3.0

GUIDELINE DOCUMENTS FOR ENVIRONMENTALLY SIGNIFICANT AREAS IDENTIFICATION, EVALUATION AND BOUNDARY DELINEATION

July 31, 1997

Approved by Council August 5, 1997

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1.0 BACKGROUND

1.1 Planning Process for the Designation and Evaluation of Environmentally Significant Areas

Criteria for the evaluation and identification of natural areas (Environmentally Significant Areas) were introduced in the current City of London Official Plan as adopted by City Council in 1989. In 1992, revisions to these criteria were developed by the technical Advisory Committee on Natural Areas (TACNA), now known as the Environmental and Ecological Planning Advisory Committee (EEPAC). Significant changes were recommended to these criteria to provide a more technical and scientific basis for the evaluation of candidate areas. The recommended criteria were similar to those used in other jurisdictions. They dealt with broad ecological principles. These revisions were adopted by Council and came into effect with the partial approval of OPA 41 in March 1994. There was an objection to this amendment by the London Development Institute and a referral to the Ontario Municipal Board. The City responded to the referral by recommending an adjournment of the hearing as it pertained to the amendment to replace the criteria to be used in the evaluation and recognition of Environmentally Significant Areas, until such time as the Vision ’96 planning process was completed. This was acceptable to LDI.

Vision '96 was a comprehensive, community-based program initiated by the City of London in 1993 to encompass all aspects of planning for the future of the City. The principal product of the planning exercise was a major amendment to the Official Plan for the lands annexed to the City in 1993. As part of the development of the Official Plan, subwatershed studies were undertaken for the entire City.

The aim of the subwatershed planning studies was to identify important natural resources and to develop strategies to protect and enhance them as land use changes. Candidate Environmentally Significant Areas were one of these important natural resources to identify and protect within the boundaries of the City of London.

Minor modifications to the EEPAC ESA Criteria were made in 1994 at the outset of the Terrestrial Resource Strategy component of the City of London Subwatershed Studies. The subwatershed consultants endorsed the use of the EEPAC criteria as a basis for the identification of ESA's in the new Official Plan. To address the broadness of the wording of the criteria, they developed application guidelines that would provide a more specific context and consistency in application.

In an initial review of the Candidate ESA's selected during the Subwatershed Studies, the EEPAC found that both the background material provided and the application guidelines for meeting the Criteria were inadequate for a fair assessment to be made. The development industry also expressed reservations over the lack of preciseness or subjectivity of some of the criteria and their application guidelines.

In response, EEPAC drafted and adopted a revised set of application guidelines by which the EEPAC Criteria could be applied and Candidate ESA's assessed in a consistent and ecologically defensible way (June 1995). These guidelines used all available information from the Subwatershed Studies Life Science Inventory Database and were in general, more rigorous. EEPAC's review of the candidate ESA's using their revised application guidelines resulted in a majority of the candidate ESA's being recommended for inclusion in the Vision London Official Plan Amendment. Several candidates were not recommended by EEPAC. Two areas (Coves,
Kilally) not assessed in the Subwatershed Studies as Candidate ESA's because they were outside the Subwatershed Studies boundary, were added as recommended ESA's by EEPAC.

In addition to the application guidelines, EEPAC also prepared Guidelines for Assessing Boundary Delineation of Environmentally Significant Areas (January 1996). These guidelines were needed in order to present to the public an objective process for determining the appropriate limit of a natural area that is ecologically significant. These revised guidelines were still not satisfactory to the development industry who employed consultants to undertake formal reviews of the ESA Criteria and Application Guidelines. For the most part, these submissions questioned the application guidelines that were used to interpret and apply the ESA criteria (as opposed to the criteria themselves). Discussions relating to these concerns and issues resulted in an agreement of the City of London to work with the developer's consultants to review and revise the ESA Criteria and Application Guidelines. When Official Plan Amendment number 88 was adopted by Council in July 1996, the ESA Criteria were deferred from inclusion until they could be tested.

A process and approach was determined for this review that included test sites for evaluation. Two sites were chosen in Community Plan areas located in the urban growth boundary of the recently annexed lands that each contained an ESA as identified through the subwatershed studies (Figure 1).

The Candidate ESAs recommended by EEPAC are identified on Schedule B, OPA 88 (July 1996) as ESA's if subject to provincially-mandated development restrictions or to landowner agreement; or as Potential ESAs if there was no landowner agreement. The status of these Potential ESAs will be determined on the basis of site-specific evaluation undertaken in conjunction with community planning studies or environmental impact studies and pending further evaluation according to the ESA Evaluation Criteria.

1.2 Subwatershed Studies Candidate ESA Identification

The following describes the historical process of Candidate ESA identification that was completed during the Subwatershed Studies and in the preparation of the Vision London Official Plan Amendment. This work is being tested and refined through the current process of ESA evaluation and boundary delineation for Community Planning Studies, environmental impact studies and/or other site-specific planning studies.

Designation of Candidate ESAs was made at the level of the Patch or Patch Cluster as recognized and mapped during the City of London Subwatershed Studies. These vegetation patches are important because they represent what is left of the original continuous upland and wetland cover. Their pattern is a reflection of land use practices, topography, edaphic conditions (soil, moisture, nutrients) and microclimate. The patches represented a starting point for the DTRS. The DTRS proposed to build on these fragments and to use them to rebuild, where possible, a more interconnected and extensive terrestrial system (TERRA 1994). In general, 4 ha was the minimum patch size, with allowance made to include smaller patches (satellites) in close proximity to each other. Patches or Patch Clusters that met the Criteria for the evaluation and identification of Environmentally Significant Areas (ESAs) qualified as Candidate ESAs.
1.2.1 Vegetation patches
The identification and outlining of patches was based on 1:10,000 OBM mapping (1985) and 1:6,250 aerial photography (1993). It was understood that modification of these patches in outline may be made during the course of the subwatershed studies based upon the most recent information with respect to development proposals and state of the vegetation cover (Terra 1994). An initial cut-off size of 4 ha was determined on the basis of the discussion in Riley and Mohr (1994) on the minimum size for functional woodlands. The mapping of existing vegetation patches was undertaken by the UTRCA using the following guidelines developed jointly by the UTRCA and TERRA:

- Patches 4 ha or more were mapped. A patch bisected by a utility corridor was outlined and considered as one patch. A patch bisected by a road but connected by a stream and culvert was outlined and considered one patch.

- Certain patches less than 4 ha were mapped if:
  - The patch was located within 100 m of a larger mapped patch and the land between the patches was absent of any permanent disturbance which may act as a permanent barrier to flora or fauna (e.g., roads, railroads, buildings). Areas such as naturalizing land (i.e. abandoned farm land - old fields), farm land, stream tributaries of any order, and utility corridors were not considered permanent cultural barriers.
  - The patch was located within 100 m of another patch less than 4 ha and the land between the patches was absent of any permanent disturbance which may act as a permanent barrier to flora or fauna (e.g., roads, railroads, buildings) and the total area of the two (or more) patches was 4 ha or more. Areas such as naturalizing land (i.e. abandoned farm land - old fields), farm land, stream tributaries of any order, and utility corridors are not considered permanent cultural barriers.
  - Advice obtained from the subwatershed terrestrial biologists suggested that some smaller patches should be considered. This was particularly applicable in the case of certain wetland areas or remnant habitats.

1.2.2 Clustering methodology guidelines for Candidate ESAs:
The following methodology describes the process by which vegetation patches were complexed to form a patch cluster. The scale of resolution for this methodology was 1:30,000, based on 1:10,000 Ontario Base Mapping and 1:6,250 aerial photographs.

Where two or more Patches or Patch Clusters were contained in a Candidate ESA, one or more of the following criteria were met:

1. Patches were contiguous or joined by a naturally vegetated corridor;
2. Patches were separated by a gap less than 100 m wide;
3. Patches were joined by natural or planted woody vegetation, or by naturally succeeding early successional vegetation (including, but not limited to, old fields and riparian meadow);
4. Patches contained different parts of a provincially significant (Class 1-3) wetland complex;
5. Patches were directly connected by a permanent, natural watercourse or stream corridor.
Figure 1: Flow Chart depicting the ESA identification, evaluation, boundary delineation and community planning process
2.0 CITY OF LONDON ESA EVALUATION CRITERIA APPLICATION GUIDELINES

2.1 Purpose
This report:

a) is based on the October 25, 1995 version of the EEPAC CANDIDATE ESA SELECTION CRITERIA: Application Guidelines;
b) recommends changes to the wording of the criteria to clarify their definition;
c) recommends changes to the application guidelines to strengthen their interpretation and scientific credibility;
d) provides a standard by which the criteria can be applied and Candidate ESAs can be assessed in a consistent and ecologically defensible manner.

2.2 Background
In October of 1996 an ESA Evaluation Criteria Review Committee, consisting of London Development Institute environmental consultants, EEPAC representatives and City Planning Staff, was established to review the ESA evaluation criteria and application guidelines that were deferred by City Council upon the adoption of Official Plan Amendment No. 88.

This review took place in order to clarify the wording of a document drafted by the Environmental and Ecological Planning Advisory Committee October 25 1995 (Candidate ESA Selection Criteria: Application Guidelines) which was used by EEPAC to recommend ESA’s to Council during the City of London Subwatershed Studies. These application guidelines reflect a general consensus of the views of the ESA Evaluation Criteria Review Committee on the wording of criteria and application guidelines that are being used for the evaluation of ESAs in the two test Community Planning Areas (Sunningdale and River Bend).

2.3 Interpretation
The following interpretations of the application guidelines should be noted.

1. To qualify for designation as an Environmentally Significant Area, a natural area must fulfill at least 2 of the City of London Criteria.

2. The same feature cannot be used to satisfy more than one criterion for a given area. However, the feature should be listed under each of the criterion that it meets. For example, if a community is identified as rare or uncommon, it would meet Criterion 1. This community will likely also be the best representative example of that type and thus would by definition, meet Criterion 2. However, unless there were other representative communities identified within the ESA, Criterion 2 could not be counted.

3. “Regional level” refers to the lands covered by the City of London Subwatershed Studies (see attached Map- Figure 2), including Oxbow Creek Subwatershed, Dingman Creek Subwatershed and the Central Area.

4. “County” refers to Middlesex County.

5. In some cases appropriate expertise will be required to apply certain elements of criterion 1 (unusual landforms), Criterion 4 (significant hydrological processes), Criterion 5 (aspects of biodiversity), Criterion 6 (important wildlife habitat or linkage functions) and Criterion 7 (significant habitat). Each time a criterion is applied, the rationale and source of expertise on which the application is based should be documented.

6. The minimum data requirements that are required to apply certain measures of a criterion, such as diversity indices, are detailed in the application guidelines. A standardized approach to
data collection will enable more consistent application of these indices. Some of these measures may be useful for long term management planning.

7. For documentation of rare community and species status, the most current working lists and authorities will be utilized. Lists of rare and unusual communities and species will be considered open-ended, since data collected from other natural areas inventories will result in additions and deletions.

8. For vegetation communities, the Ecological Land Classification for Southern Ontario (ELC) (Lee et al. 1996, 1997) will be the standard used to differentiate natural vegetation communities within patches. This will replace the Canadian Vegetation Classification System (Strong et al. 1990) which was used to evaluate communities to Level VII during the Subwatershed Studies Life Science Inventories (Bowles et al. 1994). For communities that are not yet included in the draft ELC, descriptions will be made using the principles established by the ELC hierarchy.

9. The word "Area" in this document refers to patches or patch clusters (the combined area of contiguous patches).

10. The focus of each criterion is to identify features of significance for protection.
Figure 2: City of London Subwatershed Region
(note: shaded areas depict subwatersheds studied during the City of London Subwatershed Studies. Oxbow Creek, Dingman Creek and Central Area Subwatersheds are included in the regional level)
Figure 3: City of London Glacial Geomorphology of the dominant physiographic units
CRITERION 1:  The Area contains unusual landforms and/or rare to uncommon natural communities within the country, province or London subwatershed region.

Background: Identification of landforms that reflect geological processes or features instrumental in forming London's landscape or communities that have limited occurrence, abundance or range (distribution) is important for the maintenance of biodiversity including ecosystem, landscape, species and genetic diversity.

Application: Unusual Landforms

National level: Areas identified by recognized experts as geologically significant (e.g. Ontario Geological Survey)

Provincial level: Earth Science ANSIs

Regional level: Expert opinion (e.g. Dreimanis 1963, 1964) and data obtained through the Subwatershed Studies

Rare to Uncommon Natural Communities

National/Provincial level: Significance as interpreted from the Carolinian Zone community Subnational (Ontario) S-Ranks (Bakowsky 1996) or subsequent updates and/or amendments. Applied through existing data and data obtained from the Subwatershed Studies.

• communities listed with a provincial rank of S1 to S3

Regional level: Presence of vegetation communities which have been identified as rare to uncommon based on an analysis of the London Subwatershed Studies Life Science Inventories (Bowles et al. 1994) or the best available data. This list will be open-ended to incorporate any new data collected from the London subwatershed region. It will include communities or “species assemblages” that have limited distribution and occurrence within the region (e.g. fens, older growth forests, boreal species assemblages), or that are at the limits of their distributional ranges (e.g. bogs), or that are remnants of original habitat (e.g. prairie and oak savannah).

Source References: Bogs, fens (Riley 1989) or prairie/savannahs (Riley and Bakowsky 1993) may be identified through the presence of assemblages of indicator species. Older growth forests are evaluated in the context of the London subwatershed region, the top five percent of the oldest stage forests (climax and sub-climax) that are relatively undisturbed. Boreal indicator species will be defined by a specific list based on information obtained through the London Subwatershed Life Science Inventories (Bowles et. al. 1994).

There may be special cases where rare to uncommon vegetation communities are described by the presence of Nationally, Provincially or Regionally rare plant species, if they are abundant or dominant in one or more strata. In these situations, the presence of the rare plant would not be used to meet criterion 7 for rarity.
Glossary:

Species assemblages are considered to be a group of plant species or populations of plant species with similar habitat requirements.

Boreal species assemblages are defined by the presence of specific indicator species that attain their highest presence values in the boreal forest formation. In the London Subwatershed region these assemblages may be present as outliers in topographically favourable habitats (Larsen 1980). Boreal outliers have significant historic and ecological importance. They reflect both past vulnerability of vegetation to climate change and future potential for the vegetation to adapt to climate change.

Older growth forests are relatively old and relatively undisturbed by humans. The definition of older growth considers factors other than age, such as forest type, forest structure, forest development and the historical and current patterns of human disturbance.

Community is an assemblage of species or populations that live in a defined environment at a defined spatial-temporal scale, and interact with one another forming together a distinctive living system with its own composition, structure, environmental relations, development and function (Whittaker 1975).
**CRITERION 2:**

The Area contains high quality natural landform-vegetation communities that are representative of typical pre-settlement conditions of the dominant physiographic units within the London subwatershed region, and/or that have been classified as distinctive in the Province of Ontario.

**Background:**

The focus of this criterion is to identify representative examples of the full range of landform-vegetation types that occur on each of the 5 dominant physiographic units within the London subwatershed region (Figure 3). By representing all landform-vegetation associations in a protected areas system a significant portion of the biodiversity of an area will be maintained (Crins 1996). By capturing representative native vegetation in the Natural Heritage System, examples of pre-European settlement landscapes are also protected.

This criterion differs from Criterion 1 with the emphasis on representation, size and quality. The landform-vegetation communities do not have to be rare as long as they are the best examples of their type.

The dominant physiographic units are represented by the five glacial geomorphological features based on the Ontario Geological Survey Map P.2715 (Chapman & Putnam 1984).

The presence of disturbance indicators does not necessarily disqualify a site from meeting this criterion if other factors relevant to this criterion are satisfied or if it is the only representative example. Similarly, lack of disturbance does not necessarily qualify a site. Disturbance indicators are used as a relative measure to rank sites.

**Application:**

Sites representing the same landform-vegetation types will be ranked in a relative manner to select the best examples. Priority should be given to designating the best examples, with respect to size and quality. In addition, similar landform-vegetation community types will be compared only within the same physiographic unit (e.g. till moraine; till plain; sand plain; spillway; beach ridge).

Distinctive and natural landform-vegetation communities are defined at Provincial or Regional levels:

**Provincial level:** Presence of Provincial ANSIs for Site District 7-6 (Hanna, 1984). Presence of Provincially Significant Wetlands (Class 1-3, or OMNR, 1993).

**Regional level:** Presence of regionally significant wetlands (Class 4-7) that are deemed to be significant by the City of London as identified by meeting a minimum number of key biological and special feature functions as recognized in the OMNR wetland evaluation system manuals (2nd or 3rd edition).

Presence of regionally significant ANSIs in Site District 7-6 (Hanna 1984).

Presence of Ecosite vegetation community types of high quality on distinctive topographic, landform or cultural features, applied through
existing data and data obtained from the Subwatershed Studies. For example, but not limited to:

- Moist-Fresh Black Maple Deciduous Forest Type on bottomland
- Fresh Hemlock Coniferous Forest Type on valley slope
- Fresh Sugar Maple-Beech Deciduous Forest Type on tableland
- Fresh Sugar Maple-Beech Deciduous Forest Type on valley slope

Comments: The Ecological Land Classification describes Ecosites by choosing one variable in each of eight fields that cover physical and environmental characters and vegetation characters. Not all variables are necessary for describing all Ecosites. The landform component or feature is an important variable to include in the Ecosite description for the assessment of landform-vegetation representation. Representation of high quality examples of the same ecosite vegetation type may be distinguished by the landform feature. Reference should be made to the landform type (e.g. floodplain/bottomland; terrace/valley slope/ravine; tableland/rolling upland).

High quality is evaluated by the maturity of communities, or the health of communities, or the degree of disturbance, or the presence of species that are vulnerable to disturbance.

1) High quality representative communities include, but are not limited to communities that exhibit:

- vegetation communities in a "climax" or “sub-climax” or "mid-age" stage of successional development;
- relatively healthy communities with respect to disease, fire, wind, or other natural processes;
- communities that are relatively unaffected by beaver activity;
- an absence of anthropogenic disturbance indicators. Indicators noted during the Subwatershed Studies include, but are not limited to:
  - recent or extensive timber harvesting which has substantially altered the structure or species composition or successional processes of a community.
  - ongoing grazing by livestock;
  - canopy blowdown or death resulting from the exposure of trees through drainage alteration, timber harvesting, or the creation of forest edge;
  - miscellaneous human use including extensive trail systems, cultivation for ornamental plants or crops, plantations, pruning or plant removal, mowing, building of structures, etc.;
  - cultural communities maintained in a "pioneer" or "early successional" condition as a result of human activity.

2) High quality at the species level can also be interpreted by:

- populations of native plant species with high (8-10) coefficient of conservatism (Oldham et al. 1995), or
- a low relative incidence of non-native plant species, or
- low numbers of invasive weedy species with weediness score of -3, (Oldham et al. 1995), or
- the presence of bird species considered to be good local indicators of undisturbed conditions (Hounsell 1989).
The presence of non-native species does not necessarily disqualify a site from meeting this criterion. This factor may be used as supporting evidence to differentiate between two or more areas that share representation of the same landform-vegetation community provided that the data collection efforts were consistent among sites being compared.

The low relative incidence of non-native plant species factor should be applied with caution and only used if the data collection protocol included all non-native elements.

Glossary:

**Natural landform-vegetation communities** are areas of naturalized vegetation associated with landform types (e.g. ravine, floodplain, tableland). The communities should represent typical pre-settlement vegetation conditions. For example; Yellow Birch deciduous swamp type on floodplain; or fresh Hemlock coniferous forest type on steep slope/ravine.

**Naturalized vegetation** is defined as species that have established a reproducing population in an area. It excludes those non-native species that are considered aggressive weeds or those species with the potential to become serious weeds (e.g. species with a weediness value of -3 such as purple loosestrife, garlic mustard, glossy and common buckthorns, scots pine, norway maple, ) (Oldham et al. 1995) or persistent exotic species, found in old fields, that are known to retard or modify succession, such as honeysuckle, Kentucky bluegrass, hawkweed, reed canary grass, quack grass and smooth brome grass (Hiebert 1990 as cited in Geomatics 1995).

**Distinctive areas** are those that have been classified or identified by the Province of Ontario under other programs (e.g. Provincially Significant Wetlands; Provincially Significant ANSI's). Provincially Significant Wetlands (PSW's) are identified for their relative importance based on a numerical ranking of wetland values or functions. The highest scoring wetlands thus represent the most important areas for protection. Areas of Natural and Scientific Interest (ANSI's) are identified primarily for their contribution to representation of the range of landform-vegetation features that occur within a site district.

**Pioneer communities** have invaded disturbed or newly created sites, and represent the early stages of either primary or secondary succession (Strong et al. 1990).

**Early successional communities** have not undergone a series of natural thinnings. Dominant plants are essentially growing as independent individuals, rather than as members of a phytosociological community. It is floristically similar to mid-successional stands, but is juvenile in structural development (Strong et al. 1990).

**Mid-successional communities** have undergone natural thinnings as a result of species interaction, and may show evidence of invasion by climax species, but they are still dominated by seral species. They may include stands with an over mature understorey (Strong et al. 1990).
Sub-climax communities are successional maturing communities dominated primarily by climax species, but significant remnants of earlier seral stages may be present (Strong et al. 1990).

Climax communities are self-perpetuating and composed of climax species. A successional stage with unevenly aged and multiple height classes (Strong et al. 1990).

Cultural communities are those that have originated or are maintained by anthropogenic or culturally based disturbances, (e.g. abandoned agricultural fields and pastures, mowing, woodlot management or tree-cutting) often containing a large proportion of introduced species (Lee et al. 1997).
**CRITERION 3:** The Area, due to its large size, provides habitat for species intolerant of disturbance or for species that require extensive blocks of suitable habitat.

**Background:** The focus of this criterion is to identify large contiguous blocks of natural habitat and/or combined “patches” or “patch clusters” that cover an extensive area.

The presence of large contiguous blocks of forested habitat are used as an indicator of forest-interior conditions which are required by certain forest-interior and area-sensitive species. The size, shape and continuity of these forested areas are important factors for the identification of forest interior conditions.

Large patches, or patch clusters are important for maintaining frequency of habitat across a landscape and genetic diversity of populations among interacting patches.

**Application:** This criterion can be met in any one of three ways:

1) the Area is greater than 150 ha. The minimum size limit is applied after the patches have been clustered or combined into one Area. The size of the Area is reviewed and compared relative to all other Areas so that only the largest Areas will qualify; or

2) the size of a forested patch is greater than 40 ha or the combined size of forested patches is greater than 40 ha and the patches are not interrupted by gaps wider than 40 m; or

3) the Area a) contains some interior forest habitat which is at least 200 m from all forest edges and is not interrupted by gaps wider than 40 m, OR b) there is confirmed presence of one or more “breeding birds” which are either forest-interior species or area-sensitive species.

**Source References:** Freemark and Collins (1992) and Sandilands (1997) for forest interior species; Magee (1996) updated from (Hounsell, 1989) for area-sensitive species.

**Comments:** For sites which straddle the city boundary, the size determination should be based on the whole site since this represents the ecological unit to which the criterion is applied.

The minimum size limit will result in the inclusion of only the largest Areas in the London subwatershed region, as determined through available data and data from the Subwatershed Studies. [Note: of 25 ESA's or Potential ESA's, 4 fell within the range of 150-500 ha and 2 were greater than 500 ha].
Glossary:

**Areas** are patches or the combined area of contiguous patches (patch cluster).

**Patches** are areas of woody vegetation generally larger than 4 ha. A patch may be bisected by a utility corridor or road if the right-of-way (ROW) is less than 40 m (City of London 1995).

**Patch clusters** are several patches that may be connected as one Area if certain criteria for connectivity and distance are met (EPPAC 1996).

**Breeding birds** are species present during the breeding season (June for most species, March to May for waterfowl, raptors and woodpeckers), and some indication of breeding status (pair present; territorial, display or anxiety behavior; nest, eggs, or young, etc.).

**Forest-interior species** are those that nest only within the interior of forests and rarely occur near the edge (Freemark and Collins 1992).

**Area-sensitive species** are those that require a forest to be a given size before they will inhabit it (Sandilands 1997).
CRITERION 4:  The Area, due to its hydrologic characteristics, contributes significantly to the healthy maintenance (quality or quantity) of a natural system beyond its boundaries.

Background: The focus of this criterion is to identify natural areas that contribute significantly to the quantity and quality of groundwater and surface water resources in the region. Factors such as the magnitude of the area covered or volumes of water involved and the importance of the resource should be used to assess the significance.

Landscape position and terrain setting should also be used to evaluate the significance of recharge areas.

Application: Presence of indicators of hydrological processes noted during Subwatershed Studies include but are not limited to:
- water storage;
- water release (discharge);
- wetlands;
- water quality improvement;
- first order stream/ headwater;
- groundwater recharge areas identified on subwatershed maps as high potential;
- water conveyance (i.e. floodplain and overland flow paths).

Comments: For wetlands, those that meet three or more of five key hydrologic functions as identified in the hydrology section of the OMNR Wetland Evaluation System (2nd or 3rd edition manuals) would be considered significant by the City of London. [Rationale for the conditions was determined based upon a review of ten evaluated wetlands within the City of London].

For significant groundwater recharge, where large areas have been identified as high potential, it is not expected that the entire area identified would qualify for this criterion. To be considered for inclusion as part of an ESA, the recharge area must also be part of a vegetation patch as identified in the Subwatershed Studies or support naturally succeeding vegetation communities.

For permanent non-channelized first-order streams, those with Type I -II habitat (DFO 1994) would qualify for inclusion as part of the ESA.

Source References: Sources of information include but are not limited to wetland and hydrologic information presented by the UTRCA and by the Subwatershed Studies Aquatic Resources Management Reports for Vision '96 Subwatersheds (Beak Consultants 1995).
CRITERION 5: The Area has a high biodiversity of biological communities and/or associated plant and animal species within the context of the London subwatershed region.

Background: The focus of this criterion is to identify areas that demonstrate high variability and variety of plants, animals and communities or habitats. The primary attributes of “biodiversity” include “compositional”, “structural” and “functional” diversity.

Application: For vegetation communities and species in the London subwatershed region, biodiversity can be measured in relative terms (e.g., based on analysis of the patches surveyed, the top percentage of patches that support the highest number of community types, or native species of plants, birds, mammals, herpetofauna, etc.).

Source Reference: Subwatershed Studies Life Science Inventories (Bowles et al. 1994)

For "native species", “Species-Area Curves” may also be used to measure diversity. Areas where the actual number of species exceeds the expected number are considered diverse. Only native species will be used in the calculation.

Habitat diversity may also be used as supporting evidence of diversity (e.g., for herpetofauna the presence of vernal pools, woodland-pond interface, downed woody debris).

Comments: Evaluation of biodiversity should consider the variability of data obtained through different levels of field efforts.

Vegetation community classification will be based on An Ecological Land Classification for Southern Ontario (Lee et al. 1996, 1997).

Glossary: Biodiversity is the variety and variability of plants, animals and other organisms and the ecosystems in which they live.

Compositional diversity is the variety of elements in a collection, such as the species in a species list (species diversity), or the physical and biological factors of a site relative to its size (biophysical/landscape diversity). Attributes of biophysical diversity include slope, aspect, moisture, substrate, microclimate which support a variety of aquatic, wetland and terrestrial habitats.

Complexity is the number of species in the ecosystem and their relative abundances. Ecological communities and ecosystems are good examples of complex systems. They comprise large numbers of interacting entities, on many scales of observation, and their dynamics are often non-linear (causes are not proportional to consequences) – this leads to unpredictability and even apparent randomness.

Structural diversity is the physical organization of systems, from the pattern of patches or other elements in a landscape, to habitat complexity.
Functional diversity is the contribution made by each element to processes at work within the unit, such as energy transfer (food webs), nutrient cycling, predation, competition. For example, two communities with the same number of species may differ with respect to the number of levels of energy transfer. Functional diversity is not easily measured, since ecologists do not yet understand all of the organism-process relationships in ecosystems.

Species-area curve is a graphical relationship between habitat area and species richness (numbers). Both axes are commonly made logarithmic to arrive at a straight-line relationship between number of species and area.

Native species are those determined by the Natural Heritage Information Centre.
CRITERION 6: The Area serves an important wildlife habitat or linkage function.

Background: The focus of this criterion is to identify important “wildlife” habitats or "linkages" between significant natural features. This contributes to overall landscape richness and provides habitat for wildlife (City of London, 1995).

Application: Important wildlife habitat functions may include, but are not limited to:
- waterfowl staging or stopover areas;
- deer yarding areas;
- colonial bird nesting or roosting areas;
- herpetofaunal breeding ponds and/or hibernacula areas;
- fish spawning or nursery areas (Type I habitat);
- areas that provide a temporary refuge for migratory wildlife;
- areas that provide critical life cycle habitat;
- areas that have an important linkage with other natural communities;
- specialized habitat areas such as springs or seepage areas, sites with a high density of cavity trees/snags, perched wetlands.
Source References: OMNR files and maps; Subwatershed Studies; other data obtained through site specific field investigations; MNR (1997).

The site fulfills an external linkage or corridor function between two or more significant habitats. The value of a linkage or corridor will be based upon characteristics such as width, quality and length. Linkages may include, but are not limited to:
- early successional woodlands and plantations;
- water bodies, water courses and valley lands;
- riparian zones;
- steep slopes and ground water discharge areas;
- old fields;
- hydro and pipeline corridors;
- abandoned road and rail allowances;
- recreational greenway parks.
Source Reference: Riley and Mohr (1994)

Comments: Linkages should connect significant habitat areas for native species that will benefit from the presence of this linkage. Linear habitats (such as fencerows) that may have intrinsic habitat value, but do not connect larger protected areas, and those that are human imposed with no regard for the natural landscape system (such as channelized watercourses) should not be considered linkages (Harris and Scheck 1991). Linkages and corridors, while also providing habitat or wildlife value, are important because they connect more substantive patches of habitat.

Glossary: Wildlife is all wild organisms and their habitats - including wild plants, invertebrates, and microorganisms, as well as fishes (see Federal definition in OPA 88), amphibians, reptiles and the birds and mammals traditionally regarded as wildlife (WMCC 1996).
Linkages are naturally existing or restored native linear landscape connections between two or more significant areas. These connections are often referred to as wildlife corridors or dispersal corridors. They are defined by characteristics such as width (appropriate to the scale of the phenomenon being addressed), distance (a long corridor will need to be wider than a short one), quality (e.g. vegetative structure and distribution), species diversity, low non-native plant indices, etc.), type of corridor use (1. species in which individuals pass directly between two areas in discrete events of brief duration; or 2. species that need several days to several generations to pass through), importance within the landscape, as well as the functions being expected of the linkage. Corridor functions may include, but are not limited to avenues along which:

- wide-ranging animals can travel, migrate and meet mates;
- plants can propagate;
- genetic interchange can occur among native flora and fauna;
- populations can move in response to environmental changes and natural disasters;
- individuals can recolonize habitats from which populations have been locally extirpated (Beier and Loe 1992).

Type I habitat is defined by the Policy for the Management of Fish Habitat (DFO 1986), and by the Habitat Conservation and Protection Guidelines, first edition (DFO 1994).
CRITERION 7: The Area provides significant habitat for rare, threatened, or endangered indigenous species of plants or animals that are rare within the country, province or county.

Background: The focus of this criterion is to identify populations of rare, vulnerable, threatened or endangered species for protection.

Application of this criterion is based on several factors, such as the number of rare species found, consideration of ecological distribution of the species (e.g. the only record of a species in Middlesex County) and other characteristics of the species (sensitivity, habitat needs, etc.). Definitions of significant habitat are given under each of the categories of vascular plants and animals. The most current sources of rarity designations will be used. Lists of rare species are considered open-ended as new information will result in amendments over time. Data from the Subwatershed Studies Life Science Inventories were used to update Middlesex County status for plants.

Application: Plant Species
Habitat for plant species should be indicated by the presence of a population. The presence of a single specimen of a rare plant will not qualify an area under this criterion.

National Level: COSEWIC Status reports
NHIC Global Ranks (GRANK) for Rare Vascular Plants (Oldham 1994a) and Mosses (Oldham 1994b).
• species listed with a global rank of G1 to G3
Rare Vascular Plants in Canada (Argus and Pryer 1990)

Provincial Level: NHIC Provincial Rank (SRANK) for Rare Vascular Plants (Oldham 1994a) and for Mosses (Oldham 1994b).
• species listed with a provincial rank of S1 to S3
MNR Species at Risk in Ontario (Bowman 1996)
Atlas of the Rare Vascular Plants of Ontario (Argus et al. 1982-1987)
COSSARO Status reports

County Level: Status of the Vascular Plants of Southwestern Ontario (Oldham 1993a)
• rare in SW Ontario
SWFLORA database for Subwatershed Life Science Inventories (Bowles et al. 1994)
• rare in Middlesex County
species recorded that have 1-4 records (stations) in Middlesex County.
NOTE plant records collected from the Subwatershed Studies were used to update the rare status at the county level.
Animal Species

Habitat for animal species should be interpreted to mean areas where one or more rare species are resident or breeding in the area, and/or making use of the area for a key component of their life cycle (e.g. territory, nesting, critical feeding grounds or wintering concentrations). Documentation of repeated (multi-year) use of an area by a species adds to the significance of the habitat. For breeding birds, the presence of suitable habitat for territory, nesting and feeding; for butterflies, the presence of suitable habitat including the host plants upon which they feed; for mammals, the presence of signs of active use of an area (e.g. dens, bedding areas, well-used trails, scat, etc.); for herpetofauna, the presence of suitable habitat for breeding (e.g. vernal pools, downed woody debris) and hibernating (presence of hibernacula).

National Level: COSEWIC Status reports

NHIC Global Ranks (GRANK) for Amphibians and Reptiles (Oldham 1996), Mammals (Sutherland 1994a), Birds (Sutherland 1994b), Butterflies (Sutherland 1994c) and Fishes (Sutherland 1994d)
• species listed with a global rank of G1 to G3

Provincial level: NHIC Provincial Rank (SRANK) for Amphibians and Reptiles (Oldham 1996), Mammals (Sutherland 1994a), Birds, Butterflies and Fishes (Sutherland 1994b, 1994c and 1994d respectively)
• species listed with a provincial rank of S1 to S3

MNR Species at Risk in Ontario (Bowman 1996)
COSSARO Status reports

County level: SW Ontario regional status based on records in provincial atlases:
• mammals (Dobbyn 1994)
• breeding birds (Cadman et al. 1987)
• butterflies (Holmes et al. 1991)
• herpetofauna (Weller 1994)

Middlesex County status of rarity is based upon the most recent existing county records:
• mammals - provincial mammal atlas and records from MNR District office
• breeding birds - open ended lists from the provincial bird atlas (Cadman et al. 1987) and best available county information;
• butterflies - best available county information;
• herpetofauna - Status of amphibians and reptiles in Middlesex County (Oldham 1993b); Amphibians of Middlesex County (Oldham 1989a); Reptiles of Middlesex County (Oldham 1989b)

Comments: Other non-vascular plant (e.g. Mosses) and faunal groups (e.g. Odonata) should be included where and when the information is available.
Glossary: Significant as defined by the Provincial Policy Statement means:
- in regard to other features and areas in policy 2.3 (i.e. significant portions of the habitat of endangered and threatened species, and significant wildlife habitat) ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. Criteria for determining significance may be recommended by the province, if requested by the City, but municipal approaches that achieve the same objective may also be used.
2.4 Source References for Application Guidelines


Committee on the Status of Endangered Wildlife in Canada (COSEWIC) 1996 Canadian species at risk. COSEWIC, Ottawa.

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3.0 Guidelines for Assessing Ecological Boundaries of Vegetation Patches

1. Purpose
   1) To document and describe a repeatable process leading to a credible map which can be used for planning and monitoring;
   2) To outline a consistent basis by which ecological boundaries for natural features can be determined;
   3) To provide the basis for resolving variations between different scales and types of mapping; and
   4) To develop a common understanding and approach between planners, consultants and the public regarding the ecological aspects boundary delineation for natural features and hazards.

2. Background
These guidelines and the accompanying figures are intended to outline a consistent basis for setting ecological boundaries for natural features during Phase I of the EIS. The guidelines are based strictly on ecological considerations. Broader planning considerations should be dealt with during Phase II of the EIS.

3. Boundary delineation of vegetation patches
A vegetation patch is defined as an area that contains natural vegetation and associated features and functions, that is generally free of permanent disturbance and that can be distinguished from the surrounding land use. A patch is an integrated ecological unit. All parts of it act as part of the unit, the whole of which supports and contributes to ecological performance. A patch may contain areas that have relative degrees of sensitivity and different ecological functions. These functions may change over time. Boundary delineation should not be used to separate a patch into specific parts that can be treated individually as having lesser or greater significance or contribution to ecological function. Most vegetation patches will be treed, either swamps or forests, but some may include untreed wetlands, prairies and other natural habitats.

4. Interpretation
The following interpretations apply to these guidelines.

4.1 The initial boundary will be drawn at the interface between naturalized vegetation and the adjacent lands, generally conforming to the patch outline. The natural heritage feature so mapped will be outside the development area.

4.2. Patch outlines will be refined through the application of these boundary guidelines. The guidelines are based upon ecological principles. In applying the boundary guidelines a number of natural heritage features, if they are present, must be included in the boundary. Other features that mainly provide buffer or linkage functions should be included within the boundary if certain conditions are met. These areas are regarded as Review Areas. Assessment of the Review Areas will be made during Phase II of the EIS and will be based upon an integration and review of all planning considerations for the area and detailed field studies completed for the EIS.

4.3. Application of these boundary delineation guidelines is best made at a map scale of about 1:10,000. Further boundary refinement during Phase II of the EIS will be made at a finer scale (1:5,000, or 1:2,000).
4.4 The diagrams and examples that form part of the conditions for boundary delineation are intended to convey the intent of the guidelines. While not drawn to scale, these diagrams do depict the relative sizes and distances of the areas shown. The legend precedes the diagrams.

4.5 In the application of these guidelines, the most recent map sources, aerial photographs and references should be used to verify and update background information.

4.6 A patch may be bisected by a utility corridor or road if the right-of-way is less than 40 m.
GUIDELINE 1: Habitat zones must be included within the patch boundary

Figure 1. Habitat Zones

Conditions:
Habitat zone are requirements for species at risk, nationally, provincially or regionally rare species, forest-interior or area-sensitive species.

Rationale:
A habitat zone is a significant habitat feature used regularly for a key lifecycle requirement for a species that requires special protection. The vegetation in the habitat zone need not be naturalized. The critical habitat of a plant species may extend to areas in the immediate vicinity of population that have similar soil, moisture, exposure and community conditions. The critical habitat of a butterfly may extend to the habitat of plant species on which the butterfly depends. The forest-interior habitats of many birds, and the nesting and rearing sites of raptors may constitute critical habitat zones. Breeding ponds and hibernation sites may constitute significant habitat zones (MMA 1995).

GUIDELINE 2: Rare to uncommon natural communities must be included within the boundary

Figure 2. Rare or uncommon natural communities

Conditions:
Vegetation communities may be identified as rare to uncommon because of their limited distribution and occurrence within the country, province or region (e.g. fens, older growth/mature forests), or because they are at the limits of their distribution (e.g. bogs), or are remnants of original habitat (e.g. prairie and oak savannah).

Rationale:
Protection of significant vegetation communities are necessary to ensure its continued presence over time, including natural successional processes that may occur.
GUIDELINE 3: Projections of naturalized vegetation less than thirty metres (30 m) wide that extend from the main body of the patch:
   a) must be included within the boundary if the projection includes a wooded ravine or valley with untreed or successional habitat below the top-of-slope
   b) should be included within the boundary if the projection provides linkage with another patch less than 100 m away, or between two portions of the same patch

Figure 3b: Linkage

Conditions:
A vegetated projection meeting condition a) is included within the boundaries. A vegetated projection meeting condition b) is mapped as Review Area.

Rationale:
Ravine, valley and upland corridors are important components of the natural heritage system because they contain natural habitat, provide linkage, increase species richness and diversity and facilitate movement and dispersion. In general, connected patches are usually better than unconnected patches (MNR 1997).
GUIDELINE 4: Watercourses:
   a) must be included within the boundary if the watercourse forms the boundary of the patch (Figure 4a); and
   b) must be included within the boundary if the watercourse connects two or more patches within 85 meters (Figure 4b).

Figure 4. Watercourses

Conditions:
The connection must include a minimum corridor width of:
   30 m on each side of the high water mark of small watercourses;
   100 m on the side(s) of large rivers (Thames River, Medway Creek, Stoney Creek, Dingman Creek) where the patch occurs;
   50 m on each side of coldwater streams.

Rationale:
Watercourses are important ecological habitats providing wildlife resources and functions as well as contributing substantially to connectivity within and between significant natural areas. Riparian buffers adjacent to watercourses are important for protecting the water quality and ecological health of aquatic habitats.

First order, headwater streams are recognized as indicators of hydrological processes. Stream corridors are one of the components of the natural heritage system.
GUIDELINE 5: Satellite woodlands that are small less than 2 ha and have a round to square shape, and are located within 100 m of a larger woodland patch (Figure 5):

a) **must** be included within the boundary if the satellite contains rare species or significant communities

b) **should** be included within the boundary if they contribute to biological diversity and ecological function of the larger patch.

**Conditions:**
Contribution to ecological function may include, but is not limited to:

- the satellite supports natural conifer cover of species native to region; or
- the satellite is located adjacent to or contains a wetland that is considered locally significant based on hydrology, biology or special features; or
- the satellite is located between two larger patches that are within 250 metres of each other, where the land between the patches is absent of permanent barrier; or
- the satellite meets the habitat needs of one or more species that are not met by the larger patch; or
- the satellite contains a natural vegetation community type that is not already represented in the larger patch.

**Rationale:**
Woodlands are one of the components of the natural heritage system. While woodlands less than 4 ha are often regarded as having a low relative degree of importance, there are certain indicators that, if present, increase the relative importance of the woodland (Riley & Mohr 1994; Hilditch 1993; MNR 1997).

The presence of indigenous natural conifer cover of native species is considered important for wildlife shelter. The importance of a woodland increases if it is located adjacent to a wetland or it contains a wetland because the wetland helps to increase vegetation diversity, adds wildlife habitat values and contributes to hydrological functions (Riley & Mohr 1994; Hilditch 1993).

Small woodlands that are close enough in proximity to one another or interspersed amongst larger habitat patches, may have value for area-sensitive birds and species with low mobility (Riley and Mohr 1994). Small woodlands can also provide a foundation for creating new habitat, particularly by connecting woodlands through replanting or natural regeneration and providing linkages or corridors for movement between habitats (Austen and Francis, MNR 1997).

Clusters of patches that collectively meet several of the habitat needs of one or more species are generally more valuable than clusters of patches that meet fewer habitat needs (MNR 1997). Natural areas that consist of several patches containing a diversity of vegetation community types can sometimes provide better representation of the range of habitats than a single larger habitat patch (MNR 1997).

GUIDELINE 6: Marshes, Thicket Swamps or other Untreed Wetland communities contiguous with a patch and greater than 0.2 ha in size that are relatively undisturbed and
dominated by native species that are obligate or facultative wetland species (coefficient of wetness values of -3 to -5) (Oldham et al. 1995) must be included within boundary if:

a) the wetland strengthens a linkage between natural areas by filling in a bay or connecting two or more patches (Figure 6a); or
b) the wetland is located above the top-of-slope of a stream corridor or ravine (Figure 6b); or

c) the wetland connects a patch to a permanent natural watercourse (Figure 6c).

Conditions:
A marsh or thicket swamp or other untreed wetland meeting any one of the above conditions is included in the ESA Boundary. Locally or regionally significant wetlands are part of the natural heritage system and must be mapped as vegetation patches.

Rationale:
Wetlands are one of the components of the Natural Heritage System because they provide important habitat for plants, fish and wildlife. They also influence the quality and temperature of water flowing through them and some wetlands provide storage capacity to offset peak flows associated with storm events.
GUIDELINE 7: Cultural savannahs and woodland and old fields must be included within the ESA boundary if they:

a) minimize negative edge effects by forming a well-established mantel at the edge of the treed patches and as such protect adjacent communities from the effects of surrounding land use (Figure 7a); or

b) strengthen internal linkages in the patch by filling in "bays" (Figure 7b); or

c) connect a patch to a permanent natural watercourse (Figure 7c); or

d) connect two or more patches (Figure 7d); or

e) are below the top-of-stable-slope in a stream corridor or ravine (Figure 7e).

Condition:
A cultural habitat meeting any one of the above conditions is included in the ESA boundary. However, it is not intended that the cultural habitat will occupy a large proportion of the total area of the patch being delineated (Figure 7a).

Rationale:
Cultural habitats may act as significant supporting habitat to the patch, where the loss of such communities would result in loss of ecological integrity of the whole patch. The inclusion of cultural habitats may increase the biological diversity of the area if the other similar cultural habitat is not already present.

Cultural habitats may provide: increased community and species diversity; important breeding and foraging wildlife habitat; landscape connections between naturalized areas; habitat for rare flora and fauna, and/or serve as buffers that protect more sensitive areas from adjacent land use. Cultural habitat adjacent to woodlands also has potential for rehabilitation and may contribute to a net gain in ecosystem health. Although cultural habitats are not pristine or unaffected by human activity, they have the potential to contribute natural values. This is especially so in landscapes that are still predominantly agricultural, such as southern Ontario (Geomatics 1995).

Criteria and guidelines for evaluating the ecological significance of cultural habitat areas are provided in the Geomatics (1995) report "Management options for old-field sites in southern Ontario". These criteria address a range of issues including rare and endangered species, wildlife habitat, site productivity, successional stage, soil characteristics, site history and the relationship of a particular site to the surrounding landscape.

GUIDELINE 8: Plantations contiguous with patches of natural vegetation must be included in the boundary if the plantation:
a) was originally established for the purposes of forest rehabilitation and/or has been managed towards a natural forest and/or has developed characteristics of a natural forest, such as natural regeneration of native species.

A plantation should be included in the boundary if it:

b) minimizes edge effects to natural heritage features by providing a buffer between the feature and the surrounding land use (Figure 8b); or
c) strengthens internal linkages or reduces edge to area ratios by filling in bays (Figure 8c); or
d) connects a patch to a permanent watercourse (Figure 8d); or
e) it connects two or more patches (Figure 8e); or
f) it is below the top-of-slope in a stream corridor or ravine (Figure 8f).

Condition:
A plantation meeting condition a) is mapped as part of the patch. A plantation meeting conditions b) to f) is mapped as Review Area. It is not intended that the plantation will occupy a large proportion of the total area of a patch.

Rationale:
Plantations may provide significant supporting habitat to the naturalized vegetation of a patch. Plantations form connections between naturalized areas, provide wildlife habitat, provide buffers for sensitive areas and edges, protect and enhance stream environments, stabilize soils and have the potential for regeneration to natural habitats.

GUIDELINE 9: Existing land uses within or adjacent to a patch are subject to the following boundary considerations:
a) Existing land uses within a patch, such as bridle trails, recreational trails, livestock grazing areas and woodlot management areas are included in the patch.

b) Existing heavily managed or manicured features that are surrounded on at least three sides by a patch or that form “islands” in patch are included in the patch if they are less than one hectare (1 ha) in total area (Figure 9). Such features include, but are not limited to agricultural croplands, ntried active pasture, golf courses, lawns, ornamental treeed lots, gardens, nurseries, orchards and Christmas tree plantations. Subsequent permanent abandonment or rehabilitation of “islands” larger than one hectare may qualify such areas for inclusion in the patch.

a) Existing heavily managed or manicured features adjacent to a patch are not included in a patch.

Figure 9

GUIDELINE 10): Residential sites and institutional areas within or adjacent to a patch are subject to the following boundary considerations:

a) Existing residential building envelopes and institutional building envelopes surrounded on at least three sides by a patch or forming "islands" within a patch are not affected by the protective designation. Building envelopes and access routes of existing structures within the patch must be determined on a site specific basis.

b) Existing residential building sites adjacent to a natural heritage feature are excluded from the patch.
3.0 Glossary

Bog is defined as an open or treed wetland area on deep (>40cm) peat almost entirely composed of Sphagnum species. The tree cover is less than 25%, scattered or clumped, and usually under 10 m in height. The wetland is dominated by graminoids and/or low ericaceous shrubs (Riley 1994 from Lee et al 1998).

Cultural habitat is defined as a community originating or maintained by anthropogenic or culturally based disturbances, such as agricultural fields (croplands) and pastures (grazing), mowing, woodlot management or tree cutting, etc., often containing a large proportion of introduced species (Lee et al. 1998), but are undergoing natural succession. Generally tree cover is <60%. Cultural habitat includes, but is not limited to, old field meadow, old field thicket, cultural savannah and cultural woodland ecosites (Lee et al. 1998).

Cultural savannahs and woodlands are areas where trees have been planted, or have resulted from first generation regeneration of a site originating or maintained by anthropogenic disturbances (Lee et al 1997). It does not include treed areas where the main stratum is dominated by native species and tree cover is >60%. Cultural savannahs are treed areas with 11-35% scattered or clumped tree cover and dominated by graminoids and forbs. Cultural woodlands have 36-60% scattered or clumped tree cover and dominated by graminoids and forbs.

Fen is defined as an open or treed wetland area on deep (>40cm) sedge and woody peat with a substantial component of brown moss. The tree cover is less than 25%, scattered or clumped. The wetland is dominated by graminoids and low non-ericaceous shrubs (Lee et al. 1998 from Riley 1994). Fens may also include seepage marl areas with <40 cm peat, and/or the presence of fen indicator species.

Habitat zone requirements are defined as the significant portions of the species' habitat that are critical to their life history or lifecycle requirement (e.g. territory, nesting, critical feeding grounds or wintering concentrations), as defined by documented use. The significant portions of habitat will have variable dimensions, based on the requirements of individual species (MMA 1995).

Marsh is defined as an open wetland area occurring on organic or mineral substrates with a water table that fluctuates seasonally or periodically at, near, or above the substrate surface; dominated by hydrophytic sedges, grasses, cattails, reeds, forbs or low shrubs with tree and tall shrub cover <25%; may include meadow marsh, shallow marsh, deep marsh or shrub marsh (Lee et al. 1998).

Mature Forests are dominated primarily by species which are replacing themselves and are likely to remain an important component of the community if it is not disturbed again. Significant remains of early seral stages may still be present (Lee et al 1998).

Natural watercourse is defined as one in which the dynamic morphological features, such as width, depth, velocity, discharge, slope, channel materials, sediment load and sediment size, operate within a given equilibrium (Aquafor Beech Limited 1994, p. 1.14). Excludes those sections of watercourses that have been cleared of 75% or more of their riparian cover and straightened or channelized for agricultural or other purposes (Aquafor Beech Limited 1994 p. 3.25).
Older Growth Forests are relatively old and relatively undisturbed by humans. The definition of older growth considers factors other than age, including forest type, forest structure, forest development and the historical and current patterns of human disturbance. Older growth forests are self-perpetuating communities composed primarily of late seral species which show uneven stand age distribution including large old trees without open-grown characteristics (Lee et al. 1998).

Old fields are defined as open sites where agricultural practices have been abandoned (Geomatics 1995). These abandoned agricultural fields and pastures are generally dominated by forbs and grasses in their early stages of succession. It does not include native grasslands such as prairies (Geomatics 1995). Old fields have <10% tree cover. An old field meadow has <25% cover of shrub species while an old field thicket has >25% shrubs.

Permanent stream is defined as one which flows for nine or more consecutive months in a year (Marshall Macklin Monaghan Limited and Taranus Associates 1993, p. 34).

Plantation is defined as a woodland where the dominant trees have been planted by humans as opposed to naturally regenerated. It includes treed communities dominated by non-native species in the main stratum.

Prairie and Oak Savannah is defined as open or treed areas that are dominated by unique native species assemblages of open-grown oak trees (<60% tree cover) along with a complement assemblage of grasses, sedges and forbs characteristic of the midwestern prairie biome. May include tallgrass prairie, tallgrass savannah or tallgrass woodland upland communities (Lee et al. 1998).

Ravine, valley, river and stream corridor is defined as a landform depression, usually with water flowing through or standing in it for some period of the year. Ravine, valley and river corridors are generally distinguished from stream corridors by having a distinct valley landform. Ravine and valley corridors may be defined locally by considerations such as their natural features or functions, minimum setbacks from the crest of the slope, top of ravine or valley bank or top of projected stable slope (MMA 1995).

Satellite Woodlands are small treed or forested areas located within 100 m of a larger area of significant woodland. The satellite may be part of a Patch or Patch Cluster. "Woodlands means treed areas that provide environmental and economic benefits such as erosion prevention, water retention, provision of habitat, recreation and the sustainable harvest of woodland products. Woodlands include treed areas, woodlots or forested areas and vary in their level of significance" (MNR 1997).

Significant as defined by the Provincial Policy Statement means ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. Criteria for determining significance may be recommended by the province, but municipal approaches that achieve the same objective may also be used.

Thicket Swamp is defined as a wooded wetland area occurring on organic or mineral substrates with a water table that seasonally drops below the substrate surface; dominated by small trees and shrubs where the tree cover is <25% and the small tree or tall shrub cover (shrubs defined by Soper and Hiemburger 1982) is >25% (Lee et al 1998).

Top-of-Slope is defined by the intersection of the top of a bank or valley slope with the table land.
5.0 Source References for Boundary Delineation


Ministry of Natural Resources 1996. Standards for fish habitat classification and mapping in Ontario.


6.0 General References for Boundary Delineation


7.0 Other Planning Considerations for the Delineation of ESA Boundaries (Applied to ESA Review Areas Identified as Optional for Inclusion in the ESA)

Application of the Boundary Delineation Guidelines will result in the identification of areas that are critical for inclusion in the ESA, and areas that are optional for inclusion. Application of the Guidelines limit these optional areas to: cultural habitat or plantations, in the form of bays, or mantels of vegetation along the perimeter of the ESA, or connections between satellite wooded areas and the main body of the ESA; projections of untreed vegetation extending from the main body of the ESA; small satellite woodlands; marshes/carrs. These areas are considered optional for inclusion on the grounds that they are not always critical to the long-term health and integrity of the ESA and their exclusion would not reduce in any way the ability of the patch to meet the ESA criteria. The final delineation of the ESA boundary to include, exclude or transect such areas will have regard for an equitable evaluation of both ecological and other planning considerations. Guidelines on ecological considerations can be taken from the principles embodied in the ESA Criteria and Application Guidelines. In general, the intent will be to include the optional areas in the ESA where ecological benefits can be clearly demonstrated and, as determined through the review of other planning considerations, inclusion will not be onerous to the design and viability of community development. Other planning considerations will include the following:

1. The potential use of the optional area for required sewer or water services or stormwater management as identified through the Community Planning Background Studies.

2. The usability of the development envelope having regard for logical road patterns and lotting arrangements.

3. The potential for inclusion of the optional area as land to be retained in a natural state within a development block (multi-unit residential, institutional, school, private open space etc.). The area would be protected but still count towards density calculations or site area requirements.

4. The potential for inclusion of the area with a block of dedicated parkland, recognizing that parkland will be located and designed to meet overall community needs.

5. The impact on overall planning/management for the ESA as an integrated landscape unit; for example, maintenance, ownership and access.

6. The ability to use other protective measures that would permit a wider range of uses, such as other land use designations or other policies.

7. The potential to complete restoration and enhancement that would improve portions of the habitat for the net benefit of the ESA.

8. The need to have regard for other ongoing EA processes or study requirements.

9. The ability of the area to fulfill supportive social functions such as:
   - aesthetic, historical, or accessible passive activity opportunities;
   - scientific research or conservation education.
8.0 Community Planning Process

The community planning process is developed on the basis of the subwatershed plans at a more detailed planning level. An environmental component of the plan is required to provide for the implementation of the Natural Heritage System (environmental) policies of OPA 88.

Phase I of the Community Planning Process involves completion of more detailed background studies (to a mapped scale of 1:10,000) that assess and verify the natural heritage features and ecosystem functions. All Open Space (OS) and Environmental Review (ER) lands as mapped on Schedule A at 1:30,000 are included in the background study. Potential ESAs and vegetation patches as depicted on Schedule B at 1:30,000 will be evaluated using the boundary delineation guidelines and the ESA evaluation criteria. The boundary delineation guidelines will be applied to Areas that meet the criteria for significance. Ecological boundaries will be determined for these Areas at a scale of 1:10,000. The boundaries will show areas that must be included within the ESA, and areas that should be included in the ESA, based on ecological guidelines. The latter areas will be mapped as ESA Review Areas. Areas that do not meet any of the criteria for significance will be considered for other appropriate land uses. The ecological resources, hydrology, hydrogeology and geotechnical information collected in the inventory and analysis phase will be used to develop an Environmental Management Strategy (EMS). This strategy forms part of the supporting documentation for the development of the Community Plan.

Phase II of the Community Planning process involves the preparation of an interim community plan, outlining constraints, strategies and options. This plan will integrate the findings of all background studies. In the assessment of the ESA Review Areas, other planning considerations may be used to guide the boundary delineation (see section 3.6).

In the event that an area is removed from the ESA boundary based on other than ecological reasons, the exclusion of the area will not preclude its consideration for retention as an open-space feature or open-space related function through other means such as site planning, parks designation, or storm water management planning (see section 3.6).

Once the boundaries of the ESAs and other components of the Natural Heritage System have been determined, an Environmental Impact Study (EIS) will be undertaken to evaluate the impacts of the proposed land uses on the natural heritage areas recommended for protection in the EMS and will identify appropriate buffer measures to protect these areas. EISs are required to determine, whether, or the extent to which development will be permitted in areas within, or adjacent to, specific components of the Natural Heritage System. They may refine the boundaries of components of the Natural Heritage System, and may include conditions to ensure that development does not have a negative impact on the natural features and ecological functions for which the area is defined (Policy 15.5.1 and Table 15.1).

During the EIS process, the ESA boundaries will be refined to a scale of 1:5,000, using more detailed environmental data gathered from site specific investigations, geotechnical studies, etc. As part of the overall EMS for the lands within and adjacent to the ESA, a functional overlay approach may be used to define core and supporting areas, zones of sensitivity and appropriate uses within those zones in the ESA.
The final Phase III of the Community Planning process is the resolution of outstanding issues and completion of the final community plan and management plan. At the subdivision stage, after completion and approval of the Community Planning Study, the ESA boundaries will be identified as surveyed ESA boundaries. The land within these boundaries is zoned Open Space (OS). After all environmental issues are resolved through municipal, agency and public review process, the draft plans are finalized and the community plans recommended to Planning Committee.