYPES (1ST APPROXIMATION)

CODE	TYPE DESCRIPTION
CUMI-1	Dry-moist old field meadow
CUT	Cultural thicket
FOC1-2	Dry-fresh white pine-red pine coniferous forest
FOC2-2	Dry-fresh white cedar coniferous forest
FOC4-1	Fresh-moist white cedar coniferous forest
FOD	Deciduous forest
FOD4-2	Dry-fresh white ash deciduous forest
FOD8-1	Fresh-moist poplar deciduous forest
MAM2-1	Bluejoint mineral meadow marsh
MAM2-10	Forb mineral meadow marsh
MAS2-1	Cattail mineral shallow marsh
SWC1-1	White cedar mineral coniferous swamp
SWT2-2	Willow mineral thicket swamp

FIGURE 1: VEGETATION COMMUNITIES

Pt Lots 11 & 12, Con 1, Heritage Village of Rondeau
Town of Cobourg, Secondary Plan Area
Peterborough District

UTM Zone 17
WKID: 26917 Authority: EPSG
Transverse Mercator
GCS North American 1983, ESRI ArcGIS 10.1

REVISIONS

NO	BY	DATE	DESCRIPTION
1	W.P.	10/05/2016	Initial map creation.
2	W.P.	17/06/2016	Changed labels 18A, 18B, and 19.

CONTACT: Will Pridham, GIS Specialist & Cartographer
PHONE/FAX: T: 1 (705)-878-9399 F: 1 (705)-878-9390
EMAIL: Will Pridham: wpridham@niblett.ca General Inquiries: mail@niblett.ca

PROJECT NO: PN14056
REVISION NO.: RV-01
PROJECT: East Cobourg
CLIENT: N/A

SCALE: 1:6,500 CENTIMETERS

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LEGEND

- Minnow Trap Station
- Water Quality Station
- Watercourse
- Electrofishing Station
- Parcel Fabric
- Property Boundary
- HZ Habitat Zone Label

Composite imagery acquired in May 2015. DigitalGlobe WorldView-2. 30 cm Resolution.

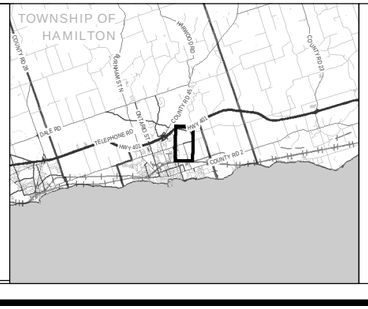

FIGURE 2: AQUATIC SURVEY LOCATIONS

Pt Lots 11 & 12, Con 1, Heritage Village of Rondeau
Town of Cobourg, Secondary Plan Area
Peterborough District

REVISIONS

NO	BY	DATE	DESCRIPTION
1	W.P.	10/05/2016	Initial map creation.

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EMAIL: Will Pridham: wpridham@niblett.ca General Inquiries: mail@niblett.ca

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3.0 Resource Inventory

3.1 Site Characteristics

The subject properties are located within a drumlinized sand plain. Three large drumlins are located on the property and create steep slopes and high elevations on parts of the property. The drumlins are located on the Bell property south of Elgin Street and crossing Brook Road, north of Elgin Street and crossing the west part of the property and on the east side of the property at Greer Road. As is typical of drumlinized areas, the intervening low areas have creeks and wetlands. The site contains a large central woodland north of Elgin Street, cedar forest and swamp south of Elgin, tributary of Midtown Creek and forest to the west and an intermittent tributary of Brook Creek through the centre and onto the Bell property. Overall the site is dominated by active agricultural fields (Figure 1).

3.2 Vegetation

Twenty-two vegetation communities were delineated on and adjacent to the property (Figure 1). A total of 186 species of plants were identified within the study area (Appendix I-A). A variety of field, thicket, wetland and forest communities were found and are described in further detail. The main features of the property include a large woodland (central woodland) with some patches of trees and fencerow connected to it and associated the tributary of Brook Creek. A large portion (>70%) of the property north of Elgin Street was active agricultural field planted in corn. The property south of Elgin Street was former pasture land that had been abandoned. It contains a dense cedar forest/swamp, thicket swamp and old field meadow habitat.

Community 1 Dry-Fresh White Pine-Red Pine Coniferous Forest (ELC code FOC1-2)

This community is located in the central woodlot along the south and western edges, bordered by agricultural fields. The majority of the pines were mature, with many measuring 50-90 cm diameter at breast height (dbh). Eastern white pine (*Pinus strobus)* is the dominant canopy species. There were some pockets containing deciduous species including balsam poplar (*Populus balsamifera*), American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), black cherry (*Prunus serotina*), ironwood (*Ostrya virginiana*), American elm (*Ulmus americana*) and Manitoba maple (*Acer negundo*) and shrubs such as alternate-leaf dogwood (*Cornus alternifolia*). Ground cover was represented by a good variety of species such as bitter nightshade (*Solanum dulcamara*), yellow avens (*Geum allepicum*), trout lily (*Erythronium americanum*), sensitive fern (*Onoclea sensibilis*), American stinging nettle (*Urtica dioica*), mayapple (*Podophyllum peltatum*) and Jack-in-the-pulpit (*Arisaema triphyllum*).

An intermittent tributary of Brook Creek bisected Community 1 in an east to west orientation.

Photo 1. Pine Plantation (Photo taken Sept 17, 2014)

Community 2 Old Field Meadow (ELC Code: CUM 1-1)

Community 2 represents a number of separate communities within the study area ranging from a regenerating field with pioneer species, to a regenerating shrubland or forest.

One of the pockets extended from the north side of Elgin Street along the east side of the riverine wetland pockets, which has had some grading and clearing in the past, and into the fields beyond. The regenerating field community was comprised of primarily pioneer and/or invasive species. Fencerows and thickets were present on both the west and east sides of the allowance. The west side had primarily Manitoba maple, sugar maple, white ash (*Fraxinus americana*) and European buckthorn (*Rhamnus cathartica*). Closer to Elgin street, the European buckthorn thicket gradually replaced the fencerow and became increasingly and more densely covered by Virginia creeper (*Parthenocissus inserta*).

The east side of the road allowance was at a slightly lower elevation and had clumps of shrubs present. Species included hawthorn (*Crataegus sp.*) species, crack willow (*Salix fragilis)*, Bebb's willow (*Salix bebbiana)* and pussy willow (*Salix discolor*), red-osier dogwood (*Cornus*

stolonifera), high bush cranberry (*Viburnum trilobum*) and choke cherry (*Prunus virginiana*).

The field itself was dominated by common strawberry (*Fragaria virginiana*), Canada goldenrod (*Solidago canadensis*), red clover (*Trifolium pratense*), common ragweed (*Ambrosia artemisiifolia*), white sweet-clover (*Melilotus alba*), chicory (*Chicorium intybus*), New England aster (*Aster novae-angliae*), cow vetch (*Vicia cracca*) and Canada thistle (*Cirsium arvense*). Species present near the bottom of the hill which are more commonly associated with wetlands included spotted jewelweed (*Impatiens capensis*), boneset (*Eupatorium perfoliatum*), spotted Joe-pye weed (*Eupatorium maculatum*), spotted water hemlock (*Cicuta maculata*) and common reed (*Phragmites australis*).

An abandoned field on the east and south side of the central woodland contained upland meadow species and scattered shrubs. Species included awnless brome grass *(Bromus inermis)*, Canada goldenrod, tartarian honeysuckle (*Lonicera tatarica*), red-osier dogwood, red clover, cow vetch and common milkweed (*Asclepias syriaca*).

An open field and slope community in the northwest part of the subject property, east and west of Midtown Creek and adjacent to the industrial lands not on the subject property, had low species diversity and contained many typical regenerating field species such as Queen Anne's lace (*Daucus carota*), Canada goldenrod, choke cherry, American mountain ash (*Sorbus americana*), Virginia creeper, marginal wood fern (*Dryopteris marginalis*), Deptford pink (*Dianthus armeria*) and foxglove beardtongue (*Penstemon digitalis*). Numerous stems of European buckthorn were scattered throughout.

Another pocket lay to the west of the Brook Road allowance along an east-west fencerow. Similar pioneer species to those found above were found this pocket also had a notable component of deciduous and shrub regeneration of species including white ash, hawthorn, staghorn sumac (*Rhus typhina*), eastern white cedar (*Thuja occidentalis*) and eastern white pine.

Photo 2. Old field meadow (Photo taken Sept 17, 2014)

Community 3 Fresh-moist Poplar Deciduous Forest (ELC Code: FOD 8-1)

The poplar forest was found on the western edge of the central woodlot along the tributary The community was dominated by trembling aspen (*Populus tremuloides*) with balsam poplar, white ash, green ash (*Fraxinus pennsylvanica var. subintergerimma*), eastern white cedar (*Thuja occidentalis*), eastern white pine, black cherry (*Prunus serotina*), red oak (*Quercus rubra*), Manitoba maple, white birch (*Betula papyrifera*) and silver maple (*Acer saccharinum*). There was a considerable amount of deadfall present in the understory. Thirteen butternuts (*Juglans cinerea*) were found in this community.

The shrub layer consisted of snowberry (*Symphoricarpos albus*), purple-flowering raspberry (*Rubus odoratus*), wild red raspberry (*Rubus idaeus*), alternate-leaf dogwood, Alleghany blackberry (*Rubus alleghaniensis*), high bush cranberry, tartarian honeysuckle (*Lonicera tatarica*) and common crabapple (*Malus pumila*). Ground cover included yellow avens (*Geum aleppicum)*, flat top white aster (*Aster umbellatus*), nodding beggarsticks (*Bidens cernua*), clearweed (*Pilea pumila*), wild cucumber (*Echinocystis lobata*), American water-horehound (*Lycopus americana*), field horsetail (*Equisetum arvense*) and hog-peanut (*Amphicarpa bracteata*).

Photo 3. Poplar forest (Photo taken Sept 17, 2014)

Community 4 Cattail Mineral Shallow Marsh (ELC Code: MAS 2-1)

This small wetland pocket just north of Elgin Street and west of the Brook Road allowance was evidently disturbed due to its proximity to the road and agricultural fields. The wetland was dominated with narrow-leaved cattail (*Typha angustifolia*). Additional species in the cattail marsh included boneset, American water-horehound, wild mint (*Mentha arvensis*), spotted jewelweed, reed canary grass (*Phalaris arundinacea*), sensitive fern, red-osier dogwood and flat top white aster.

A high spot in the southeast corner had some eastern white cedar, eastern white pine and weeping willow (*Salix babylonica*).

Photo 4. Cattail marsh (Photo taken Sept 17, 2014)

Community 5 Manitoba Maple / European Buckthorn Fencerow (no applicable ELC Code)

This disturbed community was a regenerating fencerow dominated by Manitoba maple and European buckthorn. Other species found here included black cherry, Philadelphia fleabane (*Erigeron philadelphicus*), yellow avens, wild grape (*Vitis riparia*), smooth gooseberry (*Ribes hirtellum*), ox-eye daisy (*Chrysanthemum leucanthemum*) and purple-stemmed aster (*Aster puniceum*).

Photo 5. Manitoba Maple/Buckthorn fencerow (Google map)

Community 6 Cultural Regenerating Thicket (no applicable ELC Code)

Community 6 is a regenerating community along the field edge on the slope west of the Brook road allowance and also on along the south border of the central woodland and north easterly extent of the Brook Creek tributary. This community had co-dominants of trembling aspen, Manitoba maple and balsam poplar with densely regenerating European buckthorn in the understorey. Due to the high density of the buckthorn, species variety was very low but included downy yellow violet (*Viola pubescens*), choke cherry, Virginia creeper, American elm, wild cucumber and tall buttercup (*Ranunculus acris*).

Photo 6. Thicket (Photo taken Sept 17, 2014)

Community 7 Dry-moist Old Field Meadow (ELC Code: CUM 1-1)

This open field and slope community in the northwest end of the subject property had low species diversity and contained many typical regenerating field species such as Queen Anne's lace (*Daucus carota*), Canada goldenrod, choke cherry, American mountain ash (*Sorbus americana*), Virginia creeper, marginal wood fern (*Dryopteris marginalis*), Deptford pink (*Dianthus armeria*) and foxglove beardtongue (*Penstemon digitalis*). Numerous European buckthorn were scattered throughout.

Photo 7. Cultural Field Meadow (Google map)

Community 8 Dry-fresh White Ash Deciduous Forest (FOD4-2)

Found along the slope of the intermittent tributary was a disturbed community that had regenerated in a young white ash *(Fraxinus americana)* stand (1-10 cm dbh). The community was surrounded by a dense eastern white cedar community. Additional species included black cherry, trembling aspen, American mountain ash and Scot's pine (*Pinus sylvestris*).

Photo 8. White ash deciduous forest (Photo taken Sept 17, 2014)

Community 9 Bluejoint Mineral Meadow Marsh (ELC Code: MAM 2-1)

This community was part of the creek floodplain and extended east of the Brook Road allowance. The meadow marsh was dominated by Canada bluejoint (*Calamagrostis canadensis*) and had lesser components of sensitive fern, common elderberry (*Sambucus canadensis*), mayapple, purple-stemmed aster, bitter nightshade, tall buttercup and ostrich fern (*Matteuccia struthiopteris*).

Photo 9. Bluejoint meadow marsh (Photo taken Sept 17, 2014)

Community 10 Dry-moist Old Field Meadow (ELC Code: CUM 1-1)

This community as well as Communities 11a, 11b and 12 lay to the west of the Brook Road allowance. Community 10 was comprised of similar pioneer species to those found in Community 2. It, however, also had a notable component of deciduous and shrub regeneration of species including white ash, hawthorn, staghorn sumac, eastern white cedar and eastern white pine.

Photo 10. Cultural Field Meadow (Photo taken Sept 17, 2014)

Community 11a Dry-fresh White Cedar Coniferous Forest (ELC Code: FOC 2-2)

This thicket community was comprised entirely of regenerating eastern white cedar. The cedar was very dense inhibiting any undergrowth with the deep shade and leaf litter.

Community 11b Fresh-moist White Cedar Coniferous Forest (ELC Code: FOC 4-1)

The cedar forest towards the toe of the slope was comprised of eastern white cedar with scattered green/red ash *(Acer pennsylvanica)* and trembling aspen *(Populus tremuloides)*. The groundcover was dominated by a variety of meadow and field species.

Community 12 Cultural Thicket White Ash Regeneration (ELC Code: no applicable ELC Code)

This regenerating thicket of young white ash was also quite dense. It had a much lower component of eastern white cedar, and there were a few larger white ash specimens that had provided the seed source for the young white ash regeneration.

Photo 11. Ash regenerating thicket (Google map)

Community 13 Forb Mineral Meadow Marsh (ELC Code: MAM 2-10)

The narrow riparian belt on either side of the creek was dominated by ferns and wetland plants. Three wetland areas were identified, each approximately 10 m wide and 40 m long. Species included wild red raspberry, purple loosestrife (*Lythrum salicaria*), ostrich and sensitive ferns, dwarf enchanter's nightshade (*Circaea alpina*), field horsetail and common cattail (*Typha latifolia*).

Photo 12. Meadow Marsh (Photo taken Sept 17, 2014)

BELL PROPERTY: COMMUNITIES SOUTH OF ELGIN STREET WEST
(Southwest corner of Elgin Street West and Brook Road)

Community 14a Fresh-moist White Cedar Coniferous Forest (ELC Code: FOC 4-1)

The cedar forest on the southwest corner of Brook Road and Elgin Street was very dense and therefore had very little understory, particularly in some areas. The second most dominant species was European buckthorn of which there were several mature, multi-stemmed specimens. Small openings in the western portion and edges on the north and east side contained a mixture of regenerating species and open meadow species. Edge species included field horsetail, saplings of balsam poplar, poison ivy (*Rhus rydbergii*), high bush cranberry, hawthorn, wild grape, bitter nightshade and sensitive fern. This community was part of a cattle pasture and had numerous trails, cedar forts and disturbed areas in the centre.

Photo 13. Cedar Coniferous Forest (Google map)

Community 14b White Cedar Mineral Coniferous Swamp (SWC1-2)

The western portion of the cedar forest became moister as the slope flattened. The pits and mounds, buttressed trees and organic soils are all indicators of a wetland. The change from open cedar forest with no groundcover to scattered pockets of evergreen wood-fern *(Dryopteris intermedia)*, sensitive fern *(Onoclea sensibilis)* and bitter nightshade signaled a change to a wetland community. Soils were moist to saturated with a sandy silt composition and evidence of gleying. Drainage from the wetland Community 18 was evident in an intermittent channel through the community where pussy willow, red-osier dogwood *(Cornus stolonifera)* and sensitive fern were dominant. Soils were also more organic in this feature.

Buckthorn was widely scattered in this community with small patches towards the west side of the creek.

Community 15 Dry-moist Old Field Meadow (ELC Code: CUM 1-1)

This field community located on the lee end of a drumlin. This area had been used as pasture up until 2005. This old field habitat contained awnless brome grass with weedy and spiny species scattered throughout as cattle avoid these plants. Species included mature hawthorn, wild red raspberry, Canada thistle and viper's bugloss (*Echium vulgare*). The community edge was distinct with hawthorn and buckthorn become very dense along the edge.

Photo 14. Cultural Field Meadow (Google map)

Community 16 Forb Mineral Meadow Marsh (ELC Code: MAM2-10)

At the culvert outlet where the creek passed under Elgin Street and between the tree line and the road, there was a meadow marsh dominated by reed canary grass. Marsh marigold (*Caltha palustris*) was found along the creek channel and in pockets scattered throughout this community. Other species such as swamp milkweed (*Asclepias incarnata*), spotted jewelweed, marsh bedstraw, common water-plantain (*Alisma plantago-aquatica*), purple loosestrife and bitter nightshade were also present. The community was broadest near Elgin Street and contained small pockets of standing water and an uneven topography (pits and mounds).

Photo 15. View of meadow marsh and marsh marigold mounds (Photo taken May 7th, 2015)

Community 17 Cultural Thicket (no applicable ELC Code)

A split rail fence delineated a change from a pure eastern white cedar community to a mature buckthorn thicket with pockets and rows of mature eastern white cedar. The pattern is typical of fields that were open meadows with scattered stands and individual cedar. As the field succeeds, buckthorn fills in all the gaps creating a very dense buckthorn thicket with remnant cedar trees and stands. Eastern white cedar was now regenerating under the buckthorn due to the shade and moist microclimate. Scattered mature to over mature hawthorn were widely scattered in this community.

Community 18 Willow Mineral Thicket Swamp (ELC Code: SWT2-2)

This swamp community contained crack willow, slender willow, eastern white cedar and eastern hemlock (*Tsuga canadensis*). The community was very hummocky with some organic patches containing species similar to Community 16. Pockets of dense willow were present at the south end of the community.

Photo 16. Willow Mineral Thicket Swamp (Google Earth Street View)

Community 19 Cultural Thicket and Successional Meadow (no applicable ELC Code)

The southern half of the property was a mix of agricultural fields and successional meadow. As in other parts of the property, European buckthorn was regenerating throughout the abandoned fields. Scattered stands and individual cedar were still present.

Community 20 Cattail Mineral Shallow Marsh (ELC Code: MAS 2-1)

This community was identified on the eastern side of the property and was a linear feature along the tributary. Dominated by a dense stand of narrow-leaved cattail (*Typha angustifolia*). The wetland edges contained Canada goldenrod (*Solidago canadensis*) and Canada bluejoint grass (*Calamagrostis canadensis*).

Photo 17. Cattail marsh (Photo taken Sept 17, 2014).

Community 21 Forb Mineral Meadow Marsh (ELC Code: MAM2-10)

Two small vernal pools were found in the central woodlot. Along the northwest corner and south central portion of the woodland, these pools provided seasonal amphibian breeding habitat. The pockets were mainly comprised of wetland grasses including Canada bluejoint.

Community 22 Deciduous Woodland (FOD)

This community was identified just north of the cattail marsh adjacent Elgin Street. This linear community was dominated by deciduous tree species including crack willow (*Salix fragilis*), white ash (*Fraxinus americana*) and balsam poplar (*Populus balsamifera*).

Photo 18. Deciduous Woodland (Google map)

3.3 Birds

A variety of habitats were present for the 53 bird species recorded in 2006 and 2011 on the subject property including open fields, wetlands and forests with good vertical structure. Species observed in the woodlands included a great horned owl (*Bubo virginianus*) which is thought to be roosting and nesting in the large pine trees.

Seven area sensitive bird species were among those recorded and include the Cooper's hawk (*Accipiter cooperii*), winter wren (*Troglodytes hiemalis*), veery (*Catharus fuscescens*), black and white warbler (*Mniotilta varia*), ovenbird (*Seiurus aurocapilla*), American redstart (*Setophaga ruticilla*) and savannah sparrow (*Passerculus sandwichensis*).

Field and hedgerow species included savannah sparrow *(Passerculus sandwichensis)*, red-tailed hawk (*Buteo jamaicensis*) and bobolink (*Dolichonyx oryzivorus*).

The great horned owl and Cooper's hawk (*Accipiter cooperii*), were observed in the woodland to the west and in the central woodland on several occasions during 2006 surveys and may be nesting in this area. No stick nests were observed in the woodland except those of American crow. No further observations were made of these birds after 2006.

The marshes harboured yellow warbler *(Dendroica petechia)*, red-winged blackbird *(Agelaius phoeniceus)* and common yellowthroat (*Geothlypis trichas*). Two sedge wrens singing during the October 2005 survey were considered late migrants. This species was not recorded during the breeding bird surveys or other times on site.

Bird species found in the central woodland include great-crested flycatcher (*Myiarchus crinitus*), red-eyed vireo (*Vireo olivaceus*), wood thrush (*Hylocichla mustelina*), eastern wood-pewee (*Contopus virens*), American redstart and ovenbird.

A cumulative list of birds observed during the surveys is found in Appendix II.

3.4 Mammals

A total of four mammal species were observed during 2014 field visits and include white-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), eastern chipmunk (*Tamias striatus*) and a hairy-tailed mole (*Parascalops breweri*).

An additional six species were observed in previous years (NEA, 2007) and included black squirrel (*Sciurus carolinensis*), raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), meadow vole (*Microtus pennsylvanicus*), and a northern short-tailed shrew (*Blarina brevicauda*).

3.5 Reptiles and Amphibians

Amphibian species recorded during 2014 field visits included the wood frog (*Rana sylvatica*) and mink frog (*Rana septentrionalis*).

Information collected in previous field investigations (NEA, 2007) identified northern spring peeper (*Pseudacris crucifer),* American toad (*Bufo americanus*) and eastern gray treefrog (*Hyla versicolor*) as being present. Northern leapord frogs (*Rana pipens*), Amercian bullfrogs (*Rana catesbeiana*) and green frogs (*Rana clamitans*) were observed during the 2011 surveys.

Three ephemeral ponds were noted during the spring amphibian surveys in April 2006 (NEA, 2007). These ponds were identified as Community 21 on Figure 1. Ephemeral ponds/pools are areas that are flooded in the spring after the snowmelt and provide short term (4-8 weeks) habitat for spring breeding frog species. This site contained a deeper pool and shallow flooded meadow approximately 20 x 10 metres. Spring peeper and wood frogs were heard at calling code 3 as per the Marsh Monitoring methodology. Tadpoles were noted in this pool in early May. The last pool examined was a small but deep pool approximately 5 x 15 metres located on the south side of the central woodland. On April 10th, 2006, wood frogs were calling (code 3) in this pool.

3.6 Fish and Aquatic Habitat

3.6.1 Aquatic Habitat

3.6.1.1. Cobourg Creek Watershed

Midtown Creek and Brook Creek are part of the Cobourg Creek watershed. The Cobourg Creek watershed is located within the Ganaraska Region Conservation Authority (GRCA) and drains into Lake Ontario; it is the second largest basin within the GRCA jurisdiction. Cobourg Creek watershed originates from the Oak Ridge Moraine, it drains a land base area of 123.2 km and is approximately 17.7 km long and 6.7 km wide at its widest point at the northern boundary of the watershed. (GRCA, 2008)

3.6.1.2. Aquatic Habitat Assessments

The study area was classified into three aquatic habitat zones in 2006, based on substrate composition, riparian habitat, percent in-stream cover and unique features. Habitat zones are illustrated in Figure 2.

Habitat Zone Descriptions

Brook Creek – Habitat Zone 1 & 3

Habitat Zone 1 was located in the Brook Creek tributary located immediately north and south of Elgin Street East in the bell property. Habitat Zone 3 was also located in the Brook Creek tributary approximately 300 m northeast of Habitat Zone 1 in the woodlot (Figure 2). During the 2006 habitat assessments the tributary was mainly comprised of intermittent flows primarily in the north and western portions of the tributary. The south western portion of the tributary had a well-defined channel with evidence of erosion on both sides of the bank, the wetted water widths ranged from 0.3 m to 0.6 m with water depths of 0.03 m to 0.08 m. Due to a change in the flows to the south and abandonment of the natural flow pattern southwest across the Brook Road allowance, access to the upstream areas has been impeded (NEA, 2007). During the 2015 field visit there was no flowing water within the tributary, only pockets of standing water.

Photo 19. Habitat Zone 1, Brook Creek S of Elgin Street East, looking downstream, facing south (Photo taken May 7th 2015).

Photo 20. Habitat Zone 3, Brook Creek, photo showing no flow in tributary (Photo taken May 7th 2015).

Midtown Creek – Habitat Zone 2

Habitat Zone 2 was located in Midtown Creek, north and south of Danforth Road, approximately 800 m northwest of Habitat Zone 3 (Figure 2). During the 2006 assessments, the habitat upstream of the culvert located on Danforth Road was well defined with minimal flows due to overgrown terrestrial grasses; the substrate was dominated by silt and sand. Wetted widths ranged from 0.15 m to 0.3 m with depths of 0.10 m to 0.20 m. Downstream of the culvert the channel widened to approximately 1.2 m and eventually dissipated into a wetland habitat. The substrate directly downstream of the culvert was dominated by gravel and cobble (NEA, 2007). Similar habitat features were observed in 2015, with the exception of increased flow and local areas of higher velocity.

Photo 21. Habitat Zone 2, Midtown Creek, looking upstream facing north (Photo taken May 7th 2015).

3.6.2 Fish Community

Brook Creek

Fish presence and community was sampled for in Habitat Zone 1 (2006 and 2015) and Habitat Zone 3 (2006, channel was dry in 2015). In the zone, two electrofishing samples (2006 & 2015) and two minnow trapping samples were completed.

Electrofishing surveys were conducted directly south of the Elgin Street East culvert and two minnow traps set upstream and two were set downstream of the Elgin Street East culvert. The fifth minnow trap was set in Habitat Zone 3, located in the middle of tributary in the woodlot between Greer Road and Elgin Street East (NEA, 2007) (Figure 2).

The Brook Creek fish presence sampling found fish during both spring and summer sampling events in 2006. NEA staff attempted to electrofishing in 2015 but the channel was dry and therefore sampling could not be completed. Results from 2006 samples have been summarized in Table 1.

The Brook Creek fish community (d/s of Elgin) sampled in 2006 had a total abundance of 5 individuals from one fish species, northern redbelly dace (NEA, 2007). The fish community sampled in 2016 had a lower total abundance of one individual from a different fish species, brook stickleback (NEA, 2007). The fish species represent different families, the northern redbelly dace belonging to the family *Cyprinidae* and the brook stickleback belonging to the family *Gasterosteidae.* The fish species observed in Brook Creek downstream of Eglin Street East Creek are both cool water fish species, common to the Cobourg Creek watershed (Table 1). Results from 2006 and 2015 sampling surveys have been summarized in Table 1. Detailed results for the 2015 sampling can be found in Appendix III.

Midtown Creek

Fish presence and community was sampled for in Habitat Zone 2 in 2006 and 2015. In the zone, two electrofishing samples (2006 & 2015) and two minnow trapping samples were completed.

Electrofishing surveys were conducted upstream and downstream of the Danforth Road culvert. Minnow trap were set upstream (2 traps) and downstream (2 traps) of the Danforth Road culvert (NEA, 2007) (Figure 2).

The Midtown fish community sampled in 2006 had a total abundance of 17 individuals from two fish species, representing two families, *Cyprinidae* and *Gasterosteidae* (NEA, 2007). The fish community sampled in 2015 had a higher total abundance of 172 individuals, represented by five fish species and two families, *Cyprinidae* and *Gasterosteidae* (NEA, 2007). Similar to the 2006 fish community results, these species represented families the same two families *Cyprinidae* and *Gasterosteidae.* The fish species observed in Midtown Creek are both warm and cool water fish species, common to the Cobourg Creek watershed (Table 1). Results from 2006 and 2015 sampling surveys have been summarized in Table 1. Detailed results for the 2015 sampling can be found in Appendix III.

Table 1. NEA Fish Community Results (2006 & 2015).

Family Name	Common Name	Scientific Name	Thermal Regime (Scott & Crossman, 1998)	Habitat Zone 1 (Brook Creek)				Habitat Zone 2 (Midtown Creek)				Habitat Zone 3 (Brook Creek)	
				Sample 1	Sample 2	Sample 3	Sample 4	Sample 1	Sample 2	Sample 3	Sample 4	Sample 1	Sample 2
				14-May-06	12-Jun-06	20-Jun-06	7-May-15	14-May-06	12-Jun-06	20-Jun-06	7-May-15	14-May-06	12-Jun-06
Cyprinidae	bluntnose minnow	*Pimephales notatus*	warmwater	0	0	0	0	0	0	0	4	0	0
	creek chub	*Semotilus atromaculatus*	coolwater	0	0	0	0	0	0	0	18	0	0
	fathead minnow	*Pimephales promelas*	warmwater	0	0	0	0	0	0	0	2	0	0
	northern redbelly dace	*Chrosomus eos*	coolwater	5	0	0	0	0	12	0	0	0	0
	YOY minnow sp.	*Cyprinidae sp.*	/	0	0	0	0	0	0	0	144	0	0
Gasterosteidae	brook stickleback	*Culaea inconstans*	coolwater	0	0	0	1	0	5	0	4	0	0
Catch Summary													
		Abundance		5	0	0	1	0	17	0	172	0	0
		Species Diversity		1	0	0	1	0	2	0	5	0	0
Environmental Conditions													
		Air Temperature (°C)		/	/	/	22.6	/	/	/	22.6	/	/
		Stream Temperature (°C)		/	/	/	9.5	/	/	/	9.5	/	/
Sample Attributes													
		Gear Type*		MT	EF	MT	EF	MT	EF	MT	EF	MT	MT
Electrofishing Attributes													
		Frequency (hertz)		n/a	/	n/a	60	n/a	/	n/a	70	n/a	n/a
		Voltage			/		100		/		280		
		Site Length (m)			/		4.95		/		17.36		
		Average Width (m)			/		5.6		/		1.54		
		Shocker Seconds			/		273		/		676		
		Effort sec/m²			/		9.8		/		25		

Legend: (/) data not available
(n/a) not applicable
(*) gear type; EF=Electrofisher, MT=Minnow Trap

3.6.3 Surface Water Quality

Surface water quality parameters were collected on May 7th 2015 within the electrofishing sampling areas of both sites approximately 0.2m below the surface of the water (Figure 2). Raw data have been summarized in Table 2. Detailed results can be found in Appendix IV.

Table 2. Surface Water Quality Results (7-May-15).

Surface Water Quality Parameters	Site 1	Site 2
Air Temperature (°C)	22.6	25
Water Temperature (°C)	9.5	17.5
Dissolved Oxygen (mg/L)	7.54	9.44
Total Dissolved Solids (mg/L)	452.9	604
Conductivity (um/cm)	491	786
pH	6.9	7.1
Turbidity (NTU)	0.42	1.68

Dissolved Oxygen (mg/L)

Dissolved oxygen is the measurement of the amount of oxygen dissolved within the water (EPA, 2012). The lowest acceptable range for cold water biota is 8-10 mg/L and 5-8 mg/L for warm water biota. Site 1 was slightly below the lowest acceptable range with a reading of 7.54 mg/L and Site 2 was within the lowest acceptable range for cool water biota with a reading of 9.44 mg/L (Table 2) (Canadian Council of Ministers of the Environment, 2002).

The dissolved oxygen sensor in the YSI Pro 2010 has a range of 0 to 50 mg/L, with an accuracy of ±0.2mg/L in the 0 to 20 mg/L range and ±0.6 mg/L in the 20 to 50 mg/L range (YSI Incorporated, 2010).

Total Dissolved Solids (TDS) (mg/L)

TDS is defined as the amount of inorganic salt and organic matter that are dissolved in water. TDS concentrations are the sum of cations and anions in the water (Health Canada, 2009). Sources of TDS include fertilizers, road runoff, industrial discharges and soil erosion (EPA, 2012). TDS at Site 1 was 452.9 mg/L and 604 mg/L at Site 2 (Table 2).

The Canadian Council of Ministers of the Environment does not have specific guidelines for TDS in relevance to the protection of aquatic life (Canadian Council of Ministers of the Environment, 2002). The TDS sensor range is 0 to 100g/L (YSI Incorporated, 2010).

Conductivity (us/cm)

Conductivity is the measure of capability of water to pass an electrical current (EPA, 2012). Conductivity at Site 1 was 491 us/cm and 786 us/cm (Table 2). The Canadian Council of Ministers of the Environment does not have specific guidelines for Conductivity in relevance to the protection of aquatic life (Canadian Council of Ministers of the Environment, 2002). The conductivity sensor range is 0 to 200 mS/cm with an accuracy of ±0.5% or 0.001 mS/cm, whichever is greater (YSI Incorporated, 2010)

pH

pH is the measures how acidic or basic a substance is (EPA, 2012). Local conditions in 2015 were alkaline with readings of 6.9 (Site 1) and 7.1 (Site 2) (Table 2). Both readings were in the acceptable pH range of 6.8-8.5 (Energy, 1994).

The pH handheld waterproof pH meter range is -2.00 to 16.00 and the accuracy at 20°C is ±0.05 pH (Hanna Instruments, 1995-2004).

Turbidity (NTU)

Turbidity is the measure of water transparency or clarity. The lack of clarity is caused by biotic and abiotic suspended or dissolved substances in the water. The more concentrated these substances are the higher the turbidity reading. The turbidity taken at Site 1 was 0.42 NTU and 1.68 NTU at Site 2 (Table 2). Both readings were defined as normal (Energy, 1994).

The accuracy of the turbidity meter is ±0.05 when measurements are from 0-2.5 NTU, ±2% when measurements are 2.5-100NTU and ±3% when measurements are 100NTU or greater (Hoskin Scientific, 2013).

3.7 General Hydrology

The woodland areas contained several wetland pockets, many located along an ephemeral streambed which was dry during the time of the site visits. The drainage is divided between the Brook Creek watershed which includes the eastern portion of the site and the intermittent tributary and the Midtown Creek watershed which includes the western portion and the permanent warm water creek (NEA, 2007).

3.8 Hydrogeology

The water table takes the general shape of the landscape and shallow groundwater movement follows the terrain. The water table depth on the site is considered to be relatively shallow over most of the site; however, it is deeper in upland areas and shallower in lowland areas. On July 7th, 2006 the water table was observed to be at surface at several watercourses and at 0.6 and 0.45 metres below grade (Goff, 2006).

4.0 Resource Significance

4.1 Key Features and Ecological Functions

4.1.1 Overview

The key natural features and functions of the study area are:

- Woodlands
- Significant Wildlife Habitat (SWH)
- Species At Risk
- Watercourse through central woodland and north of Elgin St. East
- Species At Risk (bobolink, bank swallow, barn swallow, wood thrush and eastern meadowlark)
- Significant vegetation species (butternut)
- General wildlife habitat
- Fish habitat in Midtown Creek
- Fish habitat downstream of Elgin Street on tributary of Brook Creek
- Unevaluated wetlands

The impact assessment of these features is discussed in greater detail in Section 6.0.

Additional ecological features and functions of the upland area and the adjacent wetland would be transitional habitat from wetland to upland and local wildlife linkage.

A review of the NHIC database did not identify any significant natural heritage features (PSWs, or ANSIs) within the subject property or within 120 metres.

4.1.2 Woodlands

The Natural Heritage Reference Manual outlines the criteria for significant woodlands. Features of the woodland based on field inventories were compared against Natural Heritage Reference Manual criteria (MNRF, 2010). Aerial imagery and the in-house "NEA mapper" was used to determine sizes and dimensions of woodlot features using the "measure tool".

Woodland cover within the Municipality was determined using data from a spreadsheet containing the area of different forest types based on the Southern Ontario Land Resource Information System (SOLRIS) which provides a landscape level inventory of woodland features. To calculate the percent cover, the area of the municipality was determined (to the edge of Lake Ontario and including all inland waterbodies) and the area of "woodland" features based on SOLRIS.

Vegetation categories that were included within the "woodland" designation included forest, coniferous forest, mixed forest, deciduous forest and hedge rows. The percent woodlot cover was then derived using the total woodland cover using the above categories within the area of the municipality. NEA did not include swamp within the percent woodland cover. Woodlands are considered significant if they meet the minimum standard for any one of the criteria within listed categories including size; woodland interior; proximity to other significant woodland or habitats; linkages; water protection; and woodland diversity representation (composition and uncommon characteristics). The woodland percentage cover within Northumberland County was determined to be approximately 20% and all criteria listed above will be rated based on this percentage.

The central woodland located on the subject property would be considered significant based on the categories met within the Natural Heritage Reference Manual (MNRF, 2010). The woodland meets the significance criteria for Water Protection and Woodland Diversity Representation.

Additionally, the secondary Plan report (Gartner Lee) identified the central woodland as containing high or in some portions moderate development constraints. The forest is mature and provides interior habitat, amphibian breeding habitat and the creek bed provides wetland habitat.

Literature Review: Secondary Plan Report (Gartner Lee)

Portions of both the subject property north of Elgin Street and the additional study area south of Elgin Street have been identified as having a high level of development constraint (Figure 2) in the report prepared for the Town of Cobourg by Gartner Lee (2004). Refer to Appendix VII of the current report for Constraints. High constraint designations identify the presence of features and functions such as wetlands and wet areas with important amphibian breeding habitat, high quality, mature forest, interior forest habitat, valley bottoms and flood plains, etc. Areas determined to have a moderate development constraint were those with smaller or lower functioning wetlands, immature forest, steep slopes, recharge areas, and areas between development and high constraint areas, therefore serving as a buffer.

Part of the northwest corner of the property contains hazard lands identified by the Ganaraska Region Conservation Authority as part of the Mid-Town Creek floodplain. Portions of the woodland (mainly the cedar forest) are identified as moderate constraint areas.

The Brook Creek (west branch) and the woodland (primarily white pine forest; Community 1) on the subject property are also recognized as having primarily high, or in some portions moderate development constraints. The forest is mature and provides interior habitat, amphibian breeding habitat and the creek bed provides wetland habitat.

A portion of the western limit of the property south of Elgin Street is also subject to these hazard land limitations as a result of the area of the Brook Creek (west branch) flood plain area. A large portion of the remainder of the property is either identified as either high or moderate constraint, likely due to the presence of wetland and woodland.

4.1.3 Significant Wildlife Habitat

A high level review of the Significant Wildlife Habitat (SWH) outlined in the Eco Region Criteron Schedule identified the potential for (Candidate) migratory butterfly stopover, waterfowl nesting area, turtle nesting, marsh breeding habitat and amphibian movement corridors. None of these were confirmed based on our field work. The potential for these SWH were based on the presence of ELC Codes within the study area.

In addition, several other criteria were confirmed based on our field surveys. This includes amphibian breeding habitat (woodland pools); woodland area sensitive bird breeding habitat; raptor nesting (great horned owl); and special concern and rare wildlife species (wood thrush, eastern wood-pewee).

4.2 Significant Species

Vegetation

A review of the list of plant species recorded on site found that five plant species were significant on a national, provincial or regional level, the federally and provincially endangered butternut tree *(Juglans cinerea)* and four regionally rare species (COSEWIC, 2017, COSSARO, 2017; Riley, 1989) (Appendix I-B).

The butternut has declined across Ontario due to the presence of a butternut canker or fungus that kills the tree. Fourteen trees were assessed by a certified Butternut Health Assessor and eight of these have been analyzed as retainable trees. Retainable trees are protected under the Ontario Endangered Species Act (2007). Butternuts require a buffer of 25 m from the base of the tree. A report will be sent to the local MNRF Species at Risk Biologist to provide details on the tree locations and BHA results. An ESA permit and planting plan are required if protection cannot be afforded and removal is necessary. The locations of the retainable trees are found on Figure 3.

Four regionally rare plant species were found on the property: purple flowering raspberry *(Rubus odoratus)*, American mountain ash *(Sorbus americana)*, European wood-sorrel *(Oxalis stricta)* and slender-leaved agalinis *(Agalinis tenuifolia)* (Riley, 1989)(Appendix I-B). All of these species were found at various locations on the property. The agalinis was present in the lower sections of the Brook Road allowance north of Elgin Street. Discussions with GRCA will determine if those specimens are to be salvaged prior to construction and relocated.

Birds

A review of the Ontario Breeding Bird Atlas (BSC 2005) Square Information Summary Sheet for the 10 x 10 km atlas square (17QJ27) that includes the subject property found fifteen (15) species listed either federally or provincially significant (Table 3).

Of the species recorded also found listed in the Atlas square, barn swallow (*Hirundo rustica*), bobolink (*Dolichonyx oryzivorus*), eastern wood-pewee (*Contopus virens*), bank swallow (*Riparia riparia*), wood thrush (*Hylocichla mustelina*), eastern meadowlark (*Sturnella magna*) were recorded on site during field visits in 2011 and 2006 (Appendix II).

The presence of bobolink in the fallow field west of the proposed Brock Road allowance (Community 2d) is directly within the proposed building envelope. It is recommended that the habitat be reassessed prior to draft plan approval to determine whether it still exists and

whether birds are still nesting here. If habitat still exists and birds are observed consultation with the MNRF Species at Risk Biologist will be required to determine the appropriate measures for species protection.

Seven area sensitive birds were recorded on site in 2006 and 2011. Area sensitive species are those that require a minimum hectarage of contiguous suitable habitat to successfully breed (MNR, 2000). These species include Cooper's hawk (*Accipiter cooperii*), winter wren (*Troglodytes hiemalis*), veery (*Catharus fuscescens*), black and white warbler (*Mniotilta varia*), ovenbird (*Seiurus aurocapilla*), American redstart (*Setophaga ruticilla*) and savannah sparrow (*Passerculus sandwichensis*) (Appendix II).

Great-horned owls are suspected to be nesting within the woodland. Although not a Species At Risk, raptor nests are protected under the Fish and Wildlife Conservation Act and as Significant Wildlife Habitat under the Provincial Policy Statement.

No regionally significant bird species were recorded on site (OMNR, 1993)(Appendix II).

Table 3. Provincially rare species at risk recorded for the Atlas of the Breeding Birds of Ontario

Species	COSEWIC (2017)	COSSARO (2017)	Habitat Preferences (OMNR 2000)	Habitat found on subject property	Recorded during field visits
Least Bittern	THR	THR	Prefers deep marshes, swamps, bogs; marshy borders of lakes, ponds, streams, ditches; dense emergent vegetation of cattail, bulrush, sedge; nests in cattails	No	No
King Rail	END	END	Prefers large, shallow, fresh water marshes, shrubby swamps, marshy borders of lakes and ponds with abundant vegetation; an 'edge' species;	No	No
Black tern*	NAR	SC	Prefers wetlands, coastal or inland marshes; large cattail marshes, marshy edges of rivers, lakes or ponds, wet open fens, wet meadows;	No	No
Common Nighthawk	THR	THR	Prefers open ground; clearings in dense forests; ploughed fields; gravel beaches or barren areas with rocky soils; open woodlands; flat gravel roofs	Yes-foraging only	No
Whip-poor-will	THR	THR	Found in a mix of open and forested areas with open woodlands or openings in more mature, deciduous, coniferous and mixed forests.	No	No
Chimney Swift	THR	THR	Commonly found in urban areas near buildings; nests in hollow trees, crevices of rock cliffs, chimneys; highly gregarious, feeds over open water	No	No

Red-headed Woodpecker	THR	SC	Open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees	No	No
Eastern wood-pewee	SC	SC	Breeding habitat is deciduous, mixed woods or pine plantations	Yes	Yes
Bank swallow	THR	THR	Breeds in a wide variety of natural and artificial sites with vertical banks, including riverbanks, lake and ocean bluffs, aggregate pits, road cuts, and stock piles of soil	No	Yes-flying over site
Barn swallow	THR	THR	Prefers farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water	No - structures not present on site	Yes-flying over site
Wood thrush	THR	SC	Breeds in deciduous and mixed forests where there are large trees, moderate understory, shade and abundant leaf litter for foraging	Yes	Yes
Canada warbler	THR	SC	An interior forest species; dense, mixed coniferous, deciduous forests with closed canopy, wet bottomlands of cedar or alder; shrubby undergrowth in cool moist mature woodlands; riparian habitat	Yes	No
Grasshopper sparrow	SC	NAR	Nests on the ground in open grasslands and prairies with patches of bare ground; prefers moist meadows and abandoned fields at an early stage with grasses dominant	No	No

Bobolink	THR	THR	Prefers tall, grassy meadows and ditches, hayfields and some croplands	Yes	Yes
Eastern Meadowlark	THR	THR	Prefers open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees	Yes	Yes

Least bittern, king rail and black tern are wetland or lacustrine species that would not find suitable habitat in the area of the proposed development. All would be found in marshes along Lake Ontario which are included in the southern end of this atlas square.

Mammals and Herpetozoa

A review of the list of mammal, reptile and amphibian species recorded on site found that none were significant on a national or provincial (COSEWIC, 2017; COSSARO, 2017). The NHIC database did not identify any rare species in the study area.

A review of the NHIC database for squares 17QJ27_73/74/83/84 identified one significant species, Swamp Darner (*Epiaeschna heros*), a dragonfly. The darner is an S2S3 species but has not been recorded in the area since 1941 and the sensitive species is an S3 species whose record is from 1987.

Fish and Fish Habitat

The literature review found no provincially and/or nationally rare species were documented within the study area (COSEWIC, 2017; SARA, 2017; SARO, 2017; OMNR, 2012; OMNR, 2013). No critical habitat for Aquatic Species at Risk or OMNF sensitive spawning areas occurred within the study area (DFO, 2015; OMNR, 2012). No Aquatic Species at Risk were observed during field surveys.

5.0 Proposed Development

The proposed development includes a mix of street townhouses, low density detached and medium density blocks (Appendix V)(The Planning Partnership, May 25, 2016, Drawing No. C, revised Sept. 28, 2017) In addition, high density commercial/residential areas, a school, and seniors housing are planned. The main access will be via a new collector road winding through the site from Elgin Street to Danforth Road East and also back to Elgin Street further east. An extension of Denton Road will also be completed as part of Phase 1. No extension of Brook Road is planned along that road allowance. Changes to the vertical alignment and possible turning lanes are proposed along Elgin Street. Only one crossing of the Brook Road tributary is proposed, just west of Greer Road. A large green corridor is proposed beginning from Greer Road and continuing through the central woodland and crossing Elgin Street. This includes the woodlands, Brook Creek tributary and buffer and all of the wetland communities.

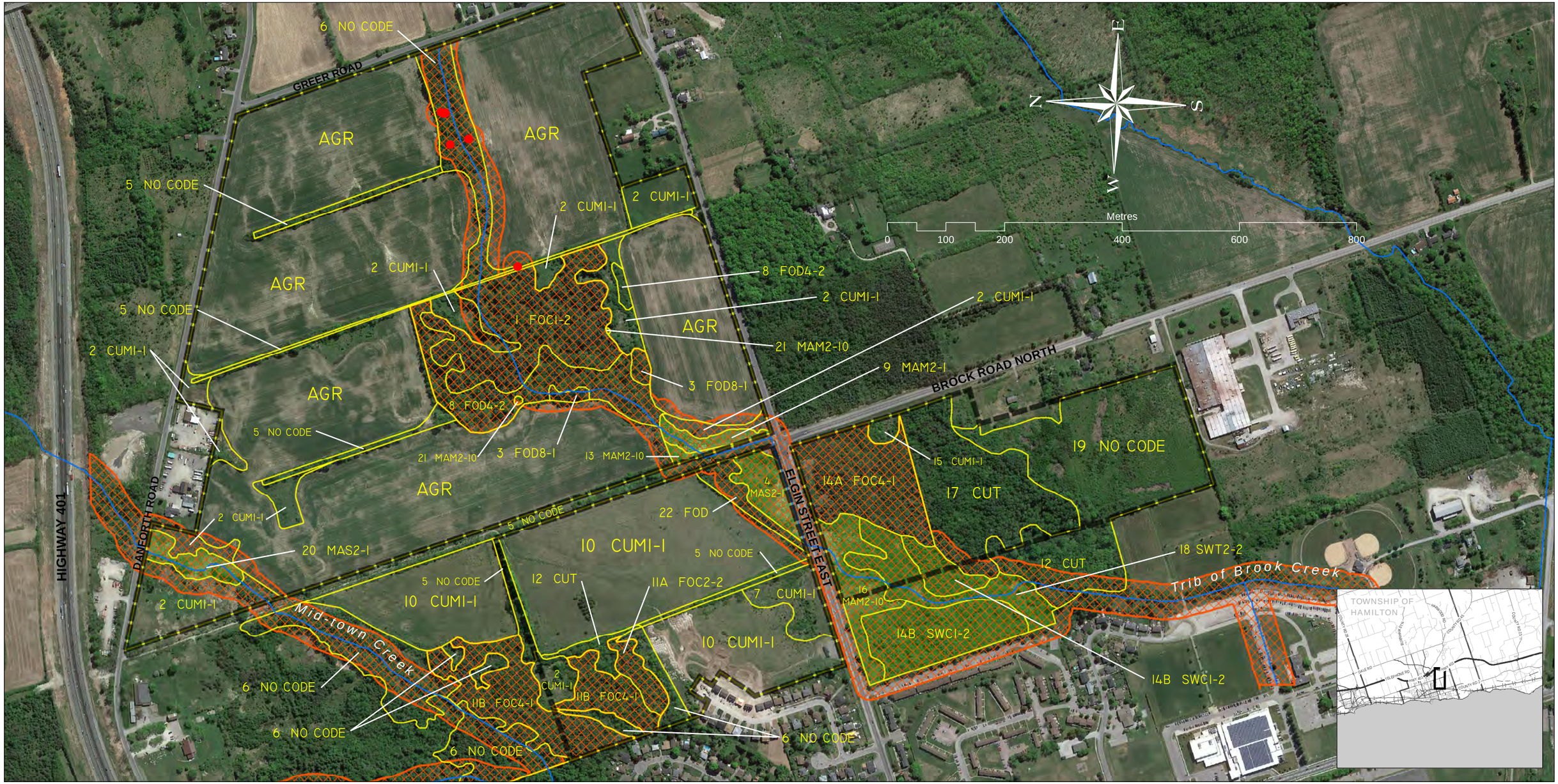
A total of approximately 26.298 ha of property is designated as Environmental Protection (EP) (Blocks 123-128) and will be left in its natural state preserving the woodlands, creeks and other natural features. A total of approximately 0.52 ha of land will be designated as open space on the property and 4.08 ha used for a Community Park, with Stormwater Management areas on 5.95 ha.

Future upgrades to Elgin Street East and Brook Road will be required as part of the improvements to intersections and the road surface. The site will be serviced by municipal water and sewer.

Several stormwater management ponds will be located on the subject property including one on the west side of Brook Road North, two just north of Elgin Street, one just north of the central woodlot and one east of the central woodlot. They will outlet into the Brook Road tributary.

A watercourse road crossing will be located over the Brook Creek tributary east of the woodlot and west of Greer Road. A small section of Brook Creek tributary north of Elgin Street East will be realigned to accommodate road access.

Grading of the site will involve decreasing the elevation of the high drumlin tops and lowering the grades on roadways and existing side slopes.



LEGEND

- Retainable Butternut
- Constraints
- Watercourse
- Property Boundary
- Vegetation Community
- Parcel Fabric
- Wetland Community

Composite imagery acquired in May 2015. DigitalGlobe WorldView-2. 30 cm Resolution.

ELC TYPES (1ST APPROXIMATION)

CODE	TYPE DESCRIPTION
CUMI-1	Dry-moist old field meadow
CUT	Cultural thicket
FOCI-2	Dry-fresh white pine-red pine coniferous forest
FOC2-2	Dry-fresh white cedar coniferous forest
FOC4-1	Fresh-moist white cedar coniferous forest
FOD	Deciduous forest
FOD4-2	Dry-fresh white ash deciduous forest
FOD8-1	Fresh-moist poplar deciduous forest
MAM2-1	Bluejoint mineral meadow marsh
MAM2-10	Forb mineral meadow marsh
MAS2-1	Cattail mineral shallow marsh
SWCI-1	White cedar mineral coniferous swamp
SWT2-2	Willow mineral thicket swamp

FIGURE 3: VEGETATION COMMUNITIES & CONSTRAINTS

Pt Lots 11 & 12, Con 1, Heritage Village of Rondeau
Town of Cobourg, Secondary Plan Area
Peterborough District

UTM Zone 17
WKID: 26917 Authority: EPSG
Transverse Mercator
GCS North American 1983, ESRI ArcGIS 10.1

REVISIONS

NO	BY	DATE	DESCRIPTION
1	W.P.	09/02/2016	Initial map creation.
2	W.P.	09/02/2016	Revised constraints. Removed tributary of Mid-town Creek. Changes labeling.
3	W.P.	10/05/2016	Revised constraints. Added property line. Changed community numbering.

CONTACT: Will Pridham, GIS Specialist & Cartographer
PHONE/FAX: T: 1 (705)-878-9399 F: 1 (705)-878-9390
EMAIL: Will Pridham: wpridham@niblett.ca General Inquiries: mail@niblett.ca

PROJECT NO: PN14056
REVISION NO.: RV-01
PROJECT: East Cobourg
CLIENT: N/A

SCALE: 1:6,500 CENTIMETERS

NIBLETT ENVIRONMENTAL ASSOCIATES INC.
WWW.NIBLETT.CA

6.0 Impact Assessment

6.1 Overview

The latest available proposed draft plan (Appendix V)(The Planning Partnership, May 25, 2016, Drawing No. C, revised Sept. 28, 2017) was used for the completion of the impact assessment.

The impact assessment was completed in three phases. The first phase was to identify the key natural heritage features, significant features, sensitive habitats and plot identified natural heritage designations. This information was derived from existing reports (Meridian Planning Consultants Inc., 2015; Gartner Lee, May 2004), the official plan and from our detailed field surveys and ELC mapping.

The second stage was to assess all of the features and their ecological functions to determine their significance on a local and regional level. This determines the key natural heritage features and functions to be retained in their entirety and those where development may be allowed with buffers and other mitigation measures. This plan was forwarded to the planners and designers to be incorporated into the early concept plans for the community. As the plan was developed additional input was provided where individual elements were proposed adjacent to these key features. The overall intent was to maintain the key existing natural features, including wildlife corridors and linkages, creeks and sensitive habitats. Buffers were determined from key natural features and applied to the site. This information (shapefiles) were supplied to the study team and mapped as part of the site plan constraints.

The final stage was to assess the potential impacts at the site preparation, construction and post-construction stages to ensure that the features and functions identified for preservation would not be negatively impacted. Specific mitigation measures were developed for each element of the development plan to minimize or avoid conflicts with wildlife and natural habitats. The EIS was written to comply with the Secondary Plan and to follow the requirements regarding environmental area designations in the Official Plan.

6.2 Large Central Woodlot Northeast of Brook Road and Elgin Street East

6.2.1 Central Woodlot Description

The main natural feature in the study area is the central woodland. This 10.68 hectare block contained many of the key features found on the site and listed in Section 4.1. The impact on each is explained in the following sections.

Overall the central woodland was identified early on as a significant feature. Preservation of the entire forested area is important for maintaining species diversity on the site post-development. Connections to the creek valleys to the west and east are important to allow species and genetic material to move across the landscape. The lot fabric has been located outside of the dripline of the edge trees, wetlands, creek corridors and sensitive amphibian pools with an appropriate setback to mitigate potential impacts during the site preparation, construction and post-construction phases. A number of site activities have to be mitigated to avoid negative impacts. These include grading, changes in hydrology, sediment and erosion, noise, lighting, changes to landform, urbanization of the fields, road crossings and human activity.

The woodlot contains interior habitat and a mature forest of white pine that provides habitat for area sensitive forest bird species, a diversity of plants, amphibian ponds and wetland pockets associated with the tributaries.

The forest edge is well defined along the southern and western edge with dense vegetation that protects the interior trees from windthrow and negative impacts. The western and southern edges will not be disturbed by the proposed development. The limit of development coincides with the dripline of the outermost trees, as well as a setback of open space to maintain the integrity of the trees and to prevent damage to the sensitive rooting zone from heavy equipment and grading. Installation of silt and snow fencing along the entire perimeter of the central woodland (at the development limit) prior to any site preparation activities is critical to preventing negative impacts and accidental intrusions by equipment operators into the preservation areas.

The central woodland was identified as significant for water protection and woodland diversity representation (Natural Heritage Reference Manual, 2010); these functions will not be impacted post construction. The central woodlot will be retained. The woodland acts as a buffer protecting the watercourse and prevents sedimentation. Additionally, the protection of the woodland will retain the woodland biodiversity. No negative impacts are expected on the woodland as a result of the proposed development.

A network of trails is included within the edge of the woodland as part of the development. The connection to the neighbourhoods and a linear network of trails from the woodland will provide nature appreciation opportunities for residents.

6.2.2 Western Portion

The northern edge contains a young community of aspen and buckthorn. Development is located outside the main treed area. The school block (Block 102) is located on the western side of the woodlot and outside of the contiguous mature forest. Mitigation measures to re-establish the buckthorn forest edge were described in the EIS and the previous addendum. A neighbourhood park exists on the western side of the woodlot just north of the proposed elementary school block. This allows more of the edge communities and disturbed meadows to be retained in the open space block. The benefit is a larger block of contiguous natural habitat.

Part of the redesign was to retain the existing creek channel in its current location and a 15 m buffer. The creek may need minor modifications or realignment associated with the crossing of Street R. This will form part of the fisheries work consultations with DFO and GRCA at that stage of the development.

The preservation of a corridor for wildlife south of Block 102 and the existing creek within the southwest portion of the woodland is still a priority in that area.

The diversity of habitats within the forest and along the edges of the forest community adds to the diversity of habitats and can be important for wildlife species that utilize different habitats at different times of the year. In particular wetlands, drainage channels and small openings in the forest add to the diversity of plant, bird and herpetezoan species. In addition, the creek has several tributaries within the western edge that provide water to fish habitat downstream and support wetland vegetation and amphibian breeding habitat. Retention of all of these habitats in a single contiguous area will maintain the existing features and their functions.

6.2.3 Southeast Corner-Seniors Housing

Mixed use/Seniors housing exists just south of the woodlot. This open area and regenerating thicket is outside the core woodland. The block is located approximately 30 metres south of an identified amphibian breeding pond. No impacts on the continued use of that pond are anticipated as it is also greater than 30 metres from Street B to the south. The area between the seniors housing and the pond is densely vegetated and will be allowed to succeed naturally as it is part of the open space designation. The seniors housing block will not result in a significant loss of forage habitat for the frogs post emergence. There is sufficient area and suitable habitat in the woodland for those species that forage in the leaf litter and shade of the forest during the non-breeding season. Overwintering habitat would also be present and a key function of the woodland.

6.2.4 Phase 1 Woodlot Adjacent to Mid-Town Creek (Block 125)

The north-western woodlot dominated by eastern white cedar existed within the Environmental Protection area (3.13 ha) as seen in the most recent Plan. The edges of the community started to grow into shrubs and some young trees. The forested area acts as a part of the tableland woodlands connected to Midtown Creek. The cedar forest (community 11A-FOC2-2) will be protected and is found within the Environmental Protection Block. The edge community is a regenerating community with meadow species and some small trees. Community 6 is to be mostly removed due to constraints of the double loaded lotting fabric and road alignment. A tree preservation plan and edge management plan are recommended for that edge as part of the detailed design. Restrictive fencing must also be installed prior to any site preparation and grading activities. The need for long term fencing at that location will be discussed with the Town and GRCA.

6.3 Significant Wildlife Habitat

6.3.1 SWH Identification

A high level review identified several candidate SWH. A high level review of the Significant Wildlife Habitat outlined in the Eco Region Criterion Schedule identified the potential for (Candidate) migratory butterfly stopover, waterfowl nesting area, turtle nesting, marsh breeding habitat and amphibian movement corridors. The potential for these SWH were based on the presence of ELC Codes.

NEA did not find these features to be present on site due to the lack of suitable habitat. The fields did not contain an abundance of milkweed or nectar plants and no records of monarchs were identified using the property. Additionally, no waterfowl nests, turtle nests or marsh bird nests were identified during field visits. Lastly, potential for amphibian movement corridors is limited as the breeding ponds exist within a woodland surrounded by agricultural fields.

Several SWH were confirmed during field surveys including woodland area sensitive bird breeding habitat, amphibian breeding habitat (woodland), raptor nesting (great horned owl) and special concern and rare wildlife species (wood thrush, eastern wood-pewee).

6.3.2 Woodland Area Sensitive Bird Breeding Habitat

Seven bird species were observed on the site which are considered area sensitive. Table 4 lists the existing habitat and the potential impact of the development on each species individually.

Table 4. Area Sensitive Bird Species Observed in Study Area (2011 & 2006).

Species	Existing habitat	Impact Post-development
Winter wren	Central woodland, prefer mature mixed and coniferous forest with dense tangles	-no impact on habitat or area -habitat will be retained in central woodland
Veery	Central woodland, prefer cool, damp deciduous or mixed forest with dense undergrowth and thicket swamps	-no impact on habitat or area -habitat will be retained in central woodland
American redstart	Central woodland, prefer open to semi-open deciduous or mixed forest and thickets	-no impact on habitat or area -habitat will be retained in central woodland
Ovenbird	Central woodland, mature undisturbed mixed and deciduous forest	-no impact on habitat or area -recent scientific information finds that individual pairs may use several woodlands in close proximity as part of territory -preservation of suitable habitat in central woodland and Midtown Creek will ensure this species remains.
Cooper's hawk	Central woodland, prefer pine plantations, cedar stands and coniferous or mixed forest	-no nests observed but suitable habitat is present. -preservation of central woodland and Midtown Creek valley and forest will maintain suitable hunting habitat (thickets, backyards, fencerows, woodlands) for this secretive species
Savannah sparrow	Fields east and west of Brook Road allowance, prefer old field meadow and agricultural field edges	-loss of habitat for this species as development phases proceed. Suitable habitat exists to the west and south.
Black-and-white warbler	Inhabits semi-open deciduous or mixed woodlands.	-no loss of habitat, as central woodland is to be preserved

6.3.3 Amphibian Breeding Habitat (Woodland) (3 Pools)

Three amphibian breeding ponds will be retained within the environmental areas and mitigation measures put in place to maintain existing conditions including hydrology.

Pond #1 is located in Communities 14 and 16 on the south side of Elgin Street. This area floods in the spring due to the creek overflow, snowmelt and location between two drumlins. The wetland provides habitat for spring breeding frogs such as spring peepers. American toad, leopard frog and grey tree frog were also recorded in these communities. The wetland communities and the adjacent cedar swamp are within the protected area. The inclusion of all of the willow thicket, cedar swamp and meadow marshes will ensure that amphibian breeding habitat and post-breeding foraging habitat is maintained post development. The reconnection of the creek to the north of Elgin Street will provide a corridor for movement north to south.

Pond #2 is located along the south edge of the central woodland and provides habitat for wood frogs. The central portion contains a spring (vernal) pool that provides habitat for wood frogs. This pool will be preserved in the plan with a 20 m buffer to the seniors housing block. These distances are sufficient to prevent negative impacts on the breeding pool. The location within the edge of the woodland also maintains a connection to the forest where the frogs spend much of the year outside of the short spring breeding season. Forested habitat with leaf litter is essential for this species that feeds on invertebrates in the woodland and overwinters underground or in the leaf litter.

Limiting construction in this area in the spring and use of silt and snow fencing closer to the housing will protect the pond while not limiting access for frogs migrating to the pond to breed.

Pond #3 is located in the northwest portion of the central woodland and is associated with runoff from the north. This pond is 20 m east of the neighbourhood park to the west and 30 m south of the stormwater management pond to the north. Maintenance of flows and spring flooding of this area is essential to preserving the breeding habitat. Runoff to this area should be maintained post development. Measures may include conveying runoff from open space and parks to the west or roof leader water. The location within the forest and foraging habitat will be maintained. Development of the surrounding area will not impact on access to the pond. Aquatic and terrestrial corridors will be maintained to the east along the intermittent creek and south to Midtown Creek along the restored creek channel.

6.3.4 Possible Great-Horned Owl Nest in Central Woodland

Great-horned owls were observed in the central woodland during July 18, 2011 surveys and evidence of this pair nesting and being on territory was present. However, no nest was found or young birds observed. Great-horned owls live in a wide variety of habitats from urban woodlots, plantations, mixed forest to wetlands and large wilderness areas. The key factors for the presence of owls are a suitable nesting site and sufficient hunting territory. The preservation of the woodland will provide both of these functions. As this species is wide ranging it would also use adjacent backyards, fields and forest edges for hunting. Although development will occur in the agricultural fields, this is not the preferred hunting territory. Urbanization does not deter owls from nesting as the new urban areas provide abundant habitat and populations of their favourite prey items, namely raccoons, squirrels, rabbits and skunks.

No impacts on the owls are anticipated by the development of the site as the entire woodlot will be retained.

6.3.5 Special Concern and Rare Wildlife Species

The wood thrush and eastern wood-pewee were identified within the central woodland. Both are listed as Special Concern species. As such the fall under the Significant Wildlife Habitat category of species of conservation concern. The wood thrush breeds in deciduous and mixed forests where there are large trees, moderate understory, shade and abundant leaf litter for foraging. The central woodlot would be considered suitable habitat for this species. The pewee uses the more open understory portions of the woodland to forage for flying insects. As the woodlot is being preserved, the habitat for both of these species will not be altered or impacted. The birds will continue to use the woodlot post construction and no net habitat loss will occur.

6.4 Tributary to Brook Creek

The unnamed tributary to Brook Creek enters the site from the east under Gear Road through a CSP culvert, flowing west into the centre woodlot, existing in the southwest corner moving across the property in a southwestern direction to the proposed Brook Road allowance at Elgin Street East crossing the road through a CSP culvert. The tributary is intermittent and no fish were observed over two seasons upstream of Elgin Street West. In addition, the tributary channel is not considered to be fish bearing due to blockages in the flow pattern and barriers created from the proposed Brook Road allowance berm, which has inadvertently realigned the tributary just north of Elgin Street East. However, the tributary indirectly supports direct fish habitat observed downstream of Elgin Street East, where fish were sampled in the spring of

2006 and 2015.

Within the study property, the entire Brook Creek tributary (30m from the watercourse high-water mark) will be designated as Environmental Protection (EP). Temporary in-water works are proposed within the EP area and include one watercourse road crossing, multiple servicing watercourse crossings, one watercourse realignment, and four stormwater blocks.

The proposed watercourse road crossing is located east of the woodlot and west of Gear Road (Appendix V). It is recommended that the crossing structure is designed to span the entire watercourse and avoid all works below the high-water mark. Additional field investigations may be required at the proposed crossing location to determine all potential impacts based on the detailed design.

Servicing such a storm sewer and water mains will likely need to cross the tributary. Directional drilling construction techniques are recommended over an open trench techniques to minimize impacts to the Brook Creek tributary, unless the in-water works can be conducted during natural dry conditions which have been observed in the summer months.

A small section of the roadside ditching and tributary along Elgin Street East and the proposed Brook Road allowance intersection will require realignment to accommodate a proposed access road. The Brook Road allowance is a main barrier to the existing tributary and is rerouting channel flow along the farm track (future Brook Road extension) and into a roadside ditch. The channel modification has impacted the downstream channel flow and volume of water reaching the downstream wetland habitat south of Elgin Street. In addition, the CSP is preventing water and runoff from maintaining a healthy wetland habitat. This has resulted in an increase of buckthorn in this community which has impacted the wetland form and function. Channel realignment should focus on enhancing the flow conveyance to the downstream wetland, fish passage through the culvert and the addition of fish habitat features. Any upgrades to the elevation or profile of Elgin Street should maintain a culvert that allows unimpeded fish passage upstream. Use of an oversized culvert would also benefit wildlife that would use the corridor of the restored creek to get under Elgin Street. If the road is to be upgraded and the culvert replaced a qualified biologist should be consulted on the fisheries and wildlife issues and sizing of the culvert.

Three stormwater ponds have been proposed north of Elgin Street East and one stormwater pond south of Elgin Street East. All four ponds will eventually discharge into the Brook Creek tributary. It is recommended that the stormwater outfalls are designed to flow into a wet meadow or wetland habitat prior to reaching the creek and a spreader or similar feature should be used to dissipate flows. Although the tributary is an intermittent warm water stream, the receiving main stem of Brook Creek is a cold water system and measures should be

made to minimize thermal impacts to Brook Creek from the four proposed stormwater ponds. It is recommended that the pond outlet design incorporate a bottom draw or underground infiltration gallery to cool or minimize heating of stormwater. The outfall for the pond should not discharge directly into wet meadows and thickets known to support breeding frogs that are sensitive to pollution and contaminants.

DFO Self-Assessment

The Fisheries Act requires projects avoid causing serious harm to fish unless authorized by the Minister of Fisheries and Oceans Canada (DFO). This applies to work being conducted in or near waterbodies that support fish species classified as commercial, recreational or Aboriginal.

A DFO Self-Assessment must be completed to determine if serious harm can be avoided through avoidance and mitigation measures. If a project cannot avoid serious harm a *Request for Review* document must be submitted to DFO staff, where they will determine the appropriate next steps based on project impacts.

Based on the proposed conceptual plan of the East Cobourg Development (Option 6) the project will likely not require DFO staff review given the following concepts are integrated into the detailed design.

<u>Stormwater Management Facilities/Basins</u>

- The construction of new land-based stormwater management facilities, settling ponds and storage basins may not require review by DFO staff if no work occurs below the high water mark of a nearby waterbody, including outflow structures.

- The construction of water outfalls will have no temporary or permanent increase in existing footprint below the high water mark and no new temporary or permanent fill will be placed below the high water mark.

<u>Bank Stabilization</u>

- All bank stabilization will use rock protection, plantings or bioengineering, no temporary or permanent increase in existing footprint below the high water mark will occur and no new temporary or permanent fill placed below the high water mark will occur.

Measures to Avoid Harm

- The project and construction works should integrate all measures to avoid harm recommended by the project biologist. It will include but be limited too, project planning, erosion and sediment control, timing windows, shoreline and bank re-vegetation and stabilization, fish protection and operation of machinery. Many of the measures to avoid harm have been provided in the Mitigation section of this report, however addition measures will likely be required as a part of detailed design.

6.5 Midtown Creek

The headwater tributaries of Midtown Creek are located northwest of the proposed development and one small reach bisects the north-west corner of the project, flowing south under Danforth Road in a south-westerly direction through dense grass meadows and narrow channel. The Midtown Creek headwaters provide fish, amphibian and wildlife habitat.

The headwater tributaries of Midtown Creek have been zoned Environmental Protection (EP) and no development will occur within the EP boundary shown in Appendix V. A DFO Self-Assessment will not be inclusive of Midtown Creek, given no development of any kind, including stormwater has been proposed for the watercourse and riparian habitat above the high-water mark.

6.6 Species At Risk

Several Species At Risk have been identified within the subject properties. This includes eastern meadowlark, bobolink, barn swallow, bank swallow and butternut. An Overall Benefit Permit and/or a Notice of Activity may be required prior to development. As the development is being phased, with Phase 1A being developed first, there may be a 10-15 year built out timeline. As such, obtaining a permit at the appropriate time prior to each phase, may be more feasible than applying for all species at this time. This would also require new surveys to be completed using the approved methods from MNRF at the time, to ensure habitat is still present, or in the case of butternut, that the trees are still classified as retainable

6.7 Endangered Butternut Trees

Seven retainable butternut trees were found in Community 3 adjacent to Greer Road (linear community detached from the central woodlot) and on the eastern edge of the central woodlot near the banks of the Brook Creek tributary. The trees within the linear community were in moderate health with little to no sign of visible canker. Those found within the central woodlot however were in poorer condition and displayed signs of canker. The seven retainable trees

will require protection with a buffer of 25 meters from the base of the tree (Figure 3). The trees themselves are inside the forest, which will be preserved but the buffer may extend beyond the forest edge. Discussions with the MNRF will be required to determine the best management and protection practices.

6.8 Wetlands

Wetland habitat on the property is associated with the intermittent creeks, floodplain and swales between drumlins. While there are no evaluated wetlands as per the Ontario Wetland Evaluation System, wetland communities are present within the study area. Some of these wetlands will be preserved in the environmental protection areas.

The pocket wetlands that harbour amphibian breeding have been discussed in Section 6.3.3.

The wetland area south of Elgin Street on the Bell property has been preserved in an environmental area designation due to a number of features and functions of this community. These include:

- amphibian breeding habitat throughout,
- diversity of wetland types (cedar swamp, willow thicket swamp, wet meadow, forb meadow marsh and riparian vegetation)
- diversity of plant and wildlife species
- habitat for amphibians, birds, mammals, insects, fish
- floodplain
- fish habitat in creek
- flood control and attenuation of spring meltwater
- wildlife corridor and linkages
- contiguous with wetland/woodland to the west (off site) and creek valley

The combination of a number of wetland types and tree/shrub species adds to the importance of these communities. The high constraint designation in the Secondary Plan was validated during our detailed assessments of this area.

A 30 m buffer from all wetlands has been recommended to preserve their features and functions (Figure 3).

6.9 Woodlot and Wetland on Bell Property

The woodlot on the northern portion of the Bell property was designated as Environmental Area and a high constraint area. An additional area to the south that includes a

buckthorn/cedar community were also included as a special policy area and moderate constraint. These areas were examined in detail as part of the overall impact assessment. Due to the pasturing that had occurred within these former fields and in the existing thickets and forest, there was a very poor structure and diversity. While the trees/shrub do have functions in terms of cover, forage, nesting, CO_2 uptake and habitat, the dominance of buckthorn and very sparse structure (canopy, subcanopy, regeneration) and groundcover limit the significance of these communities (Communities 14a & 17).

The key features were the tributary of Brook Creek, the wet meadow, forb marsh, willow thicket and the cedar swamp (Communities 16, 18 and 14b). The entire property had been used for cattle pasturing with cattle on the property up until 2007. Cattle were observed in the cedar forest and open edges along Elgin Street and Brook Road at that time. As a result, there has been extensive trampling, trails, browse and disturbance in all of the habitats. The property had not been managed for invasive species and is dominated by dense European buckthorn stands, both pure successional stands and the understory of former open poplar-cedar forest where it was very dense. This is particularly true of Community 19. There has also been extensive clearing of the southern part of the property along the southern edge of Community 19 and the former forest further south. Those areas had regenerated in early successional field/meadow and raspberry thicket vegetation (Community 2).

There are also several areas of topographic constraints and floodplain lines that pose additional limitations on the developable area.

The more significant natural features combined with the topographic and floodline constraints have created a large open space block on the western third of the property. This is adjacent to forest, floodplain and wetland retained on the development to the west creating a large core area of woodland. Combined this woodland encompasses most of the high constraint area. Large contiguous woodlands and natural areas are preferred ecologically over small fragmented parcels, particularly in development areas. The connection of this natural area to the central woodland and across Greer Road to the Brook Creek Valley was also an important consideration from a connectivity and wildlife corridor function.

The preservation of most of the environmental area is proposed, with the exception of a stormwater management facility in the eastern portion of the Bell property. The function and importance of this area was determined to be minimal in terms of wildlife, ecological functions and diversity. The proposed location of the stormwater management facility preserves the more significant communities and functions of the woodland while balancing the engineering for a pond in this part of the development. Beacon Environmental in their peer review recognizes that a balance was required. It is still our opinion that the upland cedar forest has limited functions and its loss will not have a significant impact on the ecology of the area.

The Special Study Area overlay includes Community 19 and parts of Communities 17 and 2. All of these communities are highly disturbed habitats dominated by European buckthorn. Although there is an overstory in parts of trembling aspen and pockets of eastern white cedar *(Thuja occidentalis)* scattered throughout, the area had a very low diversity of plant species (17 species total). This is due to the dense shade and soil quality, as well as previous disturbance. The main reason for the lack of groundcover is the allelopathic nature of buckthorn, which releases a natural chemical in the tissue, berries and leaves that inhibits other species from growing in the soil beneath the shrub, except other buckthorn seedlings. This is the same quality associated with black walnut trees.

The south edge of Community 19 and likely parts of this community have in the past and continue to be logged for the mature cedar and the poplar trees. The functions of this community as a result are very limited and included cover for wildlife, forested area, wildlife habitat for nesting birds and mammals and green space. There were no wetlands, area sensitive species, creeks, amphibian breeding birds or significant species identified in this community.

The criteria used to define Moderate Constraint areas by Gartner Lee (May 2004) were:

- Smaller, lower functioning wetland areas
- Early successional and degraded forest vegetation that is contiguous to high constraint areas and contributes to forest interior habitat or buffering
- Steep slopes
- Recharge areas
- Habitat linkages between high constraint areas, as well as linkages to external habitats

The Special Study Area overlay only meets one of these criteria specifically, contiguous to high constraint area. Preservation of this entire area was not considered a significant constraint to developing the land.

The plan does preserve a portion of the overlay area adjacent to the open space block. This will maintain the buffering function to the cedar swamp, creek and maintain some of the mixed forest habitat. It also adds to the area preserved on this and the adjacent property with a high constraint designation.

The amphibian breeding habitat in Communities 16 and 18 will be maintained in the environmental protection area. Amphibians use adjacent upland habitat to forage and overwinter the remainder of the year. This would include the denser woodlands with

groundcover and abundant forage where fallen logs, vegetation and diverse habitats are present. The proposed plan retains sufficient area and the key habitats (communities for these species to find those functions. The redesign of Elgin Street and the installation of a new culvert may provide additional mortality from road kills but an oversize culvert may be installed to allow some amphibians to cross under the road.

6.10 Hedgerows

The hedgerows are dominated by European buckthorn. This includes the wider fencerow to the east to Greer Road. The functions of this hedgerow are limited due to the agriculture fields adjacent, Greer Road and lack of core natural areas east of Greer Road. The eastern hedgerow has been widened (~40m wide) to include the existing creek channel and act as a wildlife corridor. Runoff from the fields and Greer Road flows through this hedgerow and into the intermittent creek. The maintenance of the catchment areas post construction will allow the flows to be maintained.

The removal of the north-south hedgerows will not have an impact on wildlife corridors. The presence of Highway 401 serves as a major barrier to wildlife movement.

6.11 Hydrogeology

Ken Goff (July 2006) in a preliminary hydrogeology report concluded:

1. There will be no impacts on local aquifers related to on-site groundwater use or sewage disposal.

2. Development-related reductions in infiltration/recharge would occur on the site as a result of impermeable surfaces such as roofs and paved areas.

3. These reductions would be offset somewhat by recharge from lawn and garden watering.

4. Because the site is underlain by fine-textured soils, the infiltration potential is relatively low. Infiltration potential should be evaluated following completion of on-site geotechnical investigations.

Prior to completion of the development plan and as part of the fisheries compensation it will be necessary to understand the contribution of groundwater to Midtown Creek and the intermittent tributary of Brook Creek. As well the catchment areas should be maintained for each creek. Maintenance of pre-development flows or enhanced flows will also be required to ensure that fish habitat is not impacted through the development. Outfalls for the stormwater

to the creeks will need to be reviewed by a fisheries biologist. Due to the nature of the creek as warm water creek and fish habitat, thermal mitigation is not required but stormwater pond discharges should meet Ministry of Environment water quality objectives for fish habitat.

6.12 Future Trails or Recreational Uses

The Secondary Plan discusses the opportunity for passive outdoor recreation facilities, where appropriate s. 15.4.5.1. h).

The woodlands, wetlands, creeks and other natural features are positive and aesthetic features of this site. However there are some sensitive features such as the creek, amphibian breeding ponds and corridors that are susceptible to a host of negative impacts from nearby residents, domestic animals and off-trail users. If trails are proposed in the future the route should be carefully designed to avoid these sensitive features and provide appropriate setbacks, fencing or other controls to prevent impacts such as untreated runoff, pet wastes, garbage, yard waste dumping, sediment and erosion and human access during critical periods. The subdivision has been designed to include these sensitive features (amphibian pools and creek) in protected areas with sufficient buffers of dense vegetation (20 m minimum). Trails should respect these buffers and setbacks.

Access to woodland is an asset and benefits residents and future naturalists but trails should be cited to minimize impacts to the creek, natural vegetation, wetlands and interior habitats. Well defined and constructed wood chip trails are preferred.

7.0 Conclusions

The development of the site will not impact on the woodland and its features and functions if our recommendations are implemented. Through careful citing of lotting, preservation of the central woodland, Midtown Creek and wetland on the Bell property approximately 20% of the land base is open space. The key natural heritage features and their functions will be maintained by the proposed plan. Most importantly linkages will be retained and an opportunity to reconnect and improve disrupted drainage and fish habitat is possible.

8.0 Recommendations

1) The limits of the development envelope should be clearly marked and staked prior to any site grading or site preparation activities. Installation of a temporary silt/snow fencing/page wire fence and appropriate signage would help operators visually to avoid entering the protected natural areas, including the creek buffers, wetlands and buffers, amphibian ponds, EP areas and central woodland.

2) The limit of development around the central woodland should be clearly marked and surveyed prior to any site preparation activities. The drip line of the outermost trees or a distinct buffer are the defining criteria.

3) Implement a 20 meter buffer from all identified amphibian breeding ponds

4) Implement a 25 meter buffer around all butternut trees unless proposed for removal; a permit should be obtained from the OMNRF in order to remove any retainable butternut trees on the property

5) Maintain a minimum a 30 meter buffer from Midtown Creek and Brook Creek and the Environmental Protection (EP) designation.

6) Silt and snow fence be placed along the north limit of the Street B alignment prior to any site preparation activities in that area. The protection of the amphibian pond is critical. No access to this area or disturbance is permitted at any time.

7) Surface water flows through the wet meadow, roadside ditches and culvert under Elgin Street be maintained.

8) Detailed sediment and erosion control plans be prepared for the site preparation, construction and post-construction periods.

9) Specific measures be included in the sediment and erosion control plan to prevent all sources of sediment to the creeks, via road runoff, mud from trucks, ditches, temporary channels.

10) Protection of fisheries in Midtown Creek will require mitigation measures and a compensation agreement, including detailed drawings if it is to be relocated to accommodate a realignment of Danforth Road.

11) Replacement of existing culverts and new culverts crossing Midtown or Brook Creek

should be oversized and be designed to incorporate fish habitat substrate and wildlife passage/crossings.

12) Engineering and grading of site should maintain existing flow regime (surface water and groundwater to tributaries of Midtown Creek and Brook Creek and associated fish habitat.

13) The design of a restored channel on the tributary of Brook Creek north of Elgin Street and west of the Brook Road road allowance be designed in cooperation with a qualified fisheries biologist and the conservation authority. The design may require input from a fluvial geomorphologist to prevent an increase in erosion.

14) Maintain pre-construction contributions of runoff to Brook Creek tributary and Midtown Creek watershed at post-development.

15) Maintain existing infiltration rates post-development. Infiltration measures may be required.

16) Maintain flows to tributaries of Midtown Creek and Brook Creek post and the amphibian habitats therein.

17) Silt fence be regularly inspected and maintained as necessary until construction is completed and the soil stabilized with vegetation.

18) No vehicles be stored or stockpiles of materials be located within 30 meters of the existing forest edges, top of slope adjacent to Midtown Creek and the dripline of the central woodland.

19) No refueling of vehicles or storage tanks be located within 30 meters of the existing forest edge and top of slope adjacent to Midtown Creek and the dripline of the central woodland.

20) Placement of fill, stumps, slash or other materials not be permitted within the wetlands or below the top of bank (development envelope-west side).

21) Hydrogeology study be conducted to determine groundwater contributions to the Midtown Creek and Brook Creek tributary.

22) Outfall for the future stormwater facilities be located and designed in consultation with a qualified fisheries biologist, the Town of Cobourg and GRCA.

23) Outfall not discharge to amphibian breeding areas south of Elgin Street.

24) Discharge from ponds at Elgin Street to Brook Creek tributary include thermal controls to maintain a cooler water temperature.

25) Use of diffuse lighting and directing lighting away from the corridor facing south to limit light pollution of the corridor. Security lighting should be diffuse and splash onto the paved areas only.

26) Tree clearing activities occur outside of the peak breeding bird season for this area as per Environment Canada guidelines (April 15th-August 15th)

27) If trails are proposed in the future that they be carefully cited to avoid sensitive natural features. This is to be completed in consultation with a qualified biologist, the Town and GRCA.

28) No fording of creeks is to occur during the site preparation and grading stages. Creeks should be clearly marked and fenced prior to these activities.

29) An edge management plan is recommended for the new edge created for the lots within Blocks 5 and 6.

30) Measure to avoid serious harm to fish are provided by a professional fisheries biologist prior to detailed design

31) A DFO self-assessment is conducted by a professional fisheries biologist during the detailed design phase.

32) If site services are to cross Midtown or Brook Creek, a qualified fisheries biologist should be consulted, as well as discussions with the Town and GRCA.

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Appendix I-A Plant Distribution by Community

APPENDIX I - A Plant Species by Community

Families and genera for the plant species found in this appendix are listed in taxonomic order. The species are listed alphabetically by its scientific name within each genus.

Three standard reference works were used for the botanical nomenclature and taxonomy (Newmaster et. al., 1998; Gleason and Cronquist 1991; Voss 1980; 1985). Other published works for botanical names included; ferns (Cody and Britton 1989); grasses (Dore and McNeill 1980); orchids (Whiting and Catling 1986); shrubs (Soper and Heimburger 1982) and trees (Farrar 1995).

Total: Number of communities where plant species was recorded
X : Plant species recorded

			COMMUNITY NUMBER														
Common Name	***Scientific Name***	**Total**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11a**	**11b**	**12**	**13**	**14a**
HORSETAIL FAMILY	*EQUISETACEAE*																
field horsetail	*Equisetum arvense*	12	X	X	X		X	X				X			X	X	X
ROYAL FERN FAMILY	*OSMUNDACEAE*																
cinnamon fern	*Osmunda cinnamonea*	1			X												
BEECH FERN FAMILY	*THELYPTERIDAE*																
New York fern	*Thelypteris noveboracensis*	1			X												

			COMMUNITY NUMBER															
Common Name	***Scientific Name***	**Total**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11a**	**11b**	**12**	**13**	**14a**
WOOD FERN FAMILY	*DRYOPTERIDACEAE*																
bulbet bladder fern	*Cystopteris bulbifera*	2														X	X
spinulose wood-fern	*Dryopteris carthusiana*	1															X
evergreen wood-fern	*Dryopteris intermedia*	3									X	X					
marginal wood-fern	*Dryopteris marginalis*	2		X					X								
oak fern	*Gymnocarpium dryopteris*	1															X
ostrich fern	*Matteuccia struthiopteris*	6	X		X			X			X					X	X
sensitive fern	*Onoclea sensibilis*	12	X	X	X	X		X	X		X	X				X	X
PINE FAMILY	*PINACEAE*																
eastern white pine	*Pinus strobus*	6	X	X	X	X				X		X					
Scot's pine	*Pinus sylvestris*	2		X						X							
eastern hemlock	*Tsuga canadensis*	1															
CYPRESS FAMILY	*CUPRESSACEAE*																
common juniper	*Juniperus communis var. depressa*	1										X					
eastern red cedar	*Juniperus virginiana*	1										X					
eastern white cedar	*Thuja occidentalis*	16	X	X	X	X		X	X	X		X	X	X	X		X
BUTTERCUP FAMILY	*RANUNCULACEAE*																
red baneberry	*Actaea rubra*	2	X														X
thimbleweed	*Anemone virginiana*	2	X					X									
marsh marigold	*Caltha palustris*	2														X	
virgin's bower	*Clematis virginiana*	3			X							X				X	
goldthread	*Coptis trifolia*	2	X					X									
tall buttercup	*Ranunculus acris*	8	X	X				X	X		X					X	X
BARBERRY FAMILY	*BERBERIDACEAE*																
common barberry	*Berberis vulgaris*	2	X		X												
mayapple	*Podophyllum peltatum*	3	X		X						X						
ELM FAMILY	*ULMACEAE*																
American elm	*Ulmus americana*	5	X	X	X			X									

			COMMUNITY NUMBER															
Common Name	***Scientific Name***	**Total**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11a**	**11b**	**12**	**13**	**14a**
NETTLE FAMILY	*URTICACEAE*																
clearweed	*Pilea pumila*	2			X												X
American stinging nettle	*Urtica dioica ssp. Gracilis*	3	X	X							X						
WALNUT FAMILY	*JUGLANDACEAE*																
butternut	*Juglans cinerea*	2	X		X												
BEECH FAMILY	*FAGACEAE*																
American beech	*Fagus grandifolia*	1	X														
red oak	*Quercus rubra*	1			X												
BIRCH FAMILY	*BETULACEAE*																
white birch	*Betula papyrifera*	2			X			X									
ironwood	*Ostrya virginiana*	1	X														
PINK FAMILY	*CARYOPHYLLACEAE*																
mouse-eared chickweed	*Cerastium fontanum*	1		X													
Deptford pink	*Dianthus armeria*	2		X					X								
white campion	*Silene latifolia*	1		X													
BUCKWHEAT FAMILY	*POLYGONACEAE*																
lady's thumb	*Polygonum persicaria*	2			X												X
curled dock	*Rumex crispus*	1														X	
ST. JOHN'S-WORT FAMILY	*GUTTIFERAE*																
common St. John's-wort	*Hypericum perforatum*	1		X													
VIOLET FAMILY	*VIOLACEAE*																
common blue violet	*Viola affinis Le Conte*	2	X								X						
downy yellow violet	*Viola pubescens*	2	X					X									
GOURD FAMILY	*CUCURBITACEAE*																
wild cucumber	*Echinocystis lobata*	3			X			X								X	

			COMMUNITY NUMBER															
Common Name	***Scientific Name***	**Total**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11a**	**11b**	**12**	**13**	**14a**
WILLOW FAMILY	*SALICACEAE*																	
balsam poplar	*Populus balsamifera*	8	X	X	X		X	X									X
large-toothed aspen	*Populus grandidentata*	1	X														
trembling aspen	*Populus tremuloides*	8	X	X	X		X	X		X				X			
weeping willow	*Salix babylonica*	2		X		X											
Bebb's willow	*Salix bebbiana*	1		X													
pussy willow	*Salix discolor*	5		X												X	
crack willow	*Salix fragilis*	3		X													
slender willow	*Salix petiolaris*	5														X	
MUSTARD FAMILY	*BRASSICACEAE*																	
yellow rocket	*Barbarea vulgaris*	1									X						
HEATH FAMILY	*ERICACEAE*																	
velvetleaf blueberry	*Vaccinium myrtilloides*	1						X									
GOOSEBERRY FAMILY	*GROSSULARIACEAE*																	
American black currant	*Ribes americanum*	1														X	
prickly gooseberry	*Ribes cynosbati*	3	X		X			X									
smooth gooseberry	*Ribes hirtellum*	2			X		X										
red currant	*Ribes rubrum*	2	X					X									
SAXIFRAGE FAMILY	*SAXIFRAGACEAE*																	
foam flower	*Tiarella cordifolia*	1			X													

			COMMUNITY NUMBER															
Common Name	***Scientific Name***	**Total**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11a**	**11b**	**12**	**13**	**14a**
ROSE FAMILY	*ROSACEAE*																	
agrimony	*Agrimonia gryposepela*	3	X		X			X										
smooth juneberry	*Amelanchier laevis*	1			X													
hawthorn species	*Crataegus spp.*	9		X	X		X	X				X						X
common strawberry	*Fragaria virginiana*	8	X	X	X		X	X	X			X						
yellow avens	*Geum aleppicum*	5	X		X		X				X							
large-leaved avens	*Geum macrophyllum*	1			X													
apple	*Malus domestica*	1	X															
common crabapple	*Malus pumila*	3			X		X					X						
rough cinquefoil	*Potentilla norvegica*	1		X														
black cherry	*Prunus serotina*	6	X		X		X	X		X		X						
choke cherry	*Prunus virginiana*	6		X	X		X	X	X			X						
smooth rose	*Rosa blanda*	1		X														
rugosa rose	*Rosa rugosa*	1		X														
Alleghany blackberry	*Rubus allegheniensis*	2	X		X													
wild red raspberry	*Rubus idaeus*	7		X	X		X									X		
purple-flowering raspberry	*Rubus odoratus*	2	X		X													
dwarf raspberry	*Rubus pubescens*	1							X									
American mountain ash	*Sorbus americana*	3			X				X	X								
European mountain ash	*Sorbus aucuparia*	4	X	X	X			X										
PEA FAMILY	*FABACEAE*																	
hog-peanut	*Amphicarpa bracteata*	1			X													
bird's-foot trefoil	*Lotus corniculatus*	2		X														
alfalfa	*Medicago sativa ssp. Sativa*	1		X														
white sweet-clover	*Melilotus alba*	2		X														
red clover	*Trifolium pratense*	3		X					X									
white clover	*Trifolium repens*	2		X														
cow vetch	*Vicia cracca*	2		X														

		COMMUNITY NUMBER															
Common Name	***Scientific Name***	**Total**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11a**	**11b**	**12**	**13**	**14a**
LOOSESTRIFE FAMILY	*LYTHRACEAE*																
purple loosestrife	*Lythrum salicaria*	3			X											X	
EVENING PRIMROSE FAMIL	*ONAGRACEAE*																
dwarf enchanter's nightshade	*Circaea alpina*	1														X	
Canada enchanter's nightshade	*Circaea lutetiana L. ssp.canadensis*	4	X		X				X		X						
common evening primrose	*Oenothera biennis*	1		X													
DOGWOOD FAMILY	*CORNACEAE*																
alternate-leaf dogwood	*Cornus alternifolia*	4	X		X		X	X									
red-osier dogwood	*Cornus stolonifera*	6		X	X	X										X	
STAFF-TREE FAMILY	*CELASTRACEAE*																
climbing bittersweet	*Celastrus scandens*	1			X												
BUCKTHORN FAMILY	*RHAMNACEAE*																
European buckthorn	*Rhamnus cathartica*	13	X	X	X	X	X	X	X			X					X
GRAPE FAMILY	*VITACEAE*																
Virginia creeper	*Parthenocissus inserta*	8	X	X	X			X	X								X
wild grape	*Vitis riparia*	7	X	X	X		X	X									X
MAPLE FAMILY	*ACERACEAE*																
Manitoba maple	*Acer negundo*	5	X	X	X		X	X									
Norway maple	*Acer platanoides*	1										X					
silver maple	*Acer saccharinum*	1			X												
sugar maple	*Acer saccharum ssp.saccharum*	3	X	X	X												
CASHEW FAMILY	*ANACARDIACEAE*																
western poison-ivy	*Rhus rydbergii*	5	X		X			X									X
staghorn sumac	*Rhus typhina*	3		X	X							X					
WOOD-SORREL FAMILY	*OXALIDACEAE*																
European wood-sorrel	*Oxalis stricta*	2	X					X									
TOUCH-ME-NOT FAMILY	*BALSAMINACEAE*																
spotted jewelweed	*Impatiens capensis*	7		X	X	X										X	

			COMMUNITY NUMBER															
Common Name	***Scientific Name***	**Total**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11a**	**11b**	**12**	**13**	**14a**
GINSENG FAMILY	*ARALIACEAE*																
wild sarsaparilla	*Aralia nudicaulis*	3			X			X									X
CARROT FAMILY	*APIACEAE*																
spotted water hemlock	*Cicuta maculata*	1		X													
Queen-Anne's lace	*Daucus carota*	3		X					X								
wild parsnip	*Pastinaca sativa*	1			X												
hemlock water parsnip	*Sium suave*	1														X	
GENTIAN FAMILY	*GENTIANACEAE*																
bottle gentian	*Gentiana andrewsii*	2		X													
MILKWEED FAMILY	*ASCLEPIADACEAE*																
swamp milkweed	*Asclepias incarnata*	3														X	X
common milkweed	*Asclepias syriaca*	3	X	X				X									
black swallow-wort	*Cynanchum nigrum*	1	X														
swallow-wort	*Cynanchum rossicum*	5	X	X	X			X	X								
NIGHTSHADE FAMILY	*SOLANACEAE*																
bitter nightshade	*Solanum dulcamara*	7	X	X							X					X	X
WATERLEAF FAMILY	*HYDROPHYLLACEAE*																
Virginia waterleaf	*Hydrophyllum virginianum*	1														X	
BORAGE FAMILY	*BORAGINACEAE*																
Viper's bugloss	*Echium vulgare*	1															
MINT FAMILY	*LAMIACEAE*																
wild basil	*Clinopodium vulgare*	1		X													
ground ivy	*Glechoma hederacea*	1	X														
American water-horehound	*Lycopus americanus*	2			X	X											
wild mint	*Mentha arvensis*	3			X	X										X	
PLANTAIN FAMILY	*PLANTAGINACEAE*																
narrow-leaved plantain	*Plantago lanceolata*	1		X													
broad-leaved plantain	*Plantago major*	2	X	X													
Rugel's plantain	*Plantago rugelii*	2	X	X													

			COMMUNITY NUMBER															
Common Name	***Scientific Name***	**Total**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11a**	**11b**	**12**	**13**	**14a**
OLIVE FAMILY	*OLEACEAE*																
white ash	*Fraxinus americana*	6		X	X					X		X			X		
black ash	*Fraxinus nigra*	2	X	X													
green ash	*Fraxinus pennsylvanica var. subintegerr*	3			X					X				X			
FIGWORT FAMILY	*SCROPHULARIACEAE*																
slender-leaved agalinis	*Agalinis tenuifolia*	2		X													
butter-and-eggs	*Linaria vulgaris*	1							X								
foxglove beardtongue	*Penstemon digitalis*	2		X					X								
MADDER FAMILY	*RUBIACEAE*																
rough bedstraw	*Galium asprellum*	1		X													
marsh bedstraw	*Galium palustre*	2														X	
HONEYSUCKLE FAMILY	*CAPRIFOLIACEAE*																
tartarian honeysuckle	*Lonicera tatarica*	3		X	X				X								
common elderberry	*Sambucus canadensis*	4	X	X	X						X						
red-berried elderberry	*Sambucus racemosa*	1			X												
snowberry	*Symphoricarpos albus*	1			X												
Guelder rose	*Viburnum americanum*	1									X						
high bush cranberry	*Viburnum trilobium*	9	X	X	X		X		X			X					X

			COMMUNITY NUMBER															
Common Name	***Scientific Name***	**Total**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11a**	**11b**	**12**	**13**	**14a**
ASTER FAMILY	*ASTERACEAE*																
common yarrow	*Achillea millefolium*	2		X													
common ragweed	*Ambrosia artemisiifolia L.*	1		X													
common burdock	*Arctium minus*	1	X														
nodding beggarticks	*Bidens cernua*	1			X												
marsh beggar-ticks	*Bidens frondosa*	1			X												
black knapweed	*Centaurea nigra*	2															
ox-eye daisy	*Chrysanthemum leucanthemum*	5		X			X		X			X					
chicory	*Cichorium intybus*	2		X													
Canada thistle	*Cirsium arvense*	2		X													
flat top white aster	*Doellingeria umbellata var.umbellata*	2			X	X											
daisy fleabane	*Erigeron annuus*	1		X													
Philadelphia fleabane	*Erigeron philadelphicus ssp. philadelphi*	2		X			X										
spotted joe-pyeweed	*Eupatorium maculatum*	4		X	X											X	
boneset	*Eupatorium perfoliatum*	6	X	X		X										X	X
grass-leaved goldenrod	*Euthamia graminifolia*	4		X												X	X
field hawkweed	*Hieracium caepitosum ssp.caespitosum*	1		X													
king devil hawkweed	*Hieracium x florbundum*	1							X								
elecampane	*Inula helenium*	1														X	
pineapple weed	*Matricaria matricarioides*	2															
black-eyed Susan	*Rudbeckia hirta*	2		X					X								
Canada goldenrod	*Solidago canadensis*	9		X					X			X				X	X
early goldenrod	*Solidago juncea*	1		X													
goldenrod species	*Solidago spp.*	1		X													
field sow thistle	*Sonchus arvensis ssp.arvensis*	1		X													
heart-leaved aster	*Symphyotrichum cordifolium*	1		X													
calico aster	*Symphyotrichum lateriflorum var.laterifl*	2			X			X									
New England aster	*Symphyotrichum novae- angliae*	5		X	X							X				X	
white heath aster	*Symphyotrichum pilosum var.pilosum*	1															

			COMMUNITY NUMBER															
Common Name	***Scientific Name***	**Total**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11a**	**11b**	**12**	**13**	**14a**
purple-stemmed aster	*Symphyotrichum puniceum*	5		X			X				X					X	
common dandelion	*Taraxacum officinale*	7	X	X	X		X	X									
WATER-PLANTAIN FAMILY	*ALISMATACEAE*																
common waterplantain	*Alisma plantago-aquatica*	2			X												
ARUM FAMILY	*ARACEAE*																
Jack-in-the-pulpit	*Arisaema triphyllum*	4	X		X							X					X
RUSH FAMILY	*JUNCACEAE*																
knotted rush	*Juncus nodosus*	1		X													
path rush	*Juncus tenuis*	1		X													
SEDGE FAMILY	*CYPERACEAE*																
awl-fruited sedge	*Carex stipata*	1		X													
wool-grass	*Scirpus cyperinus*	2		X													
GRASS FAMILY	*POACEAE*																
awnless brome grass	*Bromus inermis ssp.inermis*	4		X			X										
Canada bluejoint grass	*Calamagrostis canadensis*	4									X					X	
fowl manna grass	*Glyceria striata*	1														X	
acuminate panic grass	*Panicum acuminatum var.acuminatum*	1															
reed canary grass	*Phalaris arundinacea*	5		X		X										X	
timothy	*Phleum pratense*	1		X													
common reed	*Phragmites australis*	1		X													
CATTAIL FAMILY	*TYPHACEAE*																
narrow-leaved cattail	*Typha angustifolia*	3				X										X	
common cattail	*Typha latifolia*	3		X												X	

			COMMUNITY NUMBER															
Common Name	***Scientific Name***	**Total**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11a**	**11b**	**12**	**13**	**14a**
LILY FAMILY	*LILIACEAE*																	
asparagus	*Asparagus officinalis*	1																
trout lily	*Erythronium americanum ssp. american*	4	X		X						X							X
tiger lily	*Lilium lancifolium*	1		X														
Canada mayflower	*Maianthemum canadense*	2										X						X
false Solomon's seal	*Smilacina racemosa*	1																X
white trillium	*Trillium grandiflorum*	1																X
ORCHID FAMILY	*ORCHIDACEAE*																	
helleborine	*Epipactis helleborine*	4	X		X			X										X
Total Number of Plant Species	186		56	90	74	13	21	35	23	8	16	23	1	3	3	35	30	
			Number of Plant Species Per Community															

APPENDIX I - A Communities 14b-22

			COMMUNITY NUMBER								
Common Name	***Scientific Name***	**Total**	**14b**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
HORSETAIL FAMILY	*EQUISETACEAE*										
field horsetail	*Equisetum arvense*	12			X			X			X
ROYAL FERN FAMILY	*OSMUNDACEAE*										
cinnamon fern	*Osmunda cinnamonea*	1									
BEECH FERN FAMILY	*THELYPTERIDAE*										
New York fern	*Thelypteris noveboracensis*	1									
WOOD FERN FAMILY	*DRYOPTERIDACEAE*										
bulbet bladder fern	*Cystopteris bulbifera*	2									
spinulose wood-fern	*Dryopteris carthusiana*	1									
evergreen wood-fern	*Dryopteris intermedia*	3	X								
marginal wood-fern	*Dryopteris marginalis*	2									
oak fern	*Gymnocarpium dryopteris*	1									
ostrich fern	*Matteuccia struthiopteris*	6									
sensitive fern	*Onoclea sensibilis*	12	X					X			
PINE FAMILY	*PINACEAE*										
eastern white pine	*Pinus strobus*	6									
Scot's pine	*Pinus sylvestris*	2									
eastern hemlock	*Tsuga canadensis*	1					X				
CYPRESS FAMILY	*CUPRESSACEAE*										
common juniper	*Juniperus communis var. depressa*	1									
eastern red cedar	*Juniperus virginiana*	1									
eastern white cedar	*Thuja occidentalis*	16			X	X	X	X			
BUTTERCUP FAMILY	*RANUNCULACEAE*										

			COMMUNITY NUMBER								
Common Name	***Scientific Name***	**Total**	**14b**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
red baneberry	*Actaea rubra*	2									
thimbleweed	*Anemone virginiana*	2									
marsh marigold	*Caltha palustris*	2			X						
virgin's bower	*Clematis virginiana*	3									
goldthread	*Coptis trifolia*	2									
tall buttercup	*Ranunculus acris*	8						X			
BARBERRY FAMILY	*BERBERIDACEAE*										
common barberry	*Berberis vulgaris*	2									
mayapple	*Podophyllum peltatum*	3									
ELM FAMILY	*ULMACEAE*										
American elm	*Ulmus americana*	5									X
NETTLE FAMILY	*URTICACEAE*										
clearweed	*Pilea pumila*	2									
American stinging nettle	*Urtica dioica ssp. Gracilis*	3									
WALNUT FAMILY	*JUGLANDACEAE*										
butternut	*Juglans cinerea*	2									
BEECH FAMILY	*FAGACEAE*										
American beech	*Fagus grandifolia*	1									
red oak	*Quercus rubra*	1									
BIRCH FAMILY	*BETULACEAE*										
white birch	*Betula papyrifera*	2									
ironwood	*Ostrya virginiana*	1									
PINK FAMILY	*CARYOPHYLLACEAE*										
mouse-eared chickweed	*Cerastium fontanum*	1									
Deptford pink	*Dianthus armeria*	2									
white campion	*Silene latifolia*	1									
BUCKWHEAT FAMILY	*POLYGONACEAE*										
lady's thumb	*Polygonum persicaria*	2									
curled dock	*Rumex crispus*	1									

		COMMUNITY NUMBER									
Common Name	***Scientific Name***	**Total**	**14b**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
ST. JOHN'S-WORT FAMILY	*GUTTIFERAE*										
common St. John's-wort	*Hypericum perforatum*	1									
VIOLET FAMILY	*VIOLACEAE*										
common blue violet	*Viola affinis Le Conte*	2									
downy yellow violet	*Viola pubescens*	2									
GOURD FAMILY	*CUCURBITACEAE*										
wild cucumber	*Echinocystis lobata*	3									
WILLOW FAMILY	*SALICACEAE*										
balsam poplar	*Populus balsamifera*	8						X			X
large-toothed aspen	*Populus grandidentata*	1									
trembling aspen	*Populus tremuloides*	8						X			
weeping willow	*Salix babylonica*	2									
Bebb's willow	*Salix bebbiana*	1									
pussy willow	*Salix discolor*	5	X		X				X		
crack willow	*Salix fragilis*	3					X				X
slender willow	*Salix petiolaris*	5			X		X		X	X	
MUSTARD FAMILY	*BRASSICACEAE*										
yellow rocket	*Barbarea vulgaris*	1									
HEATH FAMILY	*ERICACEAE*										
velvetleaf blueberry	*Vaccinium myrtilloides*	1									
GOOSEBERRY FAMILY	*GROSSULARIACEAE*										
American black currant	*Ribes americanum*	1									
prickly gooseberry	*Ribes cynosbati*	3									
smooth gooseberry	*Ribes hirtellum*	2									
red currant	*Ribes rubrum*	2									
SAXIFRAGE FAMILY	*SAXIFRAGACEAE*										
foam flower	*Tiarella cordifolia*	1									
ROSE FAMILY	*ROSACEAE*										
agrimony	*Agrimonia gryposepela*	3									

		COMMUNITY NUMBER									
Common Name	***Scientific Name***	**Total**	**14b**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
smooth juneberry	*Amelanchier laevis*	1									
hawthorn species	*Crataegus spp.*	9		X		X		X			
common strawberry	*Fragaria virginiana*	8									X
yellow avens	*Geum aleppicum*	5									X
large-leaved avens	*Geum macrophyllum*	1									
apple	*Malus domestica*	1									
common crabapple	*Malus pumila*	3									
rough cinquefoil	*Potentilla norvegica*	1									
black cherry	*Prunus serotina*	6									
choke cherry	*Prunus virginiana*	6									
smooth rose	*Rosa blanda*	1									
rugosa rose	*Rosa rugosa*	1									
Alleghany blackberry	*Rubus allegheniensis*	2									
wild red raspberry	*Rubus idaeus*	7		X				X			X
purple-flowering raspberry	*Rubus odoratus*	2									
dwarf raspberry	*Rubus pubescens*	1									
American mountain ash	*Sorbus americana*	3									
European mountain ash	*Sorbus aucuparia*	4									
PEA FAMILY	*FABACEAE*										
hog-peanut	*Amphicarpa bracteata*	1									
bird's-foot trefoil	*Lotus corniculatus*	2		X							
alfalfa	*Medicago sativa ssp. Sativa*	1									
white sweet-clover	*Melilotus alba*	2		X							
red clover	*Trifolium pratense*	3		X							
white clover	*Trifolium repens*	2		X							
cow vetch	*Vicia cracca*	2						X			
LOOSESTRIFE FAMILY	*LYTHRACEAE*										
purple loosestrife	*Lythrum salicaria*	3			X						
EVENING PRIMROSE FAMIL	*ONAGRACEAE*										

		COMMUNITY NUMBER									
Common Name	***Scientific Name***	**Total**	**14b**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
dwarf enchanter's nightshade	*Circaea alpina*	1									
Canada enchanter's nightshade	*Circaea lutetiana L. ssp.canadensis*	4									
common evening primrose	*Oenothera biennis*	1									
DOGWOOD FAMILY	*CORNACEAE*										
alternate-leaf dogwood	*Cornus alternifolia*	4									
red-osier dogwood	*Cornus stolonifera*	6	X		X						
STAFF-TREE FAMILY	*CELASTRACEAE*										
climbing bittersweet	*Celastrus scandens*	1									
BUCKTHORN FAMILY	*RHAMNACEAE*										
European buckthorn	*Rhamnus cathartica*	13	X			X		X			X
GRAPE FAMILY	*VITACEAE*										
Virginia creeper	*Parthenocissus inserta*	8						X			X
wild grape	*Vitis riparia*	7									X
MAPLE FAMILY	*ACERACEAE*										
Manitoba maple	*Acer negundo*	5									
Norway maple	*Acer platanoides*	1									
silver maple	*Acer saccharinum*	1									
sugar maple	*Acer saccharum ssp.saccharum*	3									
CASHEW FAMILY	*ANACARDIACEAE*										
western poison-ivy	*Rhus rydbergii*	5									X
staghorn sumac	*Rhus typhina*	3									
WOOD-SORREL FAMILY	*OXALIDACEAE*										
European wood-sorrel	*Oxalis stricta*	2									
TOUCH-ME-NOT FAMILY	*BALSAMINACEAE*										
spotted jewelweed	*Impatiens capensis*	7			X					X	X
GINSENG FAMILY	*ARALIACEAE*										
wild sarsaparilla	*Aralia nudicaulis*	3									
CARROT FAMILY	*APIACEAE*										
spotted water hemlock	*Cicuta maculata*	1									

			COMMUNITY NUMBER								
Common Name	***Scientific Name***	**Total**	**14b**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
Queen-Anne's lace	*Daucus carota*	3		X							
wild parsnip	*Pastinaca sativa*	1									
hemlock water parsnip	*Sium suave*	1									
GENTIAN FAMILY	*GENTIANACEAE*										
bottle gentian	*Gentiana andrewsii*	2									X
MILKWEED FAMILY	*ASCLEPIADACEAE*										
swamp milkweed	*Asclepias incarnata*	3			X						
common milkweed	*Asclepias syriaca*	3									
black swallow-wort	*Cynanchum nigrum*	1									
swallow-wort	*Cynanchum rossicum*	5									
NIGHTSHADE FAMILY	*SOLANACEAE*										
bitter nightshade	*Solanum dulcamara*	7	X		X						
WATERLEAF FAMILY	*HYDROPHYLLACEAE*										
Virginia waterleaf	*Hydrophyllum virginianum*	1									
BORAGE FAMILY	*BORAGINACEAE*										
Viper's bugloss	*Echium vulgare*	1		X							
MINT FAMILY	*LAMIACEAE*										
wild basil	*Clinopodium vulgare*	1									
ground ivy	*Glechoma hederacea*	1									
American water-horehound	*Lycopus americanus*	2									
wild mint	*Mentha arvensis*	3									
PLANTAIN FAMILY	*PLANTAGINACEAE*										
narrow-leaved plantain	*Plantago lanceolata*	1									
broad-leaved plantain	*Plantago major*	2									
Rugel's plantain	*Plantago rugelii*	2									
OLIVE FAMILY	*OLEACEAE*										
white ash	*Fraxinus americana*	6									X
black ash	*Fraxinus nigra*	2									
green ash	*Fraxinus pennsylvanica var. subinteg*	3									

		COMMUNITY NUMBER									
Common Name	***Scientific Name***	**Total**	**14b**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
FIGWORT FAMILY	*SCROPHULARIACEAE*										
slender-leaved agalinis	*Agalinis tenuifolia*	2									X
butter-and-eggs	*Linaria vulgaris*	1									
foxglove beardtongue	*Penstemon digitalis*	2									
MADDER FAMILY	*RUBIACEAE*										
rough bedstraw	*Galium asprellum*	1									
marsh bedstraw	*Galium palustre*	2			X						
HONEYSUCKLE FAMILY	*CAPRIFOLIACEAE*										
tartarian honeysuckle	*Lonicera tatarica*	3									
common elderberry	*Sambucus canadensis*	4									
red-berried elderberry	*Sambucus racemosa*	1									
snowberry	*Symphoricarpos albus*	1									
Guelder rose	*Viburnum americanum*	1									
high bush cranberry	*Viburnum trilobium*	9			X			X			
ASTER FAMILY	*ASTERACEAE*										
common yarrow	*Achillea millefolium*	2		X							
common ragweed	*Ambrosia artemisiifolia L.*	1									
common burdock	*Arctium minus*	1									
nodding beggarticks	*Bidens cernua*	1									
marsh beggar-ticks	*Bidens frondosa*	1									
black knapweed	*Centaurea nigra*	2		X		X					
ox-eye daisy	*Chrysanthemum leucanthemum*	5		X							
chicory	*Cichorium intybus*	2		X							
Canada thistle	*Cirsium arvense*	2		X							
flat top white aster	*Doellingeria umbellata var.umbellata*	2									
daisy fleabane	*Erigeron annuus*	1									
Philadelphia fleabane	*Erigeron philadelphicus ssp. philadel*	2									
spotted joe-pyeweed	*Eupatorium maculatum*	4								X	
boneset	*Eupatorium perfoliatum*	6									X

		COMMUNITY NUMBER									
Common Name	***Scientific Name***	**Total**	**14b**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
grass-leaved goldenrod	*Euthamia graminifolia*	4									X
field hawkweed	*Hieracium caepitosum ssp.caespitosu*	1									
king devil hawkweed	*Hieracium x florbundum*	1									
elecampane	*Inula helenium*	1									
pineapple weed	*Matricaria matricarioides*	2		X		X					
black-eyed Susan	*Rudbeckia hirta*	2									
Canada goldenrod	*Solidago canadensis*	9						X	X	X	X
early goldenrod	*Solidago juncea*	1									
goldenrod species	*Solidago spp.*	1									
field sow thistle	*Sonchus arvensis ssp.arvensis*	1									
heart-leaved aster	*Symphyotrichum cordifolium*	1									
calico aster	*Symphyotrichum lateriflorum var.late*	2									
New England aster	*Symphyotrichum novae- angliae*	5									X
white heath aster	*Symphyotrichum pilosum var.pilosum*	1									X
purple-stemmed aster	*Symphyotrichum puniceum*	5			X						
common dandelion	*Taraxacum officinale*	7		X				X			
WATER-PLANTAIN FAMILY	*ALISMATACEAE*										
common waterplantain	*Alisma plantago-aquatica*	2			X						
ARUM FAMILY	*ARACEAE*										
Jack-in-the-pulpit	*Arisaema triphyllum*	4									
RUSH FAMILY	*JUNCACEAE*										
knotted rush	*Juncus nodosus*	1									
path rush	*Juncus tenuis*	1									
SEDGE FAMILY	*CYPERACEAE*										
awl-fruited sedge	*Carex stipata*	1									
wool-grass	*Scirpus cyperinus*	2									X
GRASS FAMILY	*POACEAE*										
awnless brome grass	*Bromus inermis ssp.inermis*	4		X				X			
Canada bluejoint grass	*Calamagrostis canadensis*	4							X	X	

			COMMUNITY NUMBER									
Common Name	***Scientific Name***	**Total**	**14b**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
fowl manna grass	*Glyceria striata*	1									
acuminate panic grass	*Panicum acuminatum var.acuminatu*	1									X
reed canary grass	*Phalaris arundinacea*	5			X						X
timothy	*Phleum pratense*	1									
common reed	*Phragmites australis*	1									
CATTAIL FAMILY	*TYPHACEAE*										
narrow-leaved cattail	*Typha angustifolia*	3							X		
common cattail	*Typha latifolia*	3									X
LILY FAMILY	*LILIACEAE*										
asparagus	*Asparagus officinalis*	1						X			
trout lily	*Erythronium americanum ssp. americ*	4									
tiger lily	*Lilium lancifolium*	1									
Canada mayflower	*Maianthemum canadense*	2									
false Solomon's seal	*Smilacina racemosa*	1									
white trillium	*Trillium grandiflorum*	1									
ORCHID FAMILY	*ORCHIDACEAE*										
helleborine	*Epipactis helleborine*	4									
Total Number of Plant Species	186		6	16	15	5	4	16	5	5	24

Number of Plant Species Per Community

Appendix I-B List of Significant Plant Species

APPENDIX I - B List of Significant Plant Species

Plant species observed by NEA with significant status on national, provincial and relevant regional lists are listed with status codes and where applicable the most current year of publication. Three standard reference works were used for the botanical nomenclature and taxonomy (Newmaster et. al., 1998; Gleason and Cronquist 1991; Voss 1980; 1985). Other published works for botanical names included; ferns (Cody and Britton 1989); grasses (Dore and McNeill 1980); orchids (Whiting and Catling 1986); shrubs (Soper and Heimburger 1982) and trees (Farrar 1995).

NATIONAL RANKING **Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Government of Canada**
Species at Risk Act (SARA), SCHEDULE 1 (Subsections 2(1), 42(2) and 68(2)), Government of Canada

PROVINCIAL RANKING **Species at Risk in Ontario (COSSARO), Government of Ontario**
Provincial Rank (SRANK), Natural Heritage Information Center, Government of Ontario

REGIONAL RANKING **Riley Simcoe** Riley,1989, Simcoe

STATUS CODES

COSEWIC	**END ***	- Endangered Species	***Year of Status Publication included in Code**
COSSARO	**THR ***	- Threatened Species	
SARA	**SC ***	- Species of Concern	
SRANK	**S1**	- Extremely Rare	**Other national or provincial codes not listed**
	S2	- Very Rare	
	S3	- Rare to Uncommon	
Regional Lists	**R**	- Rare native species	**Other Regional codes not listed**
	EXP	- Extirpated native species	

		NATIONAL RANKINGS		PROVINCIAL RANKINGS		REGIONAL RANKINGS				
Common Name	**Scientific Name**	**COSEWIC**	**SARA**	**COSSARO**	**SRank**	**Riley Simcoe**				
butternut	Juglans cinerea	END Apr/14	END Mar/13	END Jun/14	S3?					
purple-flowering raspberry	Rubus odoratus					R				
American mountain ash	Sorbus americana					R				
European wood-sorrel	Oxalis stricta					R				
slender-leaved agalinis	Agalinis tenuifolia					R				

Common Name	Scientific Name		COSEWIC	SARA	COSSARO	SRank	Riley Simcoe				
Plants with Ranking	**Total:** 5	**Status List Totals:**	1	1	1		4	0	0	0	0

Appendix II Breeding Bird Status

APPENDIX II Bird Status Report

Bird species observed by NEA are listed in the order followed the American Ornithologists' Union (AOU) Check-list of North American birds (7th edition, 1999, 47th Supplement). Common and scientific nomenclature are based on those used by AOU. Breeding status and breeding evidence code are listed when observed. Any significant status for a species on national and provincial lists is displayed as well as those from relevant regional lists.

List Status :

END - endangered	A wildlife species facing imminent extirpation or extinction.
END-R -endangered regulated	A wildlife species facing imminent extirpation or extinction in Ontario which has been regulated under Ontario's Endangered Species Act (ESA).
THR - threatened	A wildlife species likely to become endangered if limiting factors are not reversed.
SC - special concern	A wildlife species that may become threatened or an endangered species because of a combination of biological characteristics and identified threats.
YES - Area Sensitive	A wildlife species that requires large areas of suitable habitat in order to sustain their population numbers.

*** Other status levels are not displayed**

List Sources:

COSEWIC	The Committee on the Status of Endangered Wildlife in Canada, May 2015.
COSSARO	The Committee on the Status of Species at Risk in Ontario, June 2015.
SARA	Species At Risk Act, Schedule 1, Government of Canada, 2015.
Area Sensitive	Significant Wildlife Technical Guide, Appendix C, OMNR, Oct. 2000
Region 6	Southern Ontario Wetland Evaluation Appendix 11B, Version 3.2, March 2013

Breeding Status: (Observed By NEA)

B -species observed in breeding season in suitable habitat with some evidence of breeding (confirmed, probable or possible as per Ontario Breeding Bird Atlas, 2002).

F -species observed in breeding season but no evidence of breeding or suitable nest sites available on the study site (includes flyovers, migrants and foraging colonial breeders).

M -species observed outside of breeding season for that species and in area outside of the known

Breeding Evidence Code: (Observed By NEA)

OBSERVED

X -species observed in its breeding season (no evidence of breeding).

POSSIBLE BREEDING

H -species observed in its breeding season in suitable nesting habitat

S -singing male present, or breeding calls heard, in its breeding season in suitable nesting habitat

PROBABLE BREEDING

P -pair observed in their breeding season in suitable nesting habitat

T -permanent territory presumed through registration of territorial song on at least 2days, a week or more apart, at the same place

D -courtship or display between a male and a female or 2 males, including courtship feeding or copulation

V -visiting probable nest site

A -agitated behaviour or anxiety calls of an adult

B -brood patch on adult female or cloacal protuberance on adult male

N -nest-building or excavation of nest hole

CONFIRMED BREEDING

DD -distraction display or injury feigning

NU -used nest or egg shell found (occupied or laid within the period of study)

FY -recently fledged young or downy young, including young incapable of sustained flight

AE -adults leaving or entering nest site in circumstances indicating occupied nest

FS -adult carrying fecal sac

CF -adult carrying food for young

NE -nest containing eggs

NY -nest with young seen or heard

SOURCE: Ontario Breeding Bird Atlas March 2001

AOU Code	Common Name	Scientific Name	Observed Breeding Status	Breed Evidence Code			Area Sensitive Region 6		
TUVU	Turkey Vulture	*Cathartes aura*	B	None			No		
COHA	Cooper's Hawk	*Accipiter cooperii*	B	None			Yes		
RTHA	Red-tailed Hawk	*Buteo jamaicensis*	B	None			No		
RBGU	Ring-billed Gull	*Larus delawarensis*	B	None			No		
MODO	Mourning Dove	*Zenaida macroura*	B	None			No		
GHOW	Great Horned Owl	*Bubo virginianus*	B	None			No		
DOWO	Downy Woodpecker	*Picoides pubescens*	B	None			No		
EWPE	Eastern Wood-Pewee	*Contopus virens*	B	None	SC	SC	No		
WIFL	Willow Flycatcher	*Empidonax traillii*	B	None			No		
EAPH	Eastern Phoebe	*Sayornis phoebe*	B	None			No		
GCFL	Great Crested Flycatcher	*Myiarchus crinitus*	B	None			No		
EAKI	Eastern Kingbird	*Tyrannus tyrannus*	B	None			No		
REVI	Red-eyed Vireo	*Vireo olivaceus*	B	None			No		
BLJY	Blue Jay	*Cyanocitta cristata*	B	None			No		
AMCR	American Crow	*Corvus brachyrhynchos*	B	None			No		
PUMA	Purple Martin	*Progne subis*	B	None			No		
TRSW	Tree Swallow	*Tachycineta bicolor*	B	None			No		
BANS	Bank Swallow	*Riparia riparia*	B	None	THR	THR	No		
BARS	Barn Swallow	*Hirundo rustica*	B	None	THR	THR	No		
BCCH	Black-capped Chickadee	*Poecile atricapillus*	B	None			No		
HOWR	House Wren	*Troglodytes aedon*	B	None			No		
WIWR	Winter Wren	*Troglodytes troglodytes*	B	None			Yes		
VEER	Veery	*Catharus fuscescens*	B	None			Yes		
WOTH	Wood Thrush	*Hylocichla mustelina*	B	None	THR	SC	No		
AMRO	American Robin	*Turdus migratorius*	B	None			No		
GRCA	Gray Catbird	*Dumetella carolinensis*	B	None			No		

EUST	European Starling	*Sturnus vulgaris*	B	None			No		
CEWX	Cedar Waxwing	*Bombycilla cedrorum*	B	None			No		
NAWA	Nashville Warbler	*Vermivora ruficapilla*	B	None			No		
YEWA	Yellow Warbler	*Dendroica petechia*	B	None			No		
BWWA	Black-and-white Warbler	*Mniotilta varia*	B	None			Yes		
AMRE	American Redstart	*Setophaga ruticilla*	B	None			Yes		
OVEN	Ovenbird	*Seiurus aurocapillus*	B	None			Yes		
MOWA	Mourning Warbler	*Geothlypis philadelphia*	B	None			No		
COYE	Common Yellowthroat	*Geothlypis trichas*	B	None			No		
FISP	Field Sparrow	*Spizella pusilla*	B	None			No		
VESP	Vesper Sparrow	*Pooecetes gramineus*	B	None			No		
SASP	Savannah Sparrow	*Passerculus sandwichensi*	B	None			Yes		
SOSP	Song Sparrow	*Melospiza melodia*	B	None			No		
SWSP	Swamp Sparrow	*Melospiza georgiana*	B	None			No		
WTSP	White-throated Sparrow	*Zonotrichia albicollis*	B	None			No		
NOCA	Northern Cardinal	*Cardinalis cardinalis*	B	None			No		
RBGR	Rose-breasted Grosbeak	*Pheucticus ludovicianus*	B	None			No		
INBU	Indigo Bunting	*Passerina cyanea*	B	None			No		
BOBO	Bobolink	*Dolichonyx oryzivorus*	B	None	THR	THR	No		
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	B	None			No		
EAME	Eastern Meadowlark	*Sturnella magna*	B	None	THR	THR	No		
COGR	Common Grackle	*Quiscalus quiscula*	B	None			No		
BHCO	Brown-headed Cowbird	*Molothrus ater*	B	None			No		
BAOR	Baltimore Oriole	*Icterus galbula*	B	None			No		
PUFI	Purple Finch	*Carpodacus purpureus*	B	None			No		
AMGO	American Goldfinch	*Carduelis tristis*	B	None			No		
HOSP	House Sparrow	*Passer domesticus*	B	None			No		
TOTAL SPECIES OBSERVED:	**53**	**BREEDING SPECIES OBSERVED:**	**53**				**7**	**0**	**0**	**0**

Appendix III Detailed Fish Sampling Results, NEA 2015

Appendix III: Fish Sampling Record - Detailed

Project : 14-056

Waterbody/Watercourse: Trib of Brook Cr & Midtow

Sample Site: 14056_01 **SiteType:** **Site Northing:** 4873711 **Site Easting:** 728082

SAMPLE: S14056_01FC04

	SET/START	LIFT/STOP	FISHING METHOD		SHOCKING PROPERTIES		SAMPLE/GEAR COORDINATES		
Date	07-May-15	07-May-15	**Fishing Method:**	Electrofishing	**Shocker:**	ALS	**Location**	Downstream	Upstream
Time	11:20 AM	11:40 AM	**Velocity (m/s):**	n/a	**ShockTime (sec):**	273	**Northing**	4873710	4873714
WaterTemp	9.5		**Net Orientation:**	n/a	**Voltage:**	100	**Easting**	728084	728082
AirTemp	22.6		**Area Length (m):**	0	**Frequency:**	60	**Longitude**		
Weather	sunny, warm, slight breeze (BS2)						**Latitude**		

FISH OBSERVATIONS - INDIVIDUALS

MNR Code	Common Name	Scientific Name	Mesh Size	Total Length (mm)	Weight (g)	Mercury (ug/g)
280	Stickleback Family	*Gasterosteidae*				
281	Brook Stickleback	*Culaea inconstans*	0	49	1.3	

FISH OBSERVATIONS - BULK

MNR Code	Common Name	Scientific Name	Mesh Size	Weight (g)	Number of Fish	Mercury (ug/g)
0	None	-----				
0	None	-----	0		0	

Number of Species in Sample: 1

Number of Fish Collected in Sample: 0

Sample Site: 14056_02 **SiteType:** **Site Northing:** 4874852
Site Easting: 728033

SAMPLE: S14056_02FC04

	SET/START	LIFT/STOP	FISHING METHOD		SHOCKING PROPERTIES		SAMPLE/GEAR COORDINATES		
Date	07-May-15	07-May-15	**Fishing Method:**	Electrofishing	**Shocker:**	SAZ	**Location**	Downstream	Upstream
Time	1:19 PM	1:45 PM	**Velocity (m/s):**	n/a	**ShockTime (sec):**	676	**Northing**	4874843	4874862
WaterTemp	17.5		**Net Orientation:**	n/a	**Voltage:**	280	**Easting**	728033	728041
AirTemp	25		**Area Length (m):**	17.3	**Frequency:**	70	**Longitude**		
Weather	sunny, hot, slight breeeze (BS2)						**Latitude**		

FISH OBSERVATIONS - INDIVIDUALS

MNR Code	Common Name	Scientific Name	Mesh Size	Total Length (mm)	Weight (g)	Mercury (ug/g)
180	Minnow Family	*Cyprinidae*				
208	Bluntnose Minnow	*Pimephales notatus*	0	29	0.3	
208	Bluntnose Minnow	*Pimephales notatus*	0	66	3.3	
208	Bluntnose Minnow	*Pimephales notatus*	0	56	1.3	
208	Bluntnose Minnow	*Pimephales notatus*	0	47	1	
209	Fathead Minnow	*Pimephales promelas*	0	55	1	
209	Fathead Minnow	*Pimephales promelas*	0	56	2	
212	Creek Chub	*Semotilus atromaculatus*	0	33	0.5	
212	Creek Chub	*Semotilus atromaculatus*	0	117	18.5	
212	Creek Chub	*Semotilus atromaculatus*	0	39	0.7	
212	Creek Chub	*Semotilus atromaculatus*	0	54	1.2	
212	Creek Chub	*Semotilus atromaculatus*	0	55	1.6	
212	Creek Chub	*Semotilus atromaculatus*	0	33	0.4	
212	Creek Chub	*Semotilus atromaculatus*	0	30	0.3	

212	Creek Chub	*Semotilus atromaculatus*	0	54	1.2	
212	Creek Chub	*Semotilus atromaculatus*	0	35	0.5	
212	Creek Chub	*Semotilus atromaculatus*	0	51	0.9	
280	Stickleback Family	*Gasterosteidae*				
281	Brook Stickleback	*Culaea inconstans*	0	41	0.5	
281	Brook Stickleback	*Culaea inconstans*	0	39	0.5	
281	Brook Stickleback	*Culaea inconstans*	0	43	0.9	
281	Brook Stickleback	*Culaea inconstans*	0	41	0.5	

FISH OBSERVATIONS - BULK

MNR Code	Common Name	Scientific Name	Mesh Size	Weight (g)	Number of Fish	Mercury (ug/g)
180	Minnow Family	*Cyprinidae*				
225	Minnow sp.	Pimephales sp.	0	27	144	
212	Creek Chub	Semotilus atromaculatus	0	4.6	8	

Number of Species in Sample: 5

Number of Fish Collected in Sample: 172

Appendix IV Detailed Surface Water Quality Results, NEA 2015

APPENDIX IV: Water Quality Results

PN 14-056

Sample Site 14056_01

Site Type:

Waterbody/Watercourse: Trib of Brook Cr &

Northing: 4873711

Easting: 728082

Comments:

UTM at general site location

Sample ID: S14056_01WQ01

Date: 07-May-15 Start Time: 11:43 AM Water Depth (m) 0.18 Velocity (m/s):

Weather: sunny, warm with a slight End Time: 11:50 AM Sample Depth (m) 0.09 Surface Conditions Calm

Current: Slow (<1 m/s)

Air Temp *C	Water Temp *C	DO2 (mg/L)	pH	TDS (mg/L)	Phosporus (ppb)	Conductivity (us/cm)	Turbidity (NTU)	Water Colour	Salinity (ppt)
22.6	9.5	7.54	6.9	452.9		491	0.42	Colourless	0.3

Sample Site 14056_02

Site Type:

Waterbody/Watercourse: Trib of Brook Cr &

Northing: 4874852

Easting: 728033

Comments:

UTM at general site location

Sample ID: S14056_01WQ01

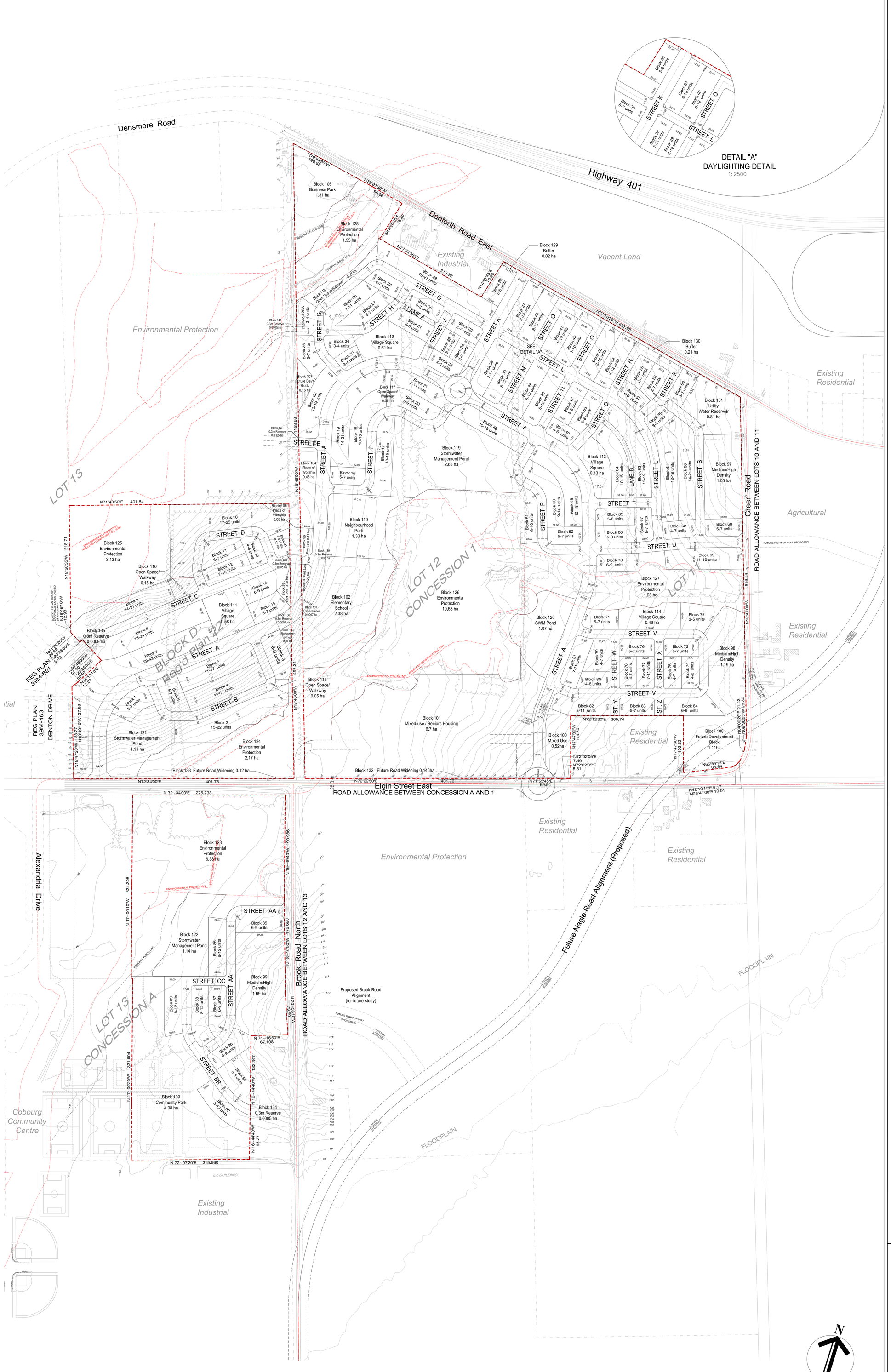
Date: 07-May-15 Start Time: 2:40 PM Water Depth (m) 0.14 Velocity (m/s):

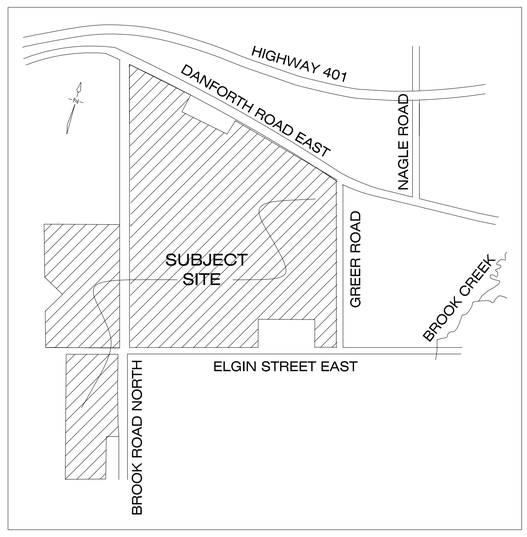
Weather: sunny, BS=1 End Time: 2:50 PM Sample Depth (m) 0.1 Surface Conditions Calm

Current: Slow (<1 m/s)

Air Temp *C	Water Temp *C	DO2 (mg/L)	pH	TDS (mg/L)	Phosporus (ppb)	Conductivity (us/cm)	Turbidity (NTU)	Water Colour	Salinity (ppt)
25	17.5	9.44	7.1	604		786	1.68	Colourless	0.5

Appendix V Draft Plan (Option A)





Key Map NTS

DRAFT PLAN OF SUBDIVISION

Section 51, Planning Act

a) As shown on the draft plan
b) As shown on the draft plan
c) As shown on the draft plan
d) As shown on the Land Use Table
e) As shown on the draft plan
f) As shown on the draft plan
g) As shown on the draft plan
h) Municipal piped water
i) Sandy Loam
j) As shown on the draft plan
k) Full Municipal services
l) As shown on the draft plan

Land Use Table	Lot/Block No.	Area (ha)
Single Detached Semi-Detached Townhouse	Bocks 1-92	32.38
Part Lots	Blocks 93-96	0.41
Medium/High Density	Blocks 97-99	3.93
Mixed Use	Blocks 100-101	7.22
Elementary School	Blocks 102-103	2.45
Place of Worship	Blocks 104-105	0.52
Business Park	Block 106	1.31
Future Development	Blocks 107-108	1.27
Community Park	Block 109	4.08
Neighbourhood Park	Block 110	1.33
Village Square	Blocks 111-114	2.11
Open Space/Walkway	Blocks 115-118	0.52
Stormwater Management	Blocks 119-122	5.95
Environmental Protection	Blocks 123-128	26.29
Buffer/Trail	Blocks 129-130	0.23
Utility - Water Reservoir	Block 131	0.81
Future Road Widening	Blocks 132-133	0.27
0.3m Reserve	Blocks 134-141	0.004
Public Right-of-Way	---	16.22
TOTAL		107.30 ha

Unit Table	No. of Units
12.8m Single-Detached 11.0m Single-Detached 16.5m Semi-Detached 7.3m Townhouse	Range of units 668 - 1,003
Subtotal	668 - 1,003 units
Medium/High Density @ 75 u/ha	295
Mixed Use @125 u/ha	65
Mixed Use/Seniors @150 u/ha	600
Subtotal	960
TOTAL	1,628 - 1,963 units

R.O.W.	Length (m)	Area (ha)
26.0m Collector	327.69	0.85
24.5m Minor Collector	1,829.04	4.48
20.0m Local	268.37	0.53
17.0m Local	5,853.00	9.95
8.5m Lane	233.43	0.20
Roundabout	---	0.21
TOTAL	8,511.53 metres	16.22 ha

Owners Authorization

We being the registered owners of the subject lands hereby authorize THE PLANNING PARTNERSHIP to prepare a draft plan of subdivision and to make application to the Town of Cobourg for approval thereof:

May 20, 2016 Signed:

Richard Rondeau, President
Rondeau (Cobourg) LTD.
513 Westney Road S.
Ajax, ON L1S 6W8

Surveyor's Certificate

I hereby certify that the boundaries of the land to be subdivided and their relationship to the adjacent lands are accurately and correctly shown on this plan.

Date: May 20, 2016 Signed:

Fred Petrich, Ontario Land Surveyor
DFP Surveyors
1101 Boundary Rd.
Oshawa, ON L1J 8P8

Revisions

Drawing No.	Date	Description
A	May 2016	New Draft Plan 'A'
B	May 2017	New Draft Plan 'B'. Revisions based on Town comments.
C	Sept. 2017	New Draft Plan 'C'. Revisions based on Town and agency comments.

METRIC: DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

Revised Draft Plan of Subdivision

Rondeau (Cobourg) Ltd.

14T-06001-R

Part of Lots 11, 12, and 13,
Concessions A and 1
Block D Registered Plan 277
Town of Cobourg
County of Northumberland

The Planning Partnership
1255 Bay Street, Suite 201
Toronto, Ontario, Canada M5R 2A9

Job.No. 1613	Designed: SLM	Drawing No. C
Date: Sept.28, 2017	Drawn: SLM	
Scale: 1:2500	Checked: DHL	