GUIDELINES FOR ASSESSING ECOLOGICAL BOUNDARIES OF VEGETATION PATCHES

1. Purpose

The purpose of this guideline is to:

1) document and describe a repeatable process leading to a credible map which can be used for planning and monitoring;
2) outline a consistent basis by which ecological boundaries for natural features can be determined;
3) provide the basis for resolving variations between different scales and types of mapping; and
4) 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.

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.

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.

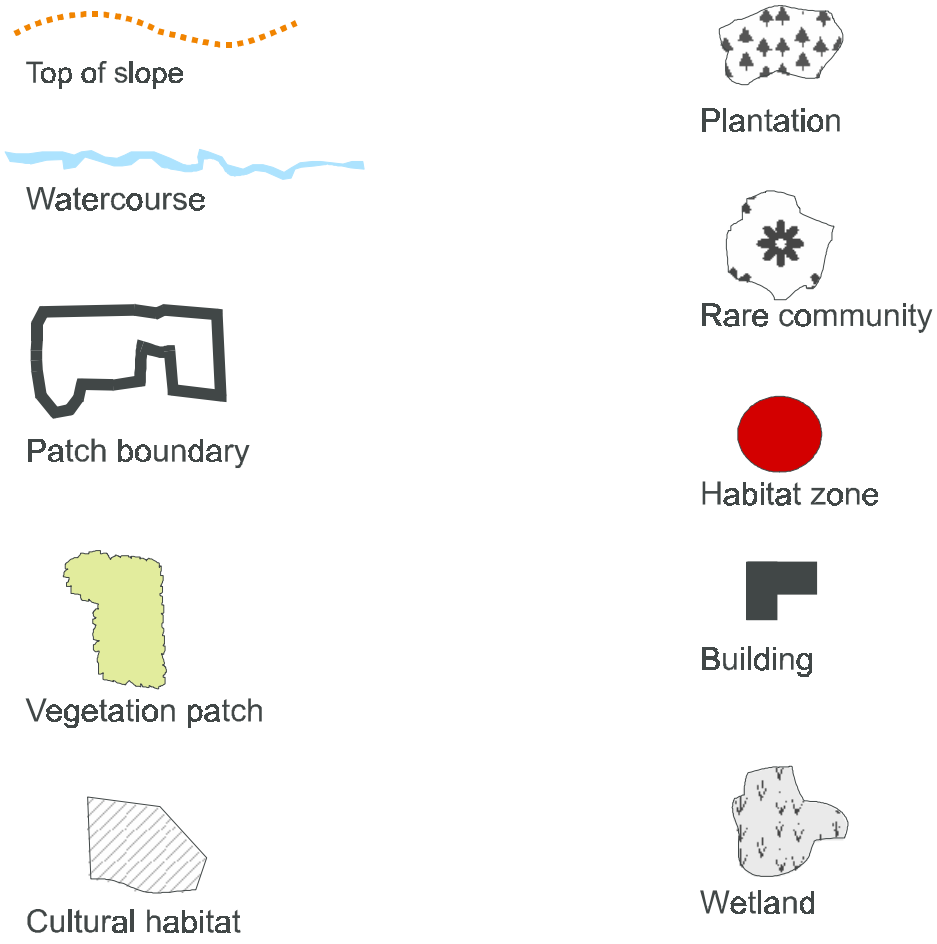
3. Application of these boundary delineation guidelines is best made at a map scale of about 1:10,000. Further boundary refinement during Phase II of the EIS will be made at a finer scale (1:5,000, or 1:2,000).

4. 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.

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.

6. A patch may be bisected by a utility corridor or road if the right-of-way is less than 40 m.



Legend for Guideline Figures 1-9.

GUIDELINE 1
Habitat zones **must be included within the patch boundary**

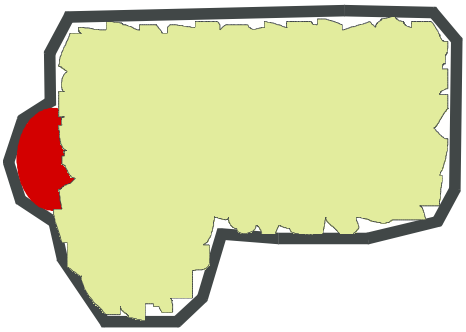


Figure 1. Habitat zones

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**

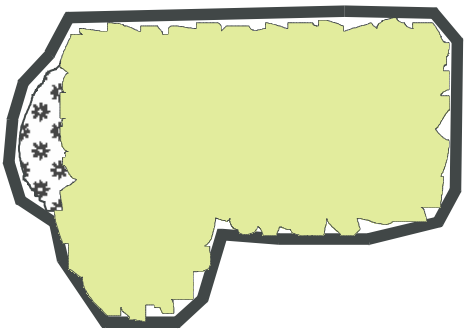


Figure 2. Rare or uncommon natural communities.

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 below the top-of-slope (Figure 3a);

b) should be included within the boundary if the projection contains a ravine with untreed or successional habitat below the top-of-stable-slope (Figure 3b); and

c) 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 3c).

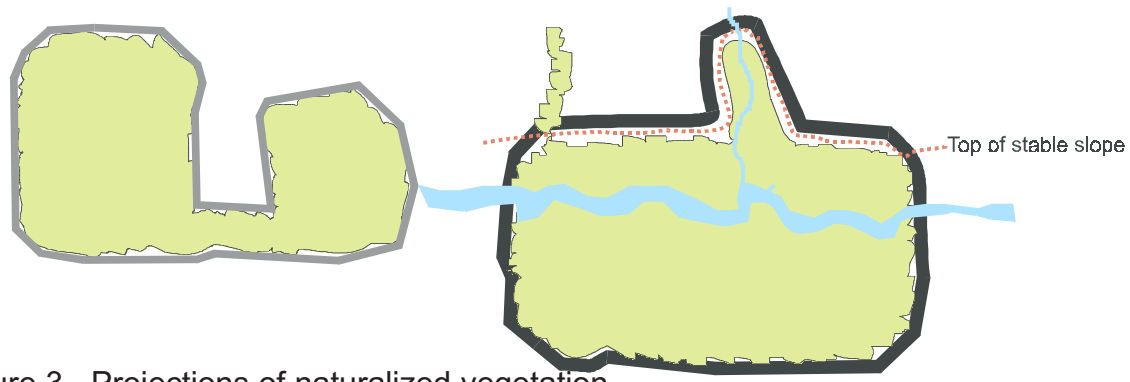


Figure 3. Projections of naturalized vegetation

Conditions A vegetated projection meeting condition a) is included within the boundaries. A vegetated projection meeting condition b) or c) 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).

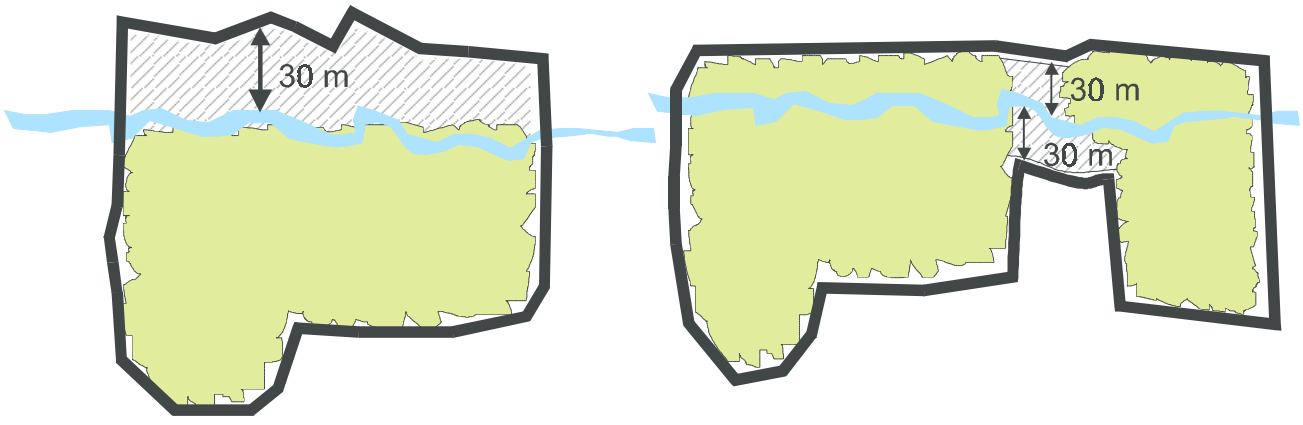


Figure 4. Watercourses.

Conditions The connection should include a minimum buffer of:
30 m on each side of the high water mark of small watercourses;
30 m on the side(s) of large rivers where the patch occurs;
50 m on each side of coldwater streams.

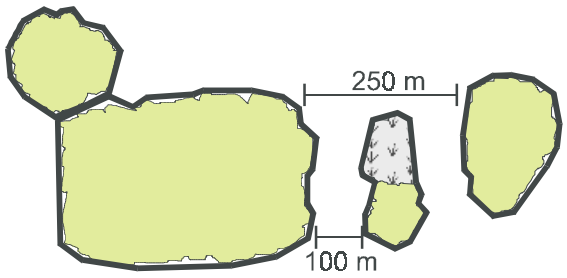
Rationale: Watercourses are important ecological habitats providing wildlife resources and functions as well as contributing substantially to connectivity within and between significant natural areas. Riparian buffers adjacent to watercourses are important for protecting the water quality and ecological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

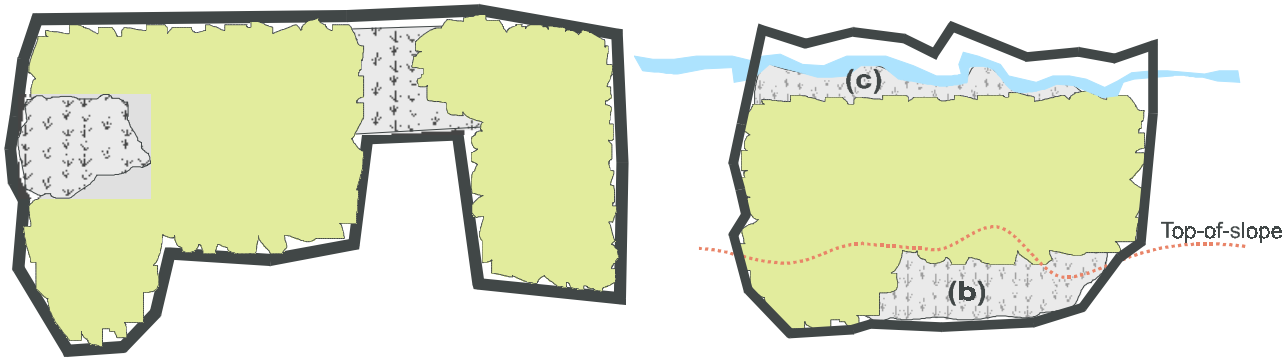
Clusters of patches that collectively meet several of the habitat needs of one or more species are generally more valuable than clusters of patches that meet fewer habitat needs (MNR 1997). Natural areas that consist of several patches containing a diversity of vegetation community types can sometimes 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) should 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 mapped as Review Area. 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 **should be included within the ESA boundary if they:**

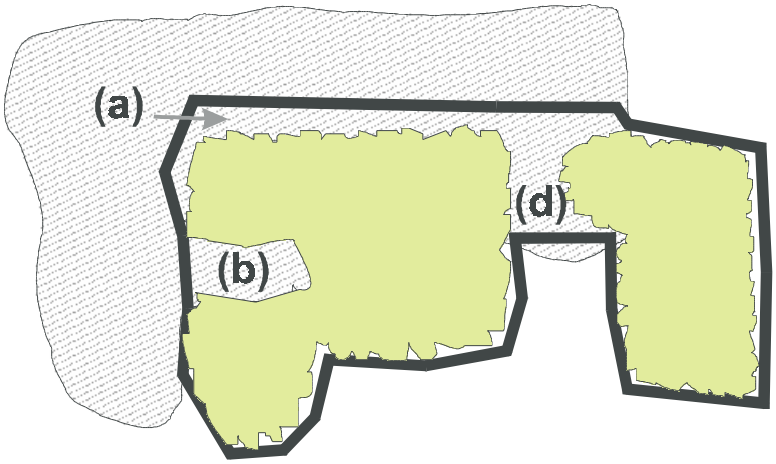
a) minimizes negative edge effects by forming a well-established mantel at the edge of the treed patches and as such protect adjacent communities from the effects of surrounding land use (Figure 7a); or

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

c) connects a patch to a permanent natural watercourse (Figure7c); or

d) connects 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 mapped as Review Area. It is not intended that the cultural habitat will occupy a large proportion of the total area of the patch being delineated.

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:

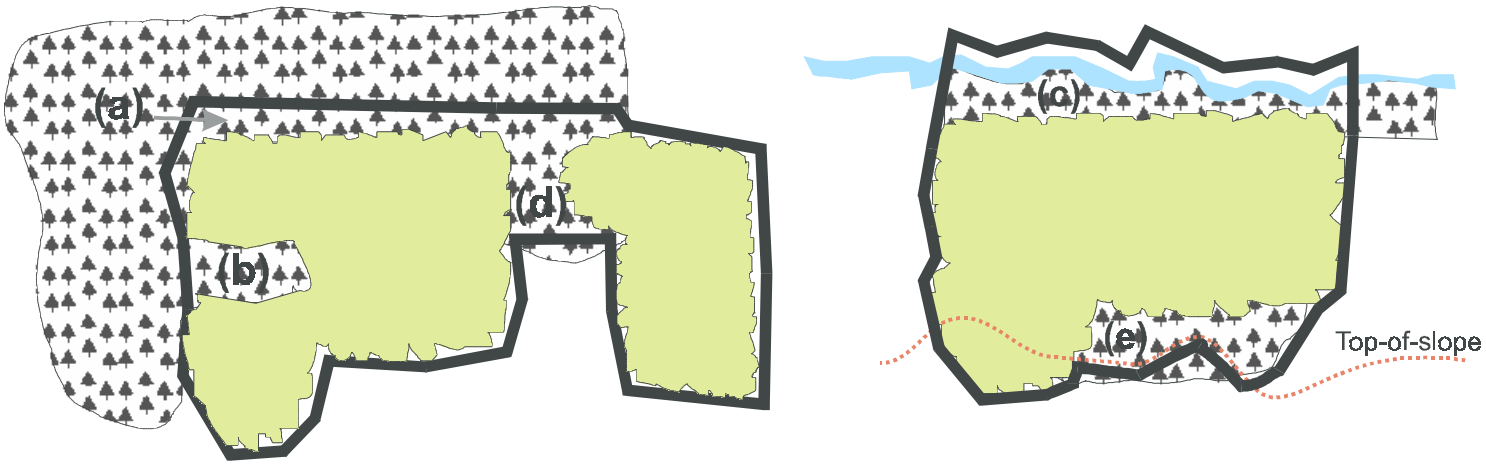
b) minimizes edge effects to natural heritage features by providing a buffer between the feature and the surrounding land use (Figure 8b); or

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.

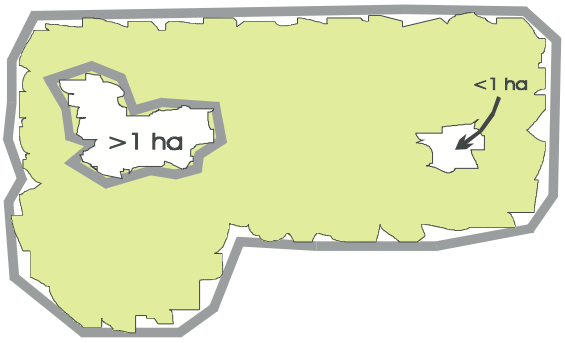
GUIDELINE 9

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, untreed active pasture, golf courses, lawns, ornamental treed 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.

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



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 (Figure 10). 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.

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 distributuion 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 Tarandus 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.

Source References for Boundary Delineation

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