CITY OF LONDON

GUIDELINE DOCUMENT FOR THE EVALUATION OF ECOLOGICALLY SIGNIFICANT WOODLANDS

March 2006
The conservation and protection of woodlands has been identified as a priority for some time and has more recently been an issue of increasing public attention and concern (Larson et al., 1999; OMNR 1993a; Hilts 1977; Upper Thames Valley Conservation Report 1992). Particular focus has been directed on the state of southern Ontario’s landscape, woodlands being one component of the natural heritage of southern Ontario that is recognized in Natural Heritage section 2:1 of the Provincial Policy Statement (2005). This guideline document presents a methodology for evaluating the ecological significance of vegetation patches identified with woodland components within the boundaries of the City of London. The adoption by Council of this document pursuant to section 19.2.2. of the Official Plan will provide a consistent approach to the evaluation for significance based on criteria contained in section 15.4.5 of the Official Plan. The criteria in 15.4.5 recognize that significant Woodlands may be selected for ecological or socioeconomic benefits. This guideline document focuses on an evaluation of ecological values that discriminate high quality woodlands. Ecological values include features and conditions that are associated with mature woodlands, processes and functions that generate and maintain biodiversity and ecological integrity. The socioeconomic values of woodlands will be evaluated in a separate process.

CRITERIA FOR IDENTIFICATION OF SIGNIFICANT WOODLANDS

The criteria for identifying Woodlands, is outlined in Section 15.4.5 of the Official Plan (City of London):

15.4.5 Woodlands: Woodlands are complex ecosystems of different tree species, shrubs, ground vegetation, and soil complexes that provide habitat for many plants and animals. Woodlands is a general term which collectively refers to areas occupied by trees, tree areas, woodylots and forested areas. Woodlands identified through the Subwatershed planning Studies and located outside of the recognized Environmentally Significant Areas are shown as “Vegetation Patches” on Schedule “B.”

The significance of Woodlands will be based on an evaluation of the following considerations:

(i) The Woodland contains natural features and ecological functions that are important to the environmental quality and integrity of the Natural Heritage System.

(ii) The Woodland provides important ecological functions and has an age, size, site quality, diversity of biological communities and associated species that is uncommon for the planning area.

(iii) The Woodland is important for the balanced distribution of open space amenities and passive recreational activities across the urban area.

(iv) The Woodland provides significant habitat for endangered or threatened species.

(v) The Woodland contains distinctive, unusual, or high quality natural communities or landforms.

APPLICATION

These guidelines will apply to all vegetation patches outside ESA’s and wetlands as identified on Schedule B and designated as Environmental Review on Schedule A. These patches, generally 4 ha in size or larger, were identified through the Subwatershed Planning Studies. The patch is the trigger for the application of these evaluation guidelines. The evaluation will identify those vegetation patches (lands) that meet and those that do not meet the criteria for significance as Woodland components of the Natural Heritage System. If the Woodland patch meets the criteria for significance, the lands determined to be significant shall be designated as Open Space on
Boundaries of the woodland patch may be revised using principles for boundary delineation of Environmentally Significant Areas (City of London 1997). Non-woodland areas may have importance to the maintenance of long-term integrity and biodiversity values of the woodland either as contributing to the ecological significance of the whole patch, or as buffers for protection of more sensitive areas within the patch. These aspects and the refinement of patch boundaries would be explored in more detail as part of an Environmental Impact Study for development applications within 50 m of the Woodland patch. Not all areas of the patch may be carried forward or identified as “significant”. The Subwatershed Studies Implementation Plan (MMR 1985) established the options for vegetation patches pending the results of more detailed studies: protection of the whole patch as significant and “no development and/or site alteration”;

a) protection of portions of the patch that will maintain functions;

b) replacement or compensation of all or portions of the patch;

c) identification of the patch as not significant and development permitted without replacement or compensation.

This evaluation system is the first step to identification of patches in the last category (not significant/development permitted) and those falling in the first two categories (significant/no development or site alteration unless it has been demonstrated through an Environmental Impact Statement that there will be no negative impacts on the natural features or their ecological functions. The scoring sheets will clearly indicate woodland’s ecological strengths and weaknesses relative to other woodlands. The degree of development permitted or not permitted will in part reflect the overall value of scores of each woodland; i.e. woodlands with more high scores are relatively more significant than those with one or no high and more medium scores. In the former instance, development may not be supported within any portions of the patch, while in the latter case some development may be permitted within a portion of the patch.

WOODLAND IDENTIFICATION AND EVALUATION

The City of London has completed a digital polygon layer of vegetation communities at the ELC Community Class and Community Series levels using airphoto interpretation and topographic layers in a GIS model. The basis for the classification was the original vegetation patch outlines from the subwatershed studies, inventory reports, aerial photographs and field inventory. Patches in the former City of London boundaries (prior to annexation) identified in the Remnant Woodlot Inventory For the City of London (1991) and/or that are currently designated Open Space as parks or within flood plain regulated lands were also identified and mapped (Bergsma & Bollson 2000). This mapping is linked to the terrestrial subwatershed database (Bowles et. al. 1994) and another database of audit and inventory information on patch characteristics. This mapping will greatly facilitate the identification and evaluation of significant woodlands within the City of London.

Most potential Woodlands are shown as “Vegetation Patches outside of ESA’s and Wetlands” on Schedule “B” of the Official Plan and as Environmental Review “ER” on Schedule “A”. Patches that contain treed areas meeting the Ecological Land Classification (ELC) definitions for a Woodland, as given below, will be evaluated through an appropriate ecological inventory in accordance with the Draft City of London Data Collection Standards For Natural Areas (July 1997) and using the methodology described below and in the Woodland Patch Assessment Score Sheets.

Application of the evaluation guidelines will apply to the entire patch, regardless of community type, with some standards applied only to natural woodland communities within the patch. Woodlands will be evaluated for their significance using a recognized evaluation model (Smith & Theberge 1987) that meets several requirements.
a) Measurements are made on an ordinal scale (high-medium-low);
b) Minimum standards can be set for each criterion;
c) It recognizes that criteria are not independent;
d) It enables the use of information at different spatial scales and recognizes the relationships between criteria;
e) It is a simple and repeatable method that will support and highlight the choices being made without clouding important issues or concealing value judgements.

This evaluation system ranks sites on the basis of whether they meet an acceptable minimum standard for any given criterion. It readily identifies the reason(s) why the site is "significant" without trying to weigh or compare criteria that are not comparable or are measured on different scales.

Each criterion will be rated using an ordinal ranked scale (high-medium-low). In general, the higher the rating for each standard, the more valuable or significant is the woodland.

The rationale behind the criteria are based on the key ecological concepts in natural heritage system planning as presented in the Natural Heritage Reference Manual for Policy 2.3 of the Provincial Policy Statement (OMNR 1999). There are 15 concepts presented as A-O and are based on the following factors:

- Representation
- Distribution
- Size
- Shape
- Fragmentation
- Connectedness
- Arrangement
- Proximity
- Habitat Diversity
- Complexity
- Community Diversity
- Species Diversity
- Species Rarity
- Naturalness and Disturbance
- Hydrologic and Related Values.
1. CRITERION 15.4.5 (i) The Woodland contains natural features and ecological functions that are important to the environmental quality and integrity of the Natural Heritage System.

1.1 Site Protection

a) Presence of hydrological features within or contiguous with the patch. Based on RULE "O": Patches that contain waterbodies are generally more important than those that do not. Based on other concepts developed for the London Subwatershed Studies to recognize: a) the linkage between protection of groundwater and vegetation on the surface; b) the interface between aquatic and terrestrial systems which is very rich and the focus of important activities and functions; and c) the important hydrological functions of wetlands that complement and enhance those provided by woodlands.

Includes groundwater recharge areas (Schedule B); headwater/1st order watercourses, 2nd, 3rd, and 4th or higher watercourses (includes flood plain regulated lands and river, stream and ravine corridors outside of flood plain regulated lands and rivers/streams (subwatershed studies category 1 patches and/or as mapped on Schedule B); wetlands (evaluated on Schedule B and unevaluated identified on the ELC digital layer).

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
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<tbody>
<tr>
<td>HIGH</td>
<td>one or more hydrological features/functions located within or contiguous with the patch (category 1 patch / within ground water recharge area / contains a wetland &gt;2 ha size).</td>
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<tr>
<td>MEDIUM</td>
<td>within 50 m of a watercourse or contains a wetland &lt; 2 ha size.</td>
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<tr>
<td>LOW</td>
<td>no hydrological features present within or contiguous with the patch</td>
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b) Erosion and Slope Protection. Based on the need to protect runoff processes, ground stability and aquatic habitat (erosion potential) for slopes > 10% (MNR, Design Guidelines for Forest Management).

As mapped in the Slope Stability Mapping Project (UTRCA 1996) and also using the surface mapping for slope and aspect based on a TIN surface file generated by ArcView 3DArialyzer. Additionally, this criterion requires knowledge of the soil textures and types as described in the Ecological Land Classification manual (MNR 1998) based on the Ontario Institute of Pedology (1985) and Canadian Soil Classification System (1978).

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<tr>
<th>Standard</th>
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<tr>
<td>HIGH</td>
<td>patch present on steep slopes &gt;25% on any soil type, OR on a remnant slope associated with other features such as moraines or remnant valley slopes no longer continuous with the river system OR on moderate to steep slopes &gt;10% - 25% with erodible soils (silty loam, sandy loam and loam, fine to coarse sands).</td>
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<tr>
<td>MEDIUM</td>
<td>patch present on moderate to steep slopes &gt; 10% - 25% with less erodible soils (heavy clay and clay, silty clay)</td>
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<tr>
<td>LOW</td>
<td>patch present on gentle slopes &lt; 10% with any soil type.</td>
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Score for criterion 1.1 based on the highest standard achieved for any one of the two standards.
1.2 Landscape Integrity (Richness, Connectivity and Distribution)

a) Landscape Richness. The density of landscape fragmentation, or patchiness as measured by the total area of all patches per unit area of land. Based on the demonstration that Native plant richness and flora quality are significantly related to local forest cover (UTRCA 1997; Bowles and Bergsma 1999). Based generally on RULE "G": Clustered patches are usually better than in-line patches of the same total area.

Percent cover of vegetation (all habitat types) within a 2 km radius circle from patch centroid. Thresholds reflect cumulative frequency distribution of patches within London.

- **HIGH** > 10% local vegetation cover
- **MEDIUM** 7 – 10% local vegetation cover
- **LOW** < 7% local vegetation cover.

b) Landscape Connectivity (linkage and distance between patches not separated by permanent cultural barriers). Based on RULE "E": Connected patches are usually better than unconnected patches and RULE "N": Patches that are relatively unaffected by human use are more valuable than more disturbed patches.

- **HIGH** patches directly connected by:
  1. waterways or riparian habitat (generally primary or secondary aquatic corridors and streams with bridges and/or underpasses: include Thames, Dingman, Medway, Stoney, Pottersburg, Kettle, Dodd, Sharon, Oxbow, Kelly, Stanton, Crumlin);
  2. Contiguous or semi-contiguous habitat.

- **MEDIUM** patches indirectly connected by:
  1. habitat gaps < 40 m;
  2. areas identified as Anti-fragmentation, Terrestrial Corridor, Big Picture Corridor (to enhance the viability of isolated woodlands by re-connection, buffering, expanding OR to infill disturbed areas or replace abandoned fields (Riley & Mohr 1994);
  3. abandoned rails, utility ROWs (hydro corridors, water/gas pipeline)
  4. Open space greenways and golf courses
  5. Active agriculture or pasture;
  6. Watercourses connected by culverts;
  7. First or second order streams channelized.

- **LOW** patches not connected due to the presence of permanent cultural barriers:
  1. major roads and highways with no culverts;
  2. urban or industrial development, large parking lots;
  3. Infrastructure;
  4. dams, buried watercourses, channelized third or greater order watercourses
  5. very active recreational (campground, parks with major facilities – community centres, arenas).
c) Patch Distribution (isolation & arrangement of patches / patch clusters*). Based on RULE "C": Large patches are usually better than clusters of smaller patches with the same total area and RULE "F": Closely clustered patches are usually better than less closely clustered patches. The interaction or flow of organisms among patches appears to be influenced by the size of patches and the distance separating them – the "gravity model" theory**

- **HIGH** patch clusters with total area > 40 ha OR identified as a Meta Core in the Carolinian Canada Big Picture Project (2000) OR is an isolated patch > 20 ha size.
- **MEDIUM** patch clusters with total area 20 – 40 ha OR identified as an Island Core in the Carolinian Canada Big Picture Project (2000) OR is an isolated patch >10 to 20 ha size.
- **LOW** patch clusters with total area < 20 ha OR is an isolated patch < 10 ha.

Score for criterion 1.2 based on the highest standard achieved for any one of the three standards

*Patch Clusters were defined by patches within 250 m of each other not separated by major roads, highways, railways or urban development.

** Gravity Model Theory – A Gravity Model can be used to predict the migration and interaction potential between populations or communities of species from nearby patches based on co-efficients for distance, habitat heterogeneity (or indices of patch similarly), and the dispersal behaviours of organisms. This was demonstrated in the Middlesex Natural Heritage Study (UTRCA 2003) in which a statistically significant negative relationship was shown between the number of native plant species to distance from a recognized natural heritage feature (AHSI and Wetland). In other words, the closer the distance between the woodland patch and a recognized natural heritage feature, the greater the number of native plant species in the woodland.

2. CRITERION 15.4.5 (ii) The Woodland provides important ecological functions and has an age, size, site quality, diversity of biological communities and associated species that is uncommon for the planning area.

2.1 Age and Site Quality

a) Community successional stage / seral age. Community age is based on definitions in the provincial Ecological Land Classification for Southern Ontario (Lee et. al. 1998). Seral age reflects the composition of the plant community (especially trees) with respect to light tolerance and moisture conditions. Generally, mature or advanced seral stage community types are under-represented in the London Subwatershed (Bowles 1995); Middlesex County (MNHS, 2003) and Oxford County (OCTES, 1997).

- **HIGH** patch contains one or more mature or older growth community
- **MEDIUM** patch contains one or more mid-aged community
- **LOW** patch contains only pioneer to young community

b) Mean Coefficient of Conservatism (MCC) of communities or whole patch. The MCC is based on the Floristic Quality Assessment System for Southern Ontario (Oldham et. al. 1995), analysis of distribution in the London Subwatershed area (Bowles & Bergsma 1999), results of the MNHS (UTRCA 2003) and OCTES (UTRCA 1997).

- **HIGH** one or more vegetation community with a MCC ≥ 4.6; OR MCC of patch > 4.5
- **MEDIUM** one or more vegetation community with a MCC 4.2 – 4.5; OR MCC of patch ≥ 4.0 – 4.5
- **LOW** all vegetation communities with a MCC < 4.2; OR MCC of patch < 4.0.
c) Disturbance related to Human Activity. Based on the assessment of vegetation patches to classify them as Excellent, Good, Fair, Poor for overall condition.

- **HIGH**: One community in excellent condition; or All communities in Good condition.
- **MEDIUM**: A combination of communities in Good, Fair and Poor condition
- **LOW**: All communities in Poor condition

Score for criterion 2.1 based on the highest standard achieved for any one of the three standards.

2.2 Size and Shape. These parameters influence the type of bird species “guilds” that a patch may be able to support. Guilds include "interior dependent" (forest interior species), "forest dependent" (forest interior-edge species), "area dependent" (area-sensitive species) and "generalists" (edge species). The number of native plant species has been found to be positively related to patch area, and negatively related to interior habitat (MNHS 2003) which means that patches with more interior had fewer native plant species than the same size patch with less interior.

- **a) Patch Size**. Based on RULE “B”: Large patches are usually better than smaller patches.

Thresholds derived from cumulative frequency curve distribution for London patches.

- **HIGH**: Patch > 9.0 ha in size OR patch contains a woodland >4 ha.
- **MEDIUM**: Patch 2.0 – 9.0 ha in size OR patch contains a woodland 2-4 ha.
- **LOW**: Patch < 2.0 ha in size.

- **b) Patch Shape and Presence of Interior**. Based on RULE “D”: A compact patch with a limited amount of edge is better than a narrow patch of the same area with more edge.

Calculated as the presence of interior area based on a 100 m interior edge zone. Based on analysis of subwatershed studies patches and calculation of perimeter to area ratios.

- **HIGH**: Patch contains interior habitat that is more than 100 m from the edge, or has a Perimeter:Area ratio <1.5 m/m².
- **MEDIUM**: Patch contains no interior habitat but has a Perimeter:Area ratio 1.5 – 3.0 m/m².
- **LOW**: Patch contains no interior and has a Perimeter:Area ratio > 3.0 m/m²

- **c) Conservative Bird Species** – Birds are indicators of habitat quality and the degree of forest fragmentation.

Evaluated based on Southern Ontario Conservation Priorities Scores for Middlesex County (Couturier 1999). Presence of species with high Jurisdictional Responsibility, Preservation Responsibility and/or Area Sensitivity as identified for all three categories of forest, marsh and open country birds.

- **HIGH**: Confirmed, probable, or possible breeding of one or more species at Level 1 or two or more at Level 2 or > five at Levels 2-4 in the patch.
- **MEDIUM**: Confirmed, probable, or possible breeding of one species at Level 2 or two or more at Level 3 or four to five at Levels 3-4 in the patch
- **LOW**: Confirmed, probable, or possible breeding of one to three species in Level 3-4; or no conservative bird species present in the patch.

Score for criterion 2.2 based on the highest standard achieved for any one of the three standards.
2.3 Diversity of Communities, Landforms and Associated Species

a) ELC Community Diversity. Based on RULE "J": Patches that contain more than one natural heritage feature or area may be more valuable than patches with a single natural heritage feature or area. Native plant species diversity is related mainly to the number of communities in the patch, also to patch area and landscape richness (OCTES, 1997).

Applied at the patch level to all communities (including cultural) identified at the Community Series level in the City of London digital GIS layer. Thresholds derived from cumulative frequency distribution of London patches for a total of 23 community series categories.

- **HIGH**: Patch contains 6 or more Community Series
- **MEDIUM**: Patch contains 3-5 Community Series
- **LOW**: Patch contains 1-2 Community Series

b) Community and Topographic Diversity (variation and heterogeneity). Based on the concept that vegetation structure and landform variability positively influences biodiversity.

Applied to all communities as defined by this study and based on ELC Community Tables (Lee et al. 1998) and topographic feature description. There are 7 possible topographic feature categories for the City of London: riverine, bottomland, terrace, valley slope, tableland, rolling upland, bluff.

- **HIGH**: Patch contains 3 or more Ecosites in one Community Series OR four or more Vegetation Types OR three or more topographic features (e.g. tableland, rolling upland, valley slope, terrace, bottomland).
- **MEDIUM**: Patch contains 2 or more Ecosites in one Community Series OR by three Vegetation Types OR two topographic features, or one Vegetation Type with inclusions or complexes.
- **LOW**: Patch relatively homogenous; 1 Ecosite OR one to two Vegetation Types on one topographic feature.

c) Diversity (species and individuals) and Critical Habitat Components for Amphibians. Based on RULE "L": Patches that contain a high diversity of species are usually more valuable than patches that contain fewer species. Amphibians are indicators of healthy woodlands with well functioning processes (OMNR 1999, 2000).

Applied at the patch level, based on presence of amphibians and/or important habitat components including 1) unpolluted shallow water that remains wet for the breeding season (presence of vernal pools); 2) emergent and submergent aquatic vegetation (presence of aquatic ELC community types); 3) presence of instream logs and shoreline shrubs (fish habitat data); 4) closed canopy offering a shaded moist understory environment (presence of forest or treed swamp communities); 5) abundance of coarse woody debris (deadfall/Logs, firm or decayed in the 1-24, 25-50 or >50 cm size classes).

- **HIGH**: 3 or more species of amphibians present in the patch, OR 1 species of amphibian that is abundant in one or more communities; OR 2 or more critical habitat components present in the patch.
- **MEDIUM**: 1-2 species of amphibians present in the patch; OR 1 species of amphibian that is occasional in one or more communities; OR 1 critical habitat components present in the patch.
- **LOW**: No species of amphibian present in the patch, OR no critical habitat components present in the patch.
d) **Presence of Conifer Cover.** Important for providing winter food and shelter for a variety of wildlife species (OMNR 1999, 2000). Conifer communities include FOC, FOM, SWC, SWM and CUP.

- **HIGH** Patch contains conifer communities that are > 4.0 ha in size.
- **MEDIUM** Patch contains conifer communities that are between 2.0 and 4.0 ha in size.
- **LOW** Patch contains conifer communities < 2.0 ha in size or no coniferous, mixed forest, swamp or plantation communities.

e) **Fish Habitat Quality.** The health of an aquatic habitat is determined by the health of the water body and surrounding land use practices. Even intermittent watercourses can provide critical habitat for many species. Fish provide an early warning of environmental problems.

- **HIGH** Dissolved oxygen > 8.0 mg/L or abundant instream woody debris and rocks and watercourse with a natural channel located within or contiguous with the patch.
- **MEDIUM** Dissolved oxygen 5.0 – 8.0 mg/L or moderate amount of instream woody debris and rocks and portions of channelized watercourses within or contiguous with the patch.
- **LOW** Dissolved oxygen < 5.0 mg/L or no instream woody debris and sparse structure and entire watercourse channelized within or contiguous with the patch.

3. **CRITERION 15.4.5.(iv) The Woodland provides significant habitat for endangered or threatened species.**

   [Note: refer to Policy 15.4.4 re: Endangered and Threatened Species habitat]

   Identification, evaluation and listing of provincially endangered or threatened species (species-at-risk (SAR) in Ontario designated by both COSEWIC/COSSARO) is the responsibility of the MNR. Planning Authorities may wish to have assessments of the significant portions of the habitat of SAR reviewed by the MNR. The MNR and Planning Authorities may take a cooperative approach on identification of the extent of habitat, with differing roles depending on the status of the species and if there is a recovery plan or not (OMNR 1999).

   SAR present or previously identified □ YES □ NO

   The presence of SAR will add one HIGH score to the over-all assessment

4. **CRITERION 15.4.5 (v). The Woodland contains distinctive, unusual or high quality natural communities or landforms.**

   **4.1 Distinctive, unusual or high quality communities.** Applied at the patch level to all community types present.


   - **HIGH** One or more communities with an SRANK of S3/S4 or higher.
   - **MEDIUM** No communities with an SRANK higher than S4.
   - **LOW** No communities with an SRANK higher than S6.
b) Specialized or rare species presence/absence. Based on RULE "M": Patches that contain rare species are generally more valuable than patches without rare species.

See glossary for definitions and lists of species that qualify.

### Type and Status of Species

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<thead>
<tr>
<th></th>
<th>HIGH</th>
<th>MEDIUM</th>
<th>LOW</th>
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<tbody>
<tr>
<td>Rare tree or shrub</td>
<td>1</td>
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<tr>
<td>Rare herbaceous</td>
<td>1</td>
<td></td>
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<tr>
<td>Northern and Specialized habitat tree/shrub</td>
<td>3</td>
<td>2</td>
<td>1</td>
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<tr>
<td>Carolinian tree/shrub</td>
<td>6</td>
<td>3-5</td>
<td>1-2</td>
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<tr>
<td>Regionally Rare plant</td>
<td>4</td>
<td>1-3</td>
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<tr>
<td>Uncommon plant</td>
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c) Size and distribution of trees

- **HIGH**: trees > 50 cm dbh abundant in one or more communities within the patch
- **MEDIUM**: trees > 50 cm dbh rare or occasional in one or more communities within the patch
- **LOW**: trees > 50 cm dbh not present in any communities within the patch

d) Basal Area

This criterion is being added to evaluate stand characteristics for total basal area, and basal area by tree species and size classes for each community. The post-logging provincial standard for tolerant hardwoods will be used as a measure of high quality woodlands (MNR 2000). It has been shown in other studies that 45% (MNHS 2003) to 73% (Bowles 2001) of forests had basal areas lower than the recommended for optimal vegetation community resiliency and stability (MNR 2000).

- **HIGH**: Average basal area of trees for any community in the patch > 16 m²/ha for trees >25 cm DBH; OR > 24 m²/ha for trees > 10 cm DBH; OR all diameter/class sizes are represented in the stand (saplings <10 cm; polewood 10-24 cm; small sawlog 26-36; medium sawlog 38-48 cm; large sawlogs 50-60 cm; x-large or veteran trees > 82 cm.
- **MEDIUM**: Average basal area for any community in the patch 12 – 24 m²/ha of trees >10 cm DBH; OR missing one of polewood, small, medium, or large size classes.
- **LOW**: Average basal area for all communities in the patch < 12 m²/ha for trees > 10 cm DBH; OR missing two or more of polewood, small, medium, or large size classes.

Score for criterion 4.1 based on the highest standard achieved for any one of the four standards.

NOTE: 4.1c and 4.1d require site visits to conduct adequate field investigation. The list of rare and unusual species may also change, and will be based on the most up-to-date lists. It has been found in other natural heritage studies in Oxford County (OCTES 1997), City of London Subwatershed (1995) and Middlesex County (MNHS 2003) that unique species of plants and birds (i.e. where a species was recorded in only one vegetation patch) accounted for 14% to 20% of all patches. For the latter two studies, data also indicated that all physiographic types contained at least one species that was not found in any other physiographic type, suggesting the importance of all individual patches and physiographic types for maintaining species diversity.
4.2 Distinctive, Unusual or High Quality Landforms

a) Distinctive landform types. Based on RULE “A”: Natural heritage systems that include the full range of habitat-landform types are better than those that contain fewer habitat-landform types.

As identified by the MNR (Earth Science ANSI) and City of London glacial geomorphology mapping (City of London GIS layer). Landform-vegetation representational significance was derived from calculating the proportion of all patches, including core areas, which are present and protected on each of the five major landform types.

- HIGH Patch located on an Earth Science ANSI OR on the Beach Ridge or Sand Plain physiographic landform units.
- MEDIUM Patch located on the Till Plain or Till Moraine physiographic landform unit.
- LOW Patch is located on the Spillway physiographic landform unit.

<table>
<thead>
<tr>
<th>Score for criterion 4.2 (based on the highest standard achieved).</th>
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<tbody>
<tr>
<td>Beach Ridge landform is unusual and rare in the City with portions identified as Earth Science ANSI and Provincially Significant Wetland/ESA.</td>
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<tr>
<td>Sand Plain landform has very little protected areas present. It is considered high quality for the aggregate extraction industry.</td>
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<tr>
<td>Till Plain is the largest landform unit with the least amount of protected areas (No ESA's) and the highest amount of vegetation. Most of the land is considered high quality agricultural.</td>
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<td>Till Moraine is the 3rd largest landform unit with fair amount of protected land. It accounts for the patches that fall on the heights of land (Westminster Ponds – Pond Mills ESA / Meadowlily Woods).</td>
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<tr>
<td>Spillway is the 2nd largest landform unit with the greatest proportion of protected areas and contains most of the ESA's. It is the most distinctive landform unit including the Thames River, Stoney Creek, Medway Valley and Dingman Creek.</td>
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<td>Criterion</td>
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<td>1.1 Site Protection</td>
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<td>Score for 1.1: Circle the highest standard achieved for any one of the two standards</td>
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<td>1.2 Landscape Integrity</td>
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<td>Score for 1.2: Circle the highest standard achieved for any one of the three standards</td>
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<td>2.1 Age and Site Quality</td>
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<td>Score for 2.1: Circle the highest standard achieved for any one of the three standards</td>
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<td>2.2 Size and Shape</td>
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<td>Score for 2.2: Circle the highest standard achieved for any one of the three standards</td>
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<td>2.3 Diversity of Natural Communities and Associated Species</td>
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<td>Score for 2.3: Circle the highest standard achieved for any one of the five standards</td>
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<td>3. Endangered and Threatened Species presence</td>
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<td>4.1 Distinctive, Unusual or High Quality Natural Communities</td>
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<td>Score for 4.1: Circle the highest standard achieved for any one of the four standards</td>
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<td>4.2 Distinctive, Unusual, or High Quality Landforms</td>
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<td>Score for 4.2: Circle the highest standard achieved</td>
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Woodland Patch Evaluation Summary Scoresheet

Assessment for Woodland Significance:
A woodland will be considered as a significant component of the Natural Heritage System and designated as open space based on the following categories:

<table>
<thead>
<tr>
<th>CRITERION</th>
<th>SCORE</th>
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<tbody>
<tr>
<td>CRITERION 1.1 Site Protection</td>
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<td>CRITERION 1.2 Landscape Integrity</td>
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<td>CRITERION 2.1 Age and Site Quality</td>
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<td>CRITERION 2.2 Size and Shape</td>
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<td>CRITERION 2.3 Diversity of Natural Communities and Associated Species</td>
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<td>CRITERION 3 Endangered and Threatened Species (TE Habitat)</td>
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<td>CRITERION 4.1 Distinctive, Unusual or High Quality Natural Communities</td>
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<td>CRITERION 4.2 Distinctive, Unusual or High Quality Landforms</td>
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</tbody>
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SUMMARY OF SIGNIFICANCE OF EIGHT ECOLOGICAL CRITERIA

Patch Number: Subwatershed:
Woodland Patch is a Significant Component of the Natural Heritage System: YES NO
Refer to Official Plan Policy 15.4.5., Woodlands for the Council approved threshold of significance.
Prepared by:
Date:
Biodiversity totality of the richness of biological variation, ranging from within-species genetic variation, through subspecies and species, to communities and the patterns and dynamics of these on the landscape.

Carolinian Tree/Shrub Species includes Kentucky coffee tree, American chestnut, Tulip-tree, Pawpaw, Blue ash, Pumpkin ash, Honey locust, Sycamore, Cottonwood, Hackberry, Butternut, Red mulberry, Shagbark hickory, Sweet pignut hickory, Black walnut, Blue beech, Black willow, Swamp white oak, Chickasaw oak, Dwarf hackberry, Sassafras, Black maple, Eastern red cedar, Flowering dogwood, Wild crab, Wild plum, Canada plum and the following Hawthorn species: Crataegus brainerdi, Crataegus calpodendron, Crataegus compacta, Crataegus dissitana, Crataegus dodgei, Crataegus lamarla, Crataegus mollis, Crataegus schultei, (Reference: City of London Guide to Plant Selection for ESA’s 1994).

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). A community may be described and classified using the Ecological Land Classification for Southern Ontario (Lee et al. 1998) or any other recognized system.

Complex pattern of two or more ecosites or vegetation types forming a mosaic that cannot be mapped at the level of resolution being employed.

Cover the absolute area of ground covered, or the relative proportion of coverage that a particular plant species, vegetation layer or plant form represents.

Cultural Barrier (permanent) includes roads (primary collector, arterial, highway as identified on Schedule ‘C’), buildings and railroads, unless connected by a culvert or bridge that allows movement of wildlife.

Cultural Community a vegetation community originating from, or maintained by, anthropogenic influences and culturally based disturbances; after containing a large proportion of non-native species.

Cultural Corridor includes abandoned rail or roads, utility easements or right-of-ways; recreational greenway parks/open space, abandoned agricultural land.

ELC Community Series is the lowest level of classification using ELC that can be identified through maps, air-photo interpretation and other remote sensing techniques. Community series are distinguished on the type of vegetation cover (open, shrub, or tree) and/or the plant form that characterizes the community (i.e. deciduous; coniferous, mixed).

ELC Ecosite is a part of an Ecosecture that consists of a mappable area or land having a consistent set of environmental factors (hydrology, soils) and patterns of vegetation characteristics.

ELC Vegetation Type is the finest level of resolution in the ELC, identified through site and stand level research and inventory. Vegetation types are generated by grouping similar plant communities based on plant species composition and dominance, according to relative cover. The goal is to distill the natural diversity and variability of plant communities to a small number of relatively uniform vegetation units.

EcoSection A subdivision of an Ecodistrict based on distinctive assemblages of relief, geology, landforms, soils and vegetation. Canadian ecological land classification (ELC) system mapping unit, usually mapped at a scale of 1:250 000 to 1:50 000.

Forest a terrestrial vegetation community with at least 60% tree cover of coniferous or deciduous trees.

Indigenous Conifer Species includes white pine, hemlock, eastern white cedar, eastern red cedar, tamarack, black spruce, white spruce.

Landform is a topographic feature. The various slopes of the land surface resulting from a variety of actions such as deposition or sedimentation, erosion and movements of the earth crust.

Large as it refers to individual tree species; the age and size at which a species is considered to be old or overmature for the particular region and site, based on best available information.

Mature a seral stage in which a community is dominated primarily by species that are replacing themselves and are likely to remain an important component of the community if it is not disturbed again.
Significant remnants of early seral stages may still be present.

**Mean Coefficient of Conservatism (MCC)** is calculated from the conservatism coefficients of all native species in a patch. MCC aids in measuring the overall quality of a site. The conservative coefficient describes the probability of finding a species in a particular habitat type or undisturbed habitat. Coefficients range from 0 (widespread) to 10 (found only in specialized habitats).

**Mid-Aged** a seral stage of a community that has undergone natural thinning and replacement as a result of species interaction; the community often contains examples of both early successional and late successional species.

**Natural Corridor** includes hedgerows, streams, drainage features, plantations, valley and stream corridors, riparian zones, thickets, woodlands. A corridor may be interrupted by some cultural features (such as bridges and culverts) which still allow movement of wildlife along the corridor.

**Non-native Conifer Species** include Jack pine, Norway spruce, European larch, Austrian pine, Scots pine.

**Northern and Specialized Habitat Tree/Shrub Species** Tamarack, Eastern hemlock, Eastern white cedar, Balsam poplar, Slender willow, Paper birch, Pin cherry, Dwarf hackberry, American mountain ash, Roundleaf Juneberry (Amelanchier sanguinea), Smooth serviceberry/juneberry (A. laevis).

**Old Growth** a self perpetuating community composed primarily of late successional species that usually show uneven age distribution, including large old trees without open-grown characteristics.

**Phytosociological** referring to a recognizable and repeatable community of interacting plant species that occurs across the landscape under the same conditions.

**Pioneer** a community that has invaded disturbed or newly created sites and represents the early stages of either primary or secondary succession.

**Plantation** a coniferous or deciduous tree community in which the majority of trees have been planted.

**Rare Herbaceous Species** includes those with an element ranking of 51-S3 (For a complete listing of Ontario's rare plant species consult NHIC at www.mnr.gov.on.ca/MNR/nhic/nhic.html).

**Rare Tree/Shrub Species** includes Black spruce, Sweet pignut hickory (C), Blue ash (C), Pumpkin ash (C), Kentucky coffee tree (C), American chestnut (C), Black gum, Pawpaw (C), Red mulberry (C), Dwarf hackberry, American mountain Ash, Juneberry (Amelanchier sanguinea), and the following Hawthorn species: Crataegus apiomorpha, Crataegus brainerdii, Crataegus corusca, Crataegus daisona, Crataegus frigida, Crataegus lumaria, Crataegus margareta, Crataegus pedicillata, Crataegus perquinunda, Crataegus scabrata, Crataegus suborbiculata, Crataegus sylvestris. Reference: City of London Guide to Plant Selection for ESA’s. (1994) and City of London Tree Preservation Policies (1990).

**Relative Abundance** is the proportion of coverage a particular plant species, vegetation layer or plant form represents:  
- **Rare** - a plant species that is represented, in the area of interest, by only one to a few individuals.
- **Occasional** - plants that are present as scattered individuals throughout a community or represented by one or more large clumps of many individuals. Most species will fall into this category.
- **Abundant** - a plant that is represented throughout the community by large numbers of individuals or clumps. Likely to be encountered anywhere in the community; usually forming >10% ground cover.
- **Dominant** - a plant with the greatest cover or biomass within a plant community and represented throughout the community by large numbers of individuals. Visually more abundant than other species in the same layer and forming >10% of the ground cover and >35% of the vegetation cover in any one layer.

**Regionally Rare Species** include species that are rare in SW Ontario based on SWFLORA database for the Subwatershed Life Science Inventories (Bowles et. al. 1994), and Status of the Vascular Plants of Southwestern Ontario (Oldham 1993). Species with 1-4 stations (records) in Middlesex County.
Savanna: a treed community with 11 to 35% cover of coniferous or deciduous trees.

Seepage: the slow movement of water near the soil surface, often occurring above an impermeable subsoil layer or at the boundary between bedrock and unconsolidated material that is exposed at ground surface. Usually occurs downslope of the recharge area.

Seral Age: The stage in a vegetation chronosequence or succession at a given site.

SRANK: ranking system that considers the provincial rank of an element (=species or community type) as a tool to prioritize protection efforts. SRANKS are assigned based on best available information on 3 factors: estimated number of occurrences, estimated areal extent and estimated range. S1 to S3 include extremely rare, very rare and rare to uncommon ranks.

Swamp: a mineral-rich wetland community characterized by a cover of coniferous or deciduous trees.

Treed: a community with tree cover of >10%.

Urban development: includes areas of the landscape that have been converted to other permanent uses such as buildings and lots, roads, parking areas. It would exclude areas of open space such as treed boulevards, parks, cemeteries, quarries, storm water management facilities and other natural vegetated areas. Includes all draft approved OMNR 1993a. A Significant Woodlands Workshop Proceedings. OMNR 1993b. Ontario Wetland Evaluation System Southern Manual - 3rd edition with 1994 updates and registered developments.

Watercourse: is defined as having one or more of the following characteristics:
- a distinct channel in which water naturally flows at some time of the year (i.e. either permanent or intermittent flow)
- natural riparian vegetation
- Type 1-Vaquatic habitat

Wetland: as defined by the Ontario Wetland Evaluation System Southern Manual, 3rd edition (OMNR 1993b), with a minimum community size of 0.5 ha.

Woodland: a treed community with 35 to 60% cover of coniferous or deciduous trees.

Young: a seral stage of a plant community that has not yet undergone a series of natural thinnings and replacements. Plants are essentially growing as independent individuals rather than as members of a phytosociological community.

References


City of London 1994. Guide to Plant Selection for ESA’s. Planning & Development, Room 609, City Hall,
City of London Official Plan (Office Consolidation January 1 2000).


UTRCA 1997. The Oxford County Terrestrial Ecosystem (OCTES): A Natural Heritage Study for Oxford County.