Region of Waterloo Greenlands Network Implementation Guideline

Contents

A. Introduction

Regional Official Plan

7.A.4 The Region will prepare and update a Regional Greenlands Network Implementation Guideline to guide the implementation of the policies in this Chapter in accordance with the provisions of Policies 10.B.9 through 10.B14.

The purpose of the **Greenlands Network Implementation Guideline** is to provide guidance to *development* applicants, the Ecological and Environmental Advisory Committee (EEAC), and agency staff[1] in the preparation and review of *applications* for *development* and *site alteration* which affect the Greenlands Network. The Greenlands Network consists of the following categories of *environmental features* designated in the Regional Official Plan (ROP) and Area Municipal Official Plans*:*

Landscape Level Systems

Environmentally Sensitive Landscapes
Significant Valleys
Regional Recharge Areas
Provincial Greenbelt Natural Heritage System

Core Environmental Features

Habitat of Endangered and Threatened Species
Provincially Significant Wetlands
Environmentally Sensitive Policy Areas
Significant Woodlands
Environmentally Significant Valley Features

Supporting Environmental Features

Environmentally Significant Discharge Areas
Environmentally Significant Recharge Areas
Linkages
Other *environmental features* designated in Area Municipal Official Plans and/or regulated by the Grand River Conservation Authority

The Implementation Guideline provides detailed implementation guidance on selected ROP environmental policies. These policies direct that the elements of the Greenlands Network be maintained, *enhanced*, or wherever feasible, *restored*.

The ROP relies on Implementation Guidelines in a number of subject areas to provide detailed technical guidance in the application of certain policies. Implementation Guidelines elaborate upon ROP policy, but may not be used as a

1. This comprises staff at the Area Municipalities, Grand River Conservation Authority, as well as the Region of Waterloo. Studies required pursuant to the Endangered Species Act shall be scoped by the Ministry of Natural Resources and Forestry.

means of introducing “new policy provisions that could be the basis for denying development applications or for interfering with the natural justice rights of landowners and the public.” (See ROP Policy 10.B.10).

The content and scope of Regional Implementation Guidelines are determined through a full, open, and transparent consultation process with Area Municipalities, other agencies, interested organisations, and interested citizens. As relevant Official Plan policies are updated, added, or deleted, Implementation Guidelines must also be updated to conform more closely to the provisions of the ROP. Once adopted by resolution of Council, Implementation Guidelines are clear and detailed elaborations of Regional policy. Input to the development of the Guideline by Area Municipal and Grand River Conservation Authority staff will allow the Guideline to serve as a common resource and thereby help co-ordinate the environmental review of complex development applications.

On June 26, 2002, Regional Council adopted the ***Guideline for the Preparation of Environmental Impact Statements in the Regional Municipality of Waterloo***. This document provided detailed guidance for *development* applicants required to prepare Full *Environmental Impact Statements*. The adoption of the new Regional Official Plan on June 16, 2009 and its subsequent approval by the Ontario Municipal Board on June 18, 2015 is the impetus for the adoption of the ***Region of Waterloo Greenlands Network Implementation Guideline.*** This includes an updated ***Guideline for the Preparation of Full Environmental Impact Statements*** which reflects changes in practice and policy since 2002. It also includes a ***Guideline for the Preparation of Scoped Environmental Impact Statements***, since most *Environmental Impact Statements* prepared for review by agencies are scoped. Reflecting the purpose of the guidelines, the ***Greenlands Network Implementation Guideline*** includes other matters related to the implementation of the ROP environmental policies which are addressed in *Environmental Impact Statements* such as

- interpreting the boundaries of *environmental features*,
- delineating *ecological buffers,* and *linkages*, and
- expanded definitions of terms.[2]

Environmental Impact Statements are used to identify potential *adverse environmental impacts* upon *environmental features* and assist *development* proponents and public agencies to avoid, minimise, or *mitigate* such impacts. They are recommended to ensure consistency with applicable policies of the Provincial Policy Statement (e.g., demonstration of “no negative impacts”), and are required by the Regional Official Plan, Area Municipal Official Plans, secondary plans, and Grand River Conservation Authority policies. This Guideline will assist proponents to

2. Terms defined in the Glossary of this Implementation Guideline but not included in the ROP are marked with an asterisk. As in the ROP itself, all terms defined in the Glossary are printed in italics in the text when the text specifically refers to that term. Terms in the Glossary are in the form of nouns. In the text of the Implementation Guideline, they may take the form of verbs when appropriate (e.g., *restoration – restore*).

organise and synthesise all the information required by the respective approval agencies. The information and expert opinions expressed in an *Environmental Impact Statement* by the *qualified professionals* who prepare them inform approval agency decisions to accept, modify, or refuse *applications* for *development* or *site alteration*. As the information and opinions contained in an *Environmental Impact Statement* may be questioned or challenged by agency staff, it should be noted that mere completion of an *Environmental Impact Statement* does not necessarily mean that the *development application* will be approved. Moreover, individual agencies may decline to review or provide comment upon draft documents or *Environmental Impact Statements* not fulfilling the requirements of the Guideline.

A.1 Environmental Impact Statements

An *Environmental Impact Statement* is defined within the Regional Official Plan as:

> a study prepared in accordance with established procedures to precisely delineate and map the boundaries of elements of the Greenlands Network, identify the potential impacts of a *development application* on such elements, and recommend a means of preventing or minimizing these impacts through avoidance or mitigation.

The ROP further specifies that an *Environmental Impact Statement* should recommend means to *enhance* or *restore* the quality and *connectivity* of elements of the Greenlands Network.

The *Environmental Impact Statement* will often be coordinated with other technical studies such as hydrological, hydrogeological, or stormwater management reports which are prepared consistent with other applicable guidelines. *Environmental Impact Statements* will be prepared in accordance with this Guideline.

There are three types of *Environmental Impact Statement*. The type of Environmental Impact Statement shall be determined by the agency(ies) having jurisdiction.

1. A **Comprehensive *Environmental Impact Statement*** is carried out at a landscape scale prior to widespread *development* in order to identify *environmental features* for protection, delineate landscape linkages, define potential development areas, recommend development setbacks and other environmental protection measures, and assess cumulative impacts to the extent feasible in order to maintain the ecological sustainability of the Greenlands Network in the area. It informs the type, scale and location of development. Typically, detailed Terms of Reference rather than generic guidelines are prepared for such a study which often takes the form of a watershed study, sub-watershed study, or Master Environmental Servicing Plan carried out under the auspices of government agencies, and once completed, is approved by Council.

2. A **Full *Environmental Impact Statement*** is an area or site-specific study that may be required in the absence of an approved Comprehensive Environmental Impact Statement in accordance with the Guideline to address potential *adverse environmental impacts* anticipated to arise from a *development application* or *site alteration*, and to identify means to *enhance* or *restore* elements of the Greenlands Network.

3. A **Scoped *Environmental Impact Statement*** is an area- or site-specific study where the impacts of the proposed *development* or *site alteration* upon one or more elements of the Greenlands Network are expected to be limited in area and/or scope, or where other environmental studies fulfilling some or all of the requirements of an *Environmental Impact Statement* have been previously approved. Terms of Reference for major applications are scoped by Regional staff in consultation with the Ecological and Environmental Advisory Committee and/or other agencies having jurisdiction. Area Municipalities and/or the Grand River Conservation Authority will scope Terms of Reference in accordance with their established procedures.

A.2 When is an Environmental Impact Statement Required?

The purpose of an *Environmental Impact Statement* is to provide necessary technical information for review by approval agencies considering the approval of *development applications* or applications for *site alteration* affecting a designated *Landscape Level System*, *Core Environmental Feature,* or *Supporting Environmental Feature*. An Environmental Impact Statement may also be required to assess the ecological significance of a hitherto undesignated natural feature affected by a proposed development application and to interpret an ecologically appropriate boundary to the feature. The *Environmental Impact Statement* identifies potential *adverse environmental impacts* to ecological features and *functions*, and recommends measures to prevent, avoid, minimise, and *mitigate* those potential impacts. It also identifies opportunities to *enhance* and/or *restore* the *environmental features* and *functions* of the area. An *Environmental Impact Statement* is generally required when *development* or *site alteration* is proposed on lands within or *contiguous* to *environmental features*. Further guidance is provided by the policies in Chapter Seven of the ROP and also by policies and procedures established by Area Municipalities and agencies. The following discussion summarises these policies.

It is intended that this Guideline consolidate the study requirements of review agencies having jurisdiction over elements of the Greenlands Network in order to avoid discrepancy or duplication. Prior to undertaking an *Environmental Impact Statement*, applicants for *development* or *site alteration* are encouraged to consult at the earliest opportunity and in a co-ordinated manner with staff of the respective agencies having jurisdiction in order to facilitate early identification of environmental issues, clarify the precise nature of the information required, and ensure timely processing of the application. See Table 1 for the agencies to be consulted.

Table 1 Review Agencies to be Consulted for Specific Greenlands Network Elements

Natural Feature	Ministry of Natural Resources & Forestry	Grand River Conservation Authority	Region of Waterloo	Area Municipality	Fisheries & Oceans Canada
Habitat of an *Endangered or Threatened Species*	√		√	√	
Provincially Rare Species and communities	√		√	√	
Provincial Greenbelt,		√	√	√	
Environmentally Sensitive Landscape		√	√	√	
Core Environmental Feature (e.g., Provincially Significant Wetland, E.S.P.A., Significant Woodland Environmentally Significant Valley Feature)		√	√	√	
Environmentally Significant Discharge Area and/or *Recharge Area* sustaining *Core Environmental Features*		√	√	√	
Significant Valley		√		√	

Non-Provincially Significant Wetland or unevaluated *wetland*		√		√	
Watercourse		√		√	
Hazardous site (i.e., karst topography), riverine erosion hazard (valleylands or steep slope), or riverine flooding hazard (floodplain)		√		√	
Supporting Environmental Feature, or Locally Significant Natural Area		√		√	
Lands sustaining fish habitat				√	√

Applicants are also advised to solicit input from local residents or organisations having knowledge of the environmental characteristics of the area.

Where an *Environmental Impact Statement* would normally be required by the Region, the submission of an *Environmental Impact Statement* may not be required where an *Environmental Assessment* or alternative environmental review is being undertaken under Provincial or Federal Legislation, providing the alternative process fulfills all the requirements for site specific, and/or landscape level *Environmental Impact Statements* otherwise required by the Regional Official Plan. Further, the Region may waive the requirement for an *Environmental Impact Statement* where consultation with other agencies or site investigation by the Region indicates that there are not likely to be *adverse environmental impacts* upon the Greenlands Network.

A.3 Pre-Submission Consultation with the Region of Waterloo

In accordance with ROP Policy 10.D.5, if an *Environmental Impact Statement* is required in support of an *application for development* or *site alteration,* it must be submitted before the application is deemed complete and the review process can begin.

The *Environmental Impact Statement* will be prepared to the satisfaction of Regional staff in consultation with other agencies having jurisdiction over the affected natural features. Therefore, it is necessary that the proponent of the proposed *development* or *site alteration* schedule a *pre-submission consultation meeting* as early as possible with the Region, and as appropriate, the respective Area Municipality, *Province*, and Grand River Conservation Authority, and/or Department of Fisheries and Oceans.

Pre-submission consultation will help to clarify whether an *Environmental Impact Statement* is required, and if so, whether the EIS should be a full *Environmental Impact Statement* or whether it can be scoped. If an *Environmental Impact Statement* is to be scoped, scoping must be done in consultation with and to the satisfaction of agency staff, and not solely by the applicant. *Pre-submission consultation* can also provide an opportunity to harmonise Regional, Provincial, Area Municipal, and Grand River Conservation Authority requirements, and ensure that all agency matters of concern are addressed. *Pre-submission consultation* should generally occur before the commencement of field surveys and prior to the completion of the report in order to ensure that all requirements are being addressed.

B. Guidelines

I. Guideline for the Preparation of a Full Environmental Impact Statement

An *Environmental Impact Statement* may be required to identify and evaluate the potential effects of a proposed *development* or *site alteration* on elements of the Greenlands Network, and recommend means of preventing, minimizing or mitigating these impacts, as well as enhancing or restoring the quality and *connectivity* of elements of the Greenlands Network. An *Environmental Impact Statement* may also be used to identify and evaluate elements of the Greenlands Network and interpret the boundaries of these elements based on ecological considerations. The *Province*, Region, Area Municipalities and the Grand River Conservation Authority will co-ordinate the requirements for the preparation of *Environmental Impact Statements*.

7.G.2 The Region, in consultation with the *Province*, Area Municipalities and the Grand River Conservation Authority may require the completion of a single comprehensive *Environmental Impact Statement* where:

(a) *development* or *site alteration* is proposed on multiple contiguous properties containing elements of the Greenlands Network;
(b) a comprehensive community planning process is being undertaken;
(c) environmental studies are required to support the proposed expansion of the Urban Area or a Township Urban Area; or
(d) the extent of a *development application* and its anticipated impacts on the Greenlands Network are anticipated by the relevant agency(ies) to be substantial.

7.G.3 The need for, and scope of *Environmental Impact Statements,* will be determined in collaboration with affected Area Municipalities, the Province, the Grand River Conservation Authority by:
(a) the *Province,* for *development* or *site alteration* potentially affecting Habitat of Endangered or Threatened Species*,* or;
(b) the Region, for *development* or *site alteration* potentially affecting:
  i) Landscape Level Systems, not including Significant Valleys;
  ii) Core Environmental Features; or
  iii) *Environmentally Significant Discharge Areas* and/or *Environmentally Significant Recharge Areas* that sustain Core Environmental Features.
(c) the Grand River Conservation Authority for Significant Valleys, Provincially Significant Wetlands located outside Environmentally Sensitive Policy Areas and *wetlands* not identified as provincially *significant*, including unevaluated *wetlands*;
(d) the affected Area Municipality for *development applications* potentially affecting other elements of the Greenlands Network; and
(e) the Federal Department of Fisheries and Oceans, or its delegate, for *fish habitat.*

7.G.4 The following provisions will apply to *Environmental Impact Statements* required by the Region under Policy 7.G.3(b):
(a) the *Environmental Impact Statement* will be prepared in accordance with the provisions of the Regional Greenlands Network Implementation Guideline; . .

Application
In accordance with policy 7.G.4 of the Regional Official Plan, this Guideline will apply when a Full *Environmental Impact Statement* is required for *development* or *site alteration* within or *contiguous to* elements of the Greenlands Network.

To ensure that all applicable agency interests are addressed, it is recommended that terms of reference for the *Environmental Impact Statement* be approved during or following *pre-submission consultation*.

Purpose
The purpose of this Guideline is to ensure that appropriate and consistent methods and report formats are followed in the preparation of *Environmental Impact Statements*. In cases when a Comprehensive Environmental Impact Study or Sub-watershed Plan has not been completed, or when the extent of a proposal and its potential impacts on the Greenlands Network are anticipated by the relevant agency(ies) to be substantial, a Full *Environmental Impact Statement* may be required. Compliance with these guidelines will help to expedite the review process by reducing the need for further study and information. Prior to commencing such a study, a *pre-submission consultation meeting* with agency staff is strongly recommended in order to determine study parameters and/or specific Terms of Reference. When a Full Environmental Impact Statement is required, it must be submitted as part of a complete application as directed by the approval authority(ies), and be prepared consistent with this Guideline.

Guideline for a Full *Environmental Impact Statement*

A Full *Environmental Impact Statement* required pursuant to the policies of the ROP, and/or the Provincial Policy Statement, and/or the Greenbelt Plan, and/or an Area Municipal Official Plan and/or the Grand River Conservation Authority will, at a minimum, consist of the following:

1. A statement of the purpose and rationale for the *application* for *development* or *site alteration*.

2. Maps, site plans, and/or recent airphotos at an appropriate scale showing previously documented and newly obtained information on:

    2.1 The location of lands affected by the *application* for *development* or *site alteration* in relation to elements of the Greenlands Network, as defined in the ROP and/or Area Municipal Official Plan, or shown on mapping maintained by the Grand River Conservation Authority, or the Ministry of Natural Resources and Forestry including but not necessarily limited to the following:
        2.1.1 Habitat of *Endangered and Threatened species* identified by the Ministry of Natural Resources and Forestry.

2.1.2 Provincially Significant Wetlands identified by the Ministry of Natural Resources and Forestry and other wetlands identified by the Grand River Conservation Authority. (Unevaluated wetlands on and contiguous to the subject lands should be assessed to determine if an individual Ontario Wetland Evaluation System (OWES) evaluation should be completed as part of the *Environmental Impact Statement*, or whether the wetland should be complexed with an existing evaluated wetland.)

2.1.3 Provincially and Regionally Significant Life Science and Earth Science *Areas of Natural and Scientific Interest* identified by the Ministry of Natural Resources and Forestry.

2.1.4 Elements of the Natural Heritage System identified by the Greenbelt Plan.

2.1.5 Environmentally Sensitive Policy Areas designated by the Region,

2.1.6 Significant Woodlands identified by the Region.

2.1.7 Environmentally Significant Valley Features designated by the Region.

2.1.8 Significant Wildlife Habitat, as defined by the Provincial Policy Statement, the current Natural Heritage Reference Manual, the Ministry of Natural Resources and Forestry's Eco-region criteria, and, where applicable, Ecological Land Classification.

2.1.9 *Fish habitat*, as defined by the ***Fisheries Act***.

2.1.10 Locally Significant Natural Areas and/or *Supporting Environmental Features* identified by an Area Municipality and/or regulated by the Grand River Conservation Authority.

2.1.11 Surface water features (i.e., watercourses).

2.1.12 Groundwater recharge and/or *discharge areas*.

2.1.13 Other natural high quality or unusual *environmental features* or *functions* such as good representative communities of native species typical of the region, natural corridors, migration staging areas, and deer yards.

2.2 Ecologically functional natural *linkages* and potential *linkage* enhancement opportunities among elements of the Greenlands Network.

2.3 Topography - showing the relationship of the proposed *development* or *site alteration* to *environmental features*.

2.4 Predominant soil series.

2.5 Groundwater regime (where known).

2.6 Grand River Conservation Authority Regulation Limit[3].

3. In addition to an EIS, other studies such as a geotechnical study, fluvio-geomorphic assessment, or hydraulic study may be required to delineate the Regulation Limit.

2.7 Existing land uses and ownership patterns of properties abutting the subject property.

2.8 Existing and proposed Regional and Area Municipal Official Plan designations and zoning.

2.9 Natural and other hazards (e.g., riverine flooding hazards, riverine erosion hazards, other valleylands, meander belt, shallow bedrock, active faults, karst, old waste deposit and disposal sites, leachate, etc.).

2.10 Other *development or site alteration applications* known to be in progress which would affect the identified *environmental features*.

Some of the above information may be available from the respective agencies. In cases where such information is not available, however, the proponent is required to assess *environmental features* and *ecological functions* in the light of applicable Provincial guidelines, the current version of the Natural Heritage Reference Manual, current Significant Wildlife Habitat Technical Guideline, or other generally accepted principles as set out in this Guideline.

3. The approved Terms of Reference for the *Environmental Impact Statement*.

4. Information on the *environmental features* identified in 2.1 on the subject property and on adjacent or *contiguous* lands as defined in the ROP, Area Municipal Official Plans or secondary plans which might also be affected or that might reasonably be expected to be affected, either directly or indirectly, by the proposed *development* or *site alteration*, namely:

4.1 Detailed mapping of the *environmental feature(s)* and nearby related natural features at an appropriate scale showing any boundary interpretations recommended by the applicant.

4.2 Mapping and description of ecological communities within the *environmental features* identified in 2.1 in the study area on and *contiguous to* the site proposed for *development* or *site alteration* to be prepared by *qualified professionals* during the appropriate season(s) using the current published version of Ecological Land Classification (ELC), with such mapping and description taken to the vegetation type level with dominant, abundant, and significant species keyed to the mapped communities.

4.3 Assessment of the quality of vegetation in the study area with reference to successional state, predicted successional pathway, assessment of natural regeneration, habitat specialisation, degree of disturbance, presence of pathogens, and presence and extent of invasive plant species

using qualitative description, and where appropriate, quantitative measures such as the Floristic Quality Assessment Index (FQAI).

4.4 A comprehensive inventory, conducted by qualified professionals in the appropriate seasons, of species occurring in the study area and adjacent lands, including but not limited to:

4.4.1 Vegetation in spring (May), summer (July), and late summer (August-early September), using commonly acceptable sampling and recording methods. See section 11.1.3 for additional detail.

4.4.2 Breeding birds

- Main breeding season: a minimum of two visits, at least a week apart, June 1-21; dates between May 24 and June 30 are acceptable as long as one visit is conducted in the June 1-21 period.
- Time of day and weather conditions consistent with the Ontario Breeding Bird Atlas (OBBA 2001).
- Line transects, point counts or a combination of both are acceptable so long as all areas receive coverage. (See Bibby *et al*. 2000 for bird census techniques.
- Where habitat is suitable, dusk and night visits to document twilight (*e.g.,* American Woodcock, Common Nighthawk) and nocturnal species (*e.g*., rails, bitterns & owls).
- Owls: two visits at least a week apart; survey dates (mostly between March 15 and April 30), time of night, and weather conditions to follow OBBA Standardized Owl Survey Protocol (OBBA 2002). A combination of silent listening and standard playback protocol is recommended.
- When applicable, Ministry of Natural Resources and Forestry protocols should be used to document Species at Risk.
- Whenever possible, field data, including breeding evidence/ behaviours, should be documented on aerial photography. Locations of all significant species should be recorded. OBBA codes (OBBA 2001) and Forest Bird Monitoring Program symbols are recommended (FBMP 2008).

4.4.3 Herpetofauna:

- Newts and mole salamanders: minnow trapping supplemented by active hand searches in suitable habitats adjacent to and around the margins of potential breeding ponds during seasonal migration (i.e., March 15 - April 30).
- If Jefferson Salamanders potentially present, trapping may be necessary in consultation with Ministry of Natural Resources and Forestry . (Note: applications to the Ministry are due February 15).

- Lungless salamanders: active hand searches between mid-May and late September, preferably following wet weather.
- Frogs and toads: Surveys to follow Bird Studies Canada's Marsh Monitoring Program protocol (BSC 2009). Point count stations should be located adjacent to breeding sites. If not feasible, document the distance and direction of calling.
- Turtles: Nesting surveys and visual encounter surveys to detect basking turtles and other habitats utilised by turtles following Ministry of Natural Resources and Forestry protocol for Blanding's Turtle (OMNR 2013b); minimum three visits to detect basking turtles. Follow Ministry protocols if Species at Risk turtles potentially present.
- Snakes:
  - Active hand searches between late April and late June (Ministry of Natural Resources and Forestry Milksnake Survey Protocol for Guelph District (OMNR 2013a).
  - Hibernacula searches: Visual encounter surveys to detect basking snakes during the first sunny, warm days in early spring.
  - Cover board surveys may be conducted where appropriate;
  - Animal Care Protocol and Fish and Wildlife Conservation Act authorisation is required.
  - Queensake surveys for the Grand River in North Dumfries Township.

4.4.4 Fish and other aquatic organisms, especially those used as indicators of environmental quality: using commonly acceptable sampling methods such as the Ontario Stream Assessment Protocol (OSAP) for aquatic organisms and the Ontario Benthos Biomonitoring Network (OBBN). Visual surveys and review of Department of Fisheries and Oceans and Ministry of Natural Resources and Forestry records for provincially rare mussels, including Species at Risk, in the Grand, Nith, Speed, and Conestoga Rivers should be completed for projects that might affect potential habitat.

4.4.5 Lepidoptera, Odonata, and Provincially significant Bumblebees: When habitats are potentially suitable for provincially ranked S1 to S3 species, at least two dedicated surveys in appropriate seasons and weather conditions. Catching and releasing adults is the most reliable way to confirm identification.

4.4.6 Mammals: Targeted surveys for listed mammal species in areas of suitable potential habitat. Examples include American Badger in areas of sandy soils, and bat species in treed areas and in suitable buildings.

4.4.7 Winter wildlife: Two visual encounter surveys between January 1 and February 28, 24 to 72 hours after a snowfall of at least two centimetres. Document all animals, calls, tracks, scat, browse, etc.) and over-wintering habitat use by waterfowl, raptors, wild turkeys, and deer as per the current applicable Significant Wildlife Technical Guideline.

4.4.8 Non-target wildlife: All species observed or detected during fieldwork (e.g., Lepidoptera, Odonata, mammals) should be identified, recorded and integrated into report findings.

4.4.9 Significant Wildlife Habitat (SWH): All potential SWH criteria should be surveyed using current accepted methodologies; some surveys may require specialised expertise (*e.g.* Lepidoptera, Odonata, bat maternity colonies, rare vegetation communities, etc.)

- SWH criteria should be consistent with the current Significant Wildlife Habitat Technical Guide (Ministry of Natural Resources and Forestry, 2000) and most current Ministry SWH Criteria Schedule for Ecoregions 6E & 7E (OMNRF 2015a,b).
- SWH surveys should focus on areas not currently protected or planned for protection.

The final list of SWH criteria to be surveyed should be screened in advance with relevant agencies.

4.4.10 Plants (e.g., Giant Hogweed, Poison Ivy) and animals (e.g., mosquitoes, ticks) likely to cause nuisance and health problems.

4.4.11 Species at Risk not noted above: If potential suitable habitat for other Species at Risk is encountered, contact the Ministry of Natural Resources and Forestry for advice on targeted survey protocols.

In addition, it is recommended that expert local naturalists and residents be consulted with respect to the flora and fauna of the site.

New and emerging techniques may be considered and/or may be required if they provide equal or better inventory results. These include remote sensing using infrared and hyperspectral imagery for large-scale tree inventory, DNA analysis of cryptic species such as Butternut/Butternut hybrids or mole salamander species, and so forth.

4.5 identification of the *ecological*, *hydrological*, hydrogeological, *economic*, and *social functions* of the respective *environmental features* identified pursuant to 4.4 above.

4.6 Groundwater regime based on at least 1 year of continuous groundwater level monitoring[4] showing groundwater contours, flow directions, and vertical gradients; the spatial and temporal variability of groundwater levels and flows; aquitard and aquifer conditions; the locations and elevations of monitoring wells, piezometers and test pits; a record of the dates and duration of observations; and an assessment of the adequacy of the groundwater observations and mapping and a quantitative analysis and summary of the spatial and temporal variability of groundwater levels and flows.

4.7 Analysis of surface water quantity and quality which assesses the interaction between groundwater and surface water features such as wetlands, watercourses, ponds, discharge areas, and existing stormwater management facilities, in terms of contributing drainage area, source of water, drainage patterns, hydroperiod, depth to groundwater within or contiguous to wetland, seasonal high water marks, and other relevant hydrological data.

4.8 Existing environmental management plans including council-approved (Sub)*Watershed Studies*, Master Environmental Servicing Plans, Master Drainage Plans, Community or Secondary Plans.

4.9 Apparent impacts of previous *development applications* or *site alteration,* or other land management activities on the identified *environmental features* and *functions*, including alteration of natural topography, draining or filling of wetlands, removal of woodlands, trails, dumping, excavation and fill, grazing, forestry, and invasive plant and animal species.

4.10 Other relevant information.

5. A discussion of the proposed *development* and/or *site alteration*, with plans showing existing grades, proposed grades, grade changes with contour intervals not exceeding one metre, and where appropriate, structure elevations, of:

5.1 the proposed *development* or *site alteration* in relation to the *environmental features* and other natural features as delineated by the proponent and confirmed by agencies having jurisdiction, including locations of existing and proposed streets and lots, limit of grading, infrastructure, stormwater management facilities, trails, and, where appropriate, other structures;

5.2 reasonable alternatives to the proposal; and

4. Three or more years of continuous groundwater level data may in some instances be required to identify seasonal and annual variations in groundwater elevations.

5.3 alternative designs and/or methods of carrying out the proposal with less *adverse environmental impact*.

6. A concise description of anticipated direct and indirect impacts to the *environmental features* identified in 2.1 and 4 that may reasonably be expected to result from the proposal, alternatives to the proposal, and alternative methods of carrying out the proposal. The impacts should be discussed in terms of their likelihood of occurrence, anticipated areal extent, anticipated duration, and reversibility/irreversibility, and relation to impacts associated with development identified in 2.10. Reference should be made to the definition and examples of *adverse environmental impacts* in the Glossary. Where *fish habitat* is present, the applicant will complete a Risk Assessment Process for Fish Habitat in order to identify the risk of impact to *fish habitat*.

   The above shall include an explanation of the methods and assumptions used to determine the above-mentioned effects of the proposed development.

7. A comparative evaluation of the alternatives identified in item 5 in terms of anticipated *adverse environmental impacts* and other relative advantages and disadvantages. This will result in selection or confirmation of a preferred alternative.

8. The actions required, in the following order of precedence, to prevent, minimize, or *mitigate adverse environmental impacts* to the *environmental features* resulting from the implementation of the alternative selected in 7. This section shall include detailed recommendations for *buffers* consistent with guidance provided in this Guideline, or other appropriate safeguards around *environmental features.*

9. A discussion of opportunities for *ecological enhancement*, *restoration*, and long term conservation and stewardship of natural areas including the conservation, enhancement, or restoration of ecological *linkages* among *environmental features* and other natural features on and *contiguous* to the subject property. Recommendations with respect to linkages should reference Section V of this Guideline.

10. A summary consisting of:

    10.1 A detailed discussion of expected *adverse environmental impacts* on the *environmental features* in relation to policies and definitions in the ROP, applicable Area Municipal Official Plans, Community Plans, international conventions, the Provincial Policy Statement, Conservation Authority regulations and policies, Risk Assessment Process for Fish Habitat, council-approved (sub-)*watershed plans*, Master Environmental Servicing Plans, *Comprehensive Environmental Impact Statements*, or other applicable studies. Where good quality natural habitat within or

contiguous to the *environmental feature* may be irremediably altered by the proposed development, this discussion shall also indicate whether habitat of comparable type, quality, or extent which will not be directly affected by the proposed *development* or *site alteration* exists in the vicinity. Where significant features or species within an *environmental feature* may be adversely affected, this discussion shall also indicate whether similar features or another population of the significant species exists in the vicinity and that that offsite habitat will not be adversely affected resulting in further reduction of the significant species. Any recommended ecological compensation for adverse environmental impacts must be consistent with applicable federal, provincial, municipal, or permitting authority compensation policies and guidelines.

10.2 Recommended conditions of *development* approval to
(a) prevent, minimise, and *mitigate* identified *adverse environmental impacts* identified in the *Environmental Impact Statement*,
(b) establish *buffers* and appropriate demarcation between the *environmental feature*(s) and proposed *development*,
(c) realise opportunities for environmental *enhancement* and/or *restoration*, and
(d) achieve the objectives of applicable council-approved sub-*watershed plans* or community plans.

This discussion shall assess the adequacy of recommended measures to prevent or *mitigate adverse environmental impacts*, and shall assess the significance of impacts likely to persist after mitigation.

10.3 Recommendations for long term management, conservation, *enhancement*, or *restoration* of significant *environmental features* and *functions* on the subject property or which may have to be considered for adjoining lands.

10.4 Recommendations for compliance and effectiveness monitoring of the site including items/areas of particular concern, meaningful benchmarks, parameters, locations, timelines, frequency, targets to ensure that mitigation measures recommended in the *Environmental Impact Statement* have been implemented, are adequate, and are performing as intended along with a plan to address deviations from desired outcomes in an adaptive management framework.

11. The following appendices:

11.1 Species lists of organisms observed in the study area as well as a detailed timeline showing dates when bio-physical information was collected in the study area and the field workers responsible for collection of the data. The above information, along with the species recorded,

should be specific to each ecological unit as identified by mapping in the report and should be consistent with the following:

11.1.1 The Natural Heritage Information Centre (NHIC) Ontario Vascular Plant Species List shall be used for all vascular plant species names. This list is updated on a regular basis and is publicly available online or by request from the NHIC. Both the scientific and common name shall be given for each species on the plant list. Regional or Provincial lists shall be consulted for the preferred taxonomy and nomenclature for all other organisms.

11.1.2 Species used to characterise vegetation communities through the current version of the Ecological Land Classification shall be identified as dominant, abundant, occasional, or rare.

11.1.3 While presence is the only requirement for recording common species, most vascular plant species listed on the Region's "Significant Vascular Plant List" shall be further qualified as to precise location, distribution and approximate numbers. Species that are susceptible to collecting (i.e., ***Panax, Drosera***, spp.), or any species considered Vulnerable, Threatened, or Endangered should NOT be qualified in a published appendix. Rather, Federal, Provincial, Regional, Grand River Conservation Authority, and Area Municipal staff should be notified directly of such information. Locations should be defined in NAD83 UTM coordinates or most currently acceptable standards, if possible. Abundance should be expressed using standard scales such as Doman or Braun-Blanquet.

11.1.4 Breeding evidence for birds is essential to properly assess, *mitigate*, and where necessary compensate potential adverse environmental impacts, Current protocols and conventions should be followed in both collecting and reporting data for all species.

- Dates of each survey visit and survey period (time of day), number of hours, weather conditions (temperature, % cloud cover, precipitation, wind speed, wind direction), and noise level).
- Map showing line transect routes, point count stations, and total area surveyed.
- Locations of locally rare or uncommon species, regionally significant species, and provincially significant species (*i.e*. S1 to S3 species) listed according to NAD 83 UTM coordinates and shown on constraint mapping.

- Conservation status information for each species: Region of Waterloo; Bird Conservation Region 13, (Environment Canada, 2014); provincial SRanks & SARO (NHIC 2015); and national (COSEWIC or SARA).
- Area sensitivity (Ministry of Natural Resources and Forestry, 2000).
- Original field notes, preferably mapped on aerial photography, should be included in an appendix.
- Field notes Locations of Species at Risk (SAR) should be shared confidentially with municipal and agency staff.

Note: As some Species at Risk information is considered sensitive, it is recommended that the Ministry of Natural Resources and Forestry be contacted prior to sharing such information with the public.

11.2 Relevant Ecological Land Classification geo-referenced mapping and datasheets, including those for canopy description and soil moisture regime analysis.

11.3 Detailed descriptions of methodologies used to gather field data, model hydrological or hydrogeological regimes (including a water balance), or make assumptions about other biophysical processes. The above shall include an explanation of the methods and assumptions, and potential errors arising therefrom, used to determine the above-mentioned effects of the proposed development.

11.4 A geo-referenced monitoring plan consistent with item 10.4 above.

11.5 A list of agencies and individuals contacted in the preparation of the report, the date of contact, information supplied, and the contacts' addresses, phone numbers and/or e-mail addresses. This must include copies of correspondence with appropriate agencies when a *Threatened or Endangered Species*, or other item subject to Provincial or Federal legislation or regulation is identified in the course of fieldwork.

11.6 Bibliography of references cited.

11.7 Current *curricula vitae* of the principal author(s), and a list of other technical staff who contributed to the document.

12. Format of the *Environmental Impact Statement*

12.1 The *Environmental Impact Statement* shall be printed on 8½ by 11 inch paper, ***double-sided to conserve paper and file storage space***. Looseleaf binders will not be accepted. An electronic copy conforming

to AODA requirements or website where the report is posted shall also be provided.

12.2 Maps up to 11 inches by 17 inches shall be bound into the report. Larger maps shall be inserted in a pocket inside the back cover of the report.

12.3 The title page shall list the name of the proponent, address, and legal description of the subject property, planning file number (i.e., 30T, OP, ZCA), principal author(s) of the report and/or their firm, and the date the report was completed.

12.4 An executive summary shall follow the title page.

12.5 Following the Executive Summary, the *Environmental Impact Statement* shall contain a statement to the effect of whether the report has been edited, by whom, and for what purpose, including normal editing which would occur by the principal author with respect to text prepared by the firm's field staff.

12.6 The *Environmental Impact Statement* shall be signed by the lead author(s) and their firms.

II. Guideline for the Preparation of an Environmental Impact Statement where the Terms of Reference have been Scoped

Regional Official Plan

7.G.1 An *Environmental Impact Statement* may be required to identify and evaluate the potential effects of a proposed *development* or *site alteration* on elements of the Greenlands Network, and recommend means of preventing, minimizing or mitigating these impacts, as well as enhancing or restoring the quality and *connectivity* of elements of the Greenlands Network. An *Environmental Impact Statement* may also be used to identify and evaluate elements of the Greenlands Network and interpret the boundaries of these elements based on ecological considerations. The *Province*, Region, Area Municipalities and the Grand River Conservation Authority will co-ordinate the requirements for the preparation of *Environmental Impact Statements*.

7.G.3 The need for, and scope of *Environmental Impact Statements,* will be determined in collaboration with affected Area Municipalities, the Province, the Grand River Conservation Authority by:

(a) the *Province,* for *development* or *site alteration* potentially affecting Habitat of Endangered or Threatened Species*,* or;

(b) the Region, for *development* or *site alteration* potentially affecting:

i) Landscape Level Systems, not including Significant Valleys;

ii) Core Environmental Features; or

iii) *Environmentally Significant Discharge Areas* and/or *Environmentally Significant Recharge Areas* that sustain Core Environmental Features.

(c) the Grand River Conservation Authority for Significant Valleys, Provincially Significant Wetlands located outside Environmentally Sensitive Policy Areas and *wetlands* not identified as provincially *significant*, including unevaluated *wetlands*;

(d) the affected Area Municipality for *development applications* potentially affecting other elements of the Greenlands Network; and

(e) the Federal Department of Fisheries and Oceans, or its delegate, for *fish habitat.*

7.G.4 The following provisions will apply to *Environmental Impact Statements* required by the Region under Policy 7.G.3(b):

(a) the *Environmental Impact Statement* will be prepared in accordance with the provisions of the Regional Greenlands Network Implementation Guideline;

(b) the Region may reduce the scope and/or content of the *Environmental Impact Statement* where the impacts of the proposed *development* or *site alteration* upon an element of the Greenlands Network are expected to be limited in area and/or scope, or where other environmental studies fulfilling the requirements of an *Environmental Impact Statement* have been previously been prepared;

Application

The Regional Official Plan (ROP) provides for a reduction in the scope and/or content of the Terms of Reference of an *Environmental Impact Statement* where the impacts of the proposed *development* or *site alteration* upon an element of the Greenlands Network are expected to be limited in area and/or scope, or where other environmental studies such as *Comprehensive Environmental Impact Statements* or council-approved *watershed studies or* Master Environmental Servicing Plans*,* which

fulfill some of the requirements of an *Environmental Impact Statement,* have previously been completed.

In accordance with policy 7.G.4 of the ***Regional Official*** Plan, this Guideline will apply when a Scoped *Environmental Impact Statement* is required for *development* or *site alteration* within or *contiguous to* elements of the Greenlands Network.

To ensure that all applicable agency interests are addressed, that terms of reference for the Scoped *Environmental Impact Statement* will be approved during or following *pre-submission consultation*.

Purpose

The purpose of this guideline is to ensure appropriate and consistent methods are applied in the preparation of Scoped *Environmental Impact Statements*. The Terms of Reference of a Scoped *Environmental Impact Statement* will focus on areas or issues of particular concern identified by the agency(ies) having jurisdiction. Subject to applicable policy, scoping is done collaboratively by the approval agency(ies) in a *pre-submission consultation* process. Applicants are strongly advised not to commence the *Environmental Impact Statement* until the Terms of Reference have been accepted by the relevant agencies as this could result in the rejection of all or part of the Scoped *Environmental Impact Statement* or the requirement for additions or revisions which could cause delays or generate further costs to the applicant. When a Scoped Environmental Impact Statement is required, it must be submitted as part of a complete application as directed by the approval authority(ies), and be prepared consistent with this Guideline.

Once the Terms of Reference have been scoped, consultants are responsible to report and discuss new information that emerges during site investigations which may be relevant to the consideration of the *development application* or *site alteration*. This may include, for example, such items as the unexpected discovery of an undocumented groundwater *discharge area*, Regionally significant species of flora and fauna, or other information which increases knowledge about the *environmental feature*, or identifies previously unanticipated potential for *adverse environmental impacts*. Such changes should be reported to staff of the relevant agency(ies) at the earliest opportunity to determine whether the Terms of Reference need to be updated.

Guideline for a Scoped *Environmental Impact Statement*

A Scoped *Environmental Impact Statement* required pursuant to the policies of the Provincial Policy Statement, and/or the Provincial Greenbelt, and/or the Regional Official Plan and/or an Area Municipal Official Plan, and/or the Grand River Conservation Authority will consist of the following items, as may be further scoped by the relevant agency(ies):

1. A statement of the purpose and rationale of the *application* for *development* or *site alteration*.

2. Maps, site plans, and/or the most recently available airphotos at an appropriate scale showing previously documented and newly obtained information on:

   2.1 The location of lands affected by the *application* for *development* or *site alteration* in relation to elements of the Greenlands Network, as defined in the Regional Official Plan*,* and/or Area Municipal Official Plan*,* or shown on mapping maintained by the Grand River Conservation Authority, or the Ministry of Natural Resources and Forestry including but not including but not necessarily limited to the following:
   - 2.1.1 Habitat of *Endangered and Threatened species* identified by the Ministry of Natural Resources and Forestry.
   - 2.1.2 Provincially Significant Wetlands identified by the Ministry of Natural Resources and Forestry and other wetlands identified by the Grand River Conservation Authority. (Unevaluated wetlands on and contiguous to the subject lands should be assessed to determine if an individual Ontario Wetland Evaluation System (OWES) evaluation should be completed as part of the *Environmental Impact Statement*, or whether the wetland should be complexed with an existing evaluated wetland.)
   - 2.1.3 Provincially and Regionally Significant Life Science and Earth Science Areas of Natural and Scientific Interest identified by the Ministry of Natural Resources and Forestry.
   - 2.1.4 Elements of the Natural Heritage System identified by the Greenbelt Plan.
   - 2.1.5 Environmentally Sensitive Policy Areas designated by the Region,
   - 2.1.6 Significant Woodlands identified by the Region.
   - 2.1.7 Environmentally Significant Valley Features designated by the Region.
   - 2.1.8 Significant Wildlife Habitat, as defined by the Provincial Policy Statement, the current Natural Heritage Reference Manual, the Ministry of Natural Resources and Forestry's Eco-region criteria, and, where applicable, Ecological Land Classification.
   - 2.1.9 *Fish habitat*, as defined by the ***Fisheries Act***.
   - 2.1.10 Locally Significant Natural Areas and/or *Supporting Environmental Features* identified by an Area Municipality and/or Grand River Conservation Authority.
   - 2.1.11 Surface water features.
   - 2.1.12 Groundwater recharge and/or *discharge areas*.
   - 2.1.13 Other natural high quality or unusual *environmental features* or *functions* such as good representative communities of native

species typical of the region, natural corridors, migration staging areas, and deeryards.

2.2 Ecologically functional natural *linkages* and potential *linkage* enhancement opportunities among elements of the Greenlands Network.

2.3 Topography - showing the relationship of the proposed *development* or *site alteration* to *environmental features*.

2.4 Grand River Conservation Authority Regulation Limit[5].

2.5 Natural and other hazards (e.g., riverine flooding hazards, riverine erosion hazards, other valleylands, meander belt, shallow bedrock, active faults, karst, old waste deposit and disposal sites, leachate, etc.).

2.6 Other *development applications* known to be in progress which would affect the identified *environmental features*.

Some of the above information may be available from the respective agencies. In cases where such information is not available, however, the proponent is required to assess *environmental features* and *ecological functions* in the light of applicable Provincial guidelines, the current version of the Natural Heritage Reference Manual, or other generally accepted principles as set out in this Guideline.

3. The approved Terms of Reference for the Scoped *Environmental Impact Statement*.

4. Information requested pursuant to the approved Terms of Reference on any *environmental features* identified in 2.1 on the subject property and on *adjacent* or *contiguous* lands as defined in the ROP, Area Municipal Official Plans or secondary plans which is considered relevant to the items to which the *Environmental Impact Statement* has been scoped. Depending on the approved Terms of Reference, this may include.

4.1 Detailed mapping of the *environmental feature(s)* and nearby related natural features at an appropriate scale showing any boundary interpretations recommended by the applicant.

4.2 Mapping and description of ecological communities within the *environmental features* identified in 2.1 in the study area on and *contiguous to* the site proposed for *development* or *site alteration* by *qualified professionals* during the appropriate season(s) using the current

5. In addition to an EIS, other studies such as a geotechnical study, fluvio-geomorphic assessment, or hydraulic study may be required to delineate the Regulation Limit.

published version of Ecological Land Classification (ELC), with such mapping and description taken to the vegetation type level with dominant, abundant, and significant species keyed to the mapped communities.

4.3 Assessment of vegetation quality in the study area with reference to successional state, predicted successional pathway, assessment of natural regeneration, habitat specialisation, degree of disturbance, presence of pathogens, and extent of invasive plant species using qualitative description, and where appropriate, quantitative measures such as the Floristic Quality Assessment Index (FQAI).

4.4 A comprehensive inventory, conducted by qualified professionals in the appropriate seasons, of species occurring in the study area and adjacent lands, including but not limited to:

4.4.1 Vegetation in spring (May), summer (July), and late summer (August-early September), using commonly acceptable sampling and recording methods. See section 10.1.3 for additional detail.

4.4.2 Breeding birds:

- Main breeding season: a minimum of two visits, at least a week apart, June 1-21; dates between May 24 and June 30 are acceptable as long as one visit conducted in the June 1-21 period.
- Time of day and weather conditions consistent with the **Ontario Breeding Bird Atlas** (OBBA 2001).
- Line transects, point counts or a combination of both are acceptable so long as all areas receive coverage. (See Bibby *et al*. 2000 for bird census techniques.
- Where habitat is suitable, dusk and night visits to document twilight (*e.g.,* American Woodcock, Common Nighthawk) and nocturnal species (*e.g*., rails, bitterns & owls).
- Owls: two visits at least a week apart; survey dates (mostly between March 15 – April 30), time of night, and weather conditions to follow OBBA Standardized Owl Survey protocol (OBBA 2002). A combination of silent listening and standard playback protocol is recommended.
- When applicable, Ministry of Natural Resources and Forestry protocols should be used to document Species at Risk. Whenever possible, field data, including breeding evidence/ behaviours, should be documented on aerial photography. Locations of all significant species should be recorded. OBBA codes (OBBA 2001) and Forest Bird Monitoring Program symbols are recommended (FBMP 2008).

4.4.3 Herpetofauna:

- Newts and mole salamanders: minnow trapping supplemented by active hand searches in suitable habitats adjacent to and around the margins of potential breeding ponds during seasonal migration (i.e., March 15 - April 30).
- If Jefferson Salamanders potentially present, trapping may be necessary in consultation with Ministry of Natural Resources and Forestry. (Note: applications to the Ministry are due by February 15).
- Lungless salamanders: active hand searches between mid-May and late September, preferably following wet weather.
- Frogs and toads: Surveys to follow Bird Studies Canada's Marsh Monitoring Program protocol (BSC 2009). Point count stations should be located adjacent to breeding sites. If not feasible, document the distance and direction of calling.
- Turtles: Nesting surveys and visual encounter surveys to detect basking turtles and other habitats utilised by turtles following Ministry of Natural Resources and Forestry protocol for Blanding's Turtle (Ministry of Natural Resources, 2013b); minimum three visits to detect basking turtles. Follow Ministry protocols if Species at Risk turtles potentially present.
- Snakes:
  - Active hand searches between late April and late June (Ministry of Natural Resources and Forestry Milksnake survey protocol for Guelph District (Ministry of Natural Resources, 2013a).
  - Hibernacula searches: Visual encounter surveys to detect basking snakes during the first sunny, warm days in early spring.
  - Cover board surveys may be conducted where appropriate;
  - Animal Care Protocol and Fish and Wildlife Conservation Act authorisation is required.
  - Queensake surveys for the Grand River in North Dumfries Township.

4.4.4 Fish and other aquatic organisms, especially those used as indicators of environmental quality: using commonly acceptable sampling methods such as the Ontario Stream Assessment Protocol (OSAP) for aquatic organisms and the Ontario Benthos Biomonitoring Network (OBBN). Visual surveys and review of Department of Fisheries and Oceans and the Ministry of Natural Resources and Forestry records for provincially rare mussels, including Species at Risk, in the Grand, Nith, Speed, and Conestoga Rivers should be completed for projects that might affect potential habitat.

4.4.5 Lepidoptera, Odonata, and Provincially Significant Bumblebees: When habitats are potentially suitable for provincially ranked S1 to S3 species, at least two dedicated surveys in appropriate seasons and weather conditions. Catching and releasing adults is the most reliable way to confirm identification.

4.4.6 Mammals
Targeted surveys for listed mammal species in areas of suitable potential habitat. Examples include American Badger in areas of sandy soils, and bat species in treed areas and in suitable buildings.

4.4.7 Winter wildlife: Two visual encounter surveys between January 1 and February 28, 24 to 72 hours after a snowfall of at least two centimetres. Document all animals, calls, tracks, scat, browse, etc.) and over-wintering habitat use by waterfowl, raptors, wild turkeys, and deer as per the current applicable Significant Wildlife Technical Guideline.

4.4.8 Non-target wildlife: All species observed or detected during fieldwork (e.g., Lepidoptera, Odonata, mammals) should be identified, recorded and integrated into report findings.

4.4.9 Significant Wildlife Habitat (SWH): All potential SWH criteria should be surveyed using current accepted methodologies; some surveys may require specialized expertise (*e.g.* Lepidoptera, Odonata, bat maternity colonies, rare vegetation communities, etc.)

- SWH criteria should be consistent with the current Significant Wildlife Habitat Technical Guide (Ministry of Natural Resources, 2000) and most current Ministry of Natural Resources and Forestry, SWH Criteria Schedule for Ecoregions 6E & 7E (Ministry of Natural Resources and Forestry, 2015a,b).
- SWH surveys should focus on areas not currently protected or planned for protection.

The final list of SWH criteria to be surveyed should be screened in advance with relevant agencies.

4.4.10 Plants (e.g., Giant Hogweed, Poison Ivy) and animals (e.g., mosquitoes, ticks) likely to cause nuisance and health problems.

4.4.11 Species at Risk not noted above: If potential suitable habitat for other Species at Risk is encountered, contact the M.N.R.F. for advice on targeted survey protocols.

In addition, it is recommended that expert local naturalists and residents be consulted with respect to the flora and fauna of the site.

New and emerging techniques may be considered and/or may be required if they provide equal or better inventory results. These include remote sensing using infrared and hyperspectral imagery for large-scale tree inventory, DNA analysis of cryptic species such as Butternut/Butternut hybrids or mole salamander species, and so forth.

4.5 Identification of the *ecological*, *hydrological*, hydrogeological, economic and *social functions* of the *environmental features* identified in 4.4 above.

4.6 Groundwater regime based on at least one year of continuous groundwater level monitoring[6] showing groundwater contours, flow directions, and vertical gradients; and the locations and elevations of monitoring wells, piezometers and test pits, along with a record of the dates and duration of observations; an assessment of the adequacy of the groundwater observations and mapping, and a quantitative analysis and summary of the spatial and temporal variability of groundwater levels and flows.

4.7 Analysis of surface water quantity and quality which assesses the interaction between groundwater and surface water features such as wetlands, watercourses, ponds, discharge areas, and existing stormwater management facilities in terms of contributing drainage area, source of water, drainage patterns, hydroperiod, depth to groundwater within or contiguous to wetland, seasonal high water marks, and other relevant hydrological data.

4.8 Existing environmental management plans including council-approved (Sub-) *Watershed Studies*, Master Drainage Plans, Master Environmental Servicing Plans, Community or Secondary Plans.

4.9 Apparent impacts of previous *development applications* or *site alteration,* or other land management activities on the identified *environmental features* and *functions*, including alteration of natural topography, draining or filling of wetlands, removal of woodlands, trails, dumping, excavation and fill, grazing, forestry, and invasive plant and animal species.

4.10 Other relevant information.

5. A discussion of the proposed *development* and/or *site alteration* in relation to the *environmental features* as delimited by the proponent and confirmed by agencies having jurisdiction. Where necessary, this may include plans

6 Three or more years of continuous groundwater level data may in some instances be required to identify seasonal and annual variations in groundwater elevations.

showing existing and proposed grades with contour intervals not exceeding one metre, and where appropriate, structure elevations of the proposal, including locations of existing and proposed streets and lots, infrastructure, stormwater management facilities, trails, and, other structures.

6. A concise description of anticipated direct and indirect impacts to the *environmental features* identified in 2.1 and 4 above that may reasonably be expected to result from the proposed *development* or *site alteration*. The impacts should be discussed in terms of their likelihood of occurrence, anticipated areal extent, anticipated duration, and reversibility/irreversibility. Reference should be made to the definition and examples of *adverse environmental impacts* in the Glossary. Where *fish habitat* is present, the applicant will complete a Risk Assessment Process for Fish Habitat in order to identify the risk of *development* and *site alteration* impacts to *fish habitat*. The above shall include an explanation of the methods and assumptions used to determine the identified effects of the proposed *development* or *site alteration*.

7. The actions required, in the following order of precedence, to prevent, minimise, or *mitigate adverse environmental impacts* to the *environmental features* resulting from the proposed *development* or *site alteration*. This section shall include detailed recommendations for *buffers* consistent with guidance provided in this Guideline, or other appropriate safeguards around *environmental features.*

8. A discussion of opportunities for *ecological enhancement*, *restoration*, and long term conservation and stewardship of *environmental features* including the conservation, enhancement, or restoration of ecological *linkages* among *environmental features* and other natural features on and *contiguous* to the subject property. Recommendations with respect to linkages should reference Section V of this Guideline.

9. A summary consisting of:

    9.1 A detailed discussion of expected *adverse environmental impacts* on the *environmental features* in relation to policies and definitions in the ROP, applicable Area Municipal Official Plans, Community Plans, international conventions, the Provincial Policy Statement, Conservation Authority regulations and policies, Risk Assessment Process for Fish Habitat, council-approved (sub-)*watershed plans*, Master Environmental Servicing Plans, *Comprehensive Environmental Impact Statements*, or other applicable studies. Where good quality natural habitat within or *contiguous* to the *environmental feature* may be irremediably altered by the proposed development, this discussion shall also indicate whether habitat of comparable type, quality, or extent which will not be directly affected by the proposed *development* or *site alteration* exists in the vicinity. Where significant features or species within an *environmental feature* may be

adversely affected, this discussion shall also indicate whether similar features or another population of the significant species exists in the vicinity and that that offsite habitat will not be adversely affected resulting in further reduction of the significant species. Any recommended ecological compensation for adverse environmental impacts must be consistent with applicable federal, provincial, municipal or permitting authority compensation policies and guidelines.

9.2 Recommended conditions of *development* approval to:
(a) prevent, minimise, and *mitigate* identified *adverse environmental impacts*,
(b) establish *buffers* and appropriate demarcation between the *environmental feature*(s) and proposed *development*,
(c) realise opportunities for environmental *enhancement* and/or *restoration*,
(d) meet the objectives of applicable council-approved sub-*watershed plans* or community plans.

This discussion shall assess the adequacy of recommended measures to prevent or *mitigate adverse environmental impacts*, and shall assess the significance of impacts likely to persist after mitigation.

9.3 Recommendations for long term management, conservation, *enhancement*, or *restoration* of significant *environmental features* and *functions* on the subject property or which may have to be considered for adjoining lands.

9.4 Recommendations for compliance and effectiveness monitoring the site including items/areas of particular concern, meaningful benchmarks and parameters, locations, timelines, frequency, targets, and recommendations for an adaptive management framework plan to address deviations from desired outcomes in.

10. The following appendices (where such information is required by the Terms of Reference):

10.1 Species lists of organisms observed in the study area while carrying out the study as well as a detailed timeline showing dates when bio-physical information was collected in the study area and the field workers responsible for collection of the data. The above information, along with the species recorded, should be specific to each ecological unit as identified by mapping in the report and should be consistent with the following:

10.1.1 The Natural Heritage Information Centre (NHIC) Ontario Vascular Plant Species List shall be used for all vascular plant species names. This list is updated on a regular basis and is

publicly available online or by request from the NHIC. Both the scientific and common name shall be given for each species on the plant list. Regional or Provincial lists shall be consulted for the preferred taxonomy and nomenclature for all other organisms.

10.1.2 Species used to characterise vegetation communities through the current version of the Ecological Land Classification shall be identified as dominant, abundant, occasional, or rare.

10.1.3 While presence is the only requirement for recording common species, most vascular plant species listed on the Region's "Significant Vascular Plant List" shall be further qualified as to precise location, distribution and approximate numbers. Species that are susceptible to collecting (i.e., ***Panax, Drosera***, spp.), or any species considered Vulnerable, Threatened, or Endangered should NOT be qualified in a published appendix. Rather, Regional, GRCA, and Area Municipal staff should be notified directly of such information. Locations should be defined in NAD83 UTM coordinates or most currently acceptable standards, if possible. Abundance should be expressed using standard scales such as Doman or Braun-Blanquet.

10.1.4 Breeding evidence for birds is essential to properly assess, *mitigate*, and where necessary compensate potential adverse environmental impacts, Current protocols and conventions should be followed in both collecting and reporting data for all species.

- Dates of each survey visit and survey period (time of day), number of hours, weather conditions (temperature, % cloud cover, precipitation, wind speed, wind direction), and noise level).
- Map showing line transect routes, point count stations, and total area surveyed.
- Locations of locally rare or uncommon species, regionally significant species, and provincially significant species (*i.e*. S1 to S3 species) listed according to NAD 83 UTM coordinates and shown on constraint mapping.
- Conservation status information for each species: Region of Waterloo; Bird Conservation Region 13, (Environment Canada, 2014); provincial SRanks & SARO (NHIC 2015); and national (COSEWIC or SARA).
- Area sensitivity (Ministry of Natural Resources, 2000).
- Original field notes, preferably mapped on aerial photography, should be included in an appendix.

- field notes Locations of Species at Risk (SAR) should be shared confidentially shared with municipal and agency staff.

Note: As some Species at Risk information is considered sensitive, it is recommended that the Ministry of Natural Resources and Forestry be contacted prior to sharing such information with the public.

10.2 Relevant Ecological Land Classification geo-referenced mapping and datasheets, including those for canopy description and soil moisture regime analysis.

10.3 Detailed descriptions of methodologies used to gather field data, model hydrological or hydrogeological regimes (including a water balance), or make assumptions about other biophysical processes. The above shall include an explanation of the methods and assumptions, and potential errors arising therefrom, used to determine the above-mentioned effects of the proposed development.

10.4 A geo-referenced monitoring plan consistent with item 9.4 above.

10.5 A list of agencies and individuals contacted in the preparation of the report, the date of contact, information supplied, and the contacts' addresses, phone numbers and/or e-mail addresses. This must include copies of correspondence with appropriate agencies when a *Threatened or Endangered Species*, or other item subject to Provincial or Federal legislation or regulation is identified in the course of fieldwork.

10.6 Bibliography of references cited.

10.7 Current *curricula vitae* of the principal author(s), and a list of other technical staff who contributed to the document.

11. Format of the Scoped *Environmental Impact Statement*

11.1 The scoped *Environmental Impact Statement* shall be printed on 8½ by 11 inch paper, ***double-sided to conserve paper and file space***. Looseleaf binders will not be accepted. An electronic copy conforming to AODA requirements or website where the report is posted shall also be provided.

11.2 Maps up to 11 inches by 17 inches shall be bound into the report. Larger maps shall be inserted in a pocket inside the back cover of the report.

11.3 The title page shall list the name of the proponent, address and legal description of the subject property, planning file number (i.e., 30T, OP, ZCA), principal author(s) of the report and/or their firm, and the date the report was completed.

11.4 An executive summary shall follow the title page.

11.5 Following the Executive Summary, the *Environmental Impact Statement* shall contain a statement to the effect of whether the report has been edited, by whom, and for what purpose, including normal editing which would occur by the principal author with respect to text prepared by the firm's field staff.

11.6 The scoped *Environmental Impact Statement* shall be signed by the lead author(s) and their firms.

III. Guideline for Interpreting the Boundaries of *Environmental Features*

Regional Official Plan

7.A.6 Interpretation of the boundaries of Landscape Level Systems and Core Environmental Features, as required to support the review of *development applications*, will be achieved through the completion of *Environmental Impact Statements* or other appropriate studies in accordance with the policies in Section 7.G.

7.A.7 Boundary interpretations not consistent with the Technical Appendix for Landscape Level Systems and Core Environmental Features must be approved by Regional Council, in consultation with the *Province*, Area Municipalities, the Grand River Conservation Authority and other stakeholders.

7.A.8 Boundary interpretations not generally in conformity with the Greenlands Network as shown on Map 4 will require an amendment to this Plan.

1. Application

This guideline will apply in interpreting the boundaries of *Core Environmental Features* designated in the Regional Official Plan but excluding Habitat of *Endangered or Threatened Species*, which is identified by the *Province.* Area Municipalities may also apply the Guideline to interpret boundaries of *Supporting Environmental Features* designated in Area Municipal Official Plans.

2. Purpose

The preliminary delineation of *environmental features* is usually undertaken through air photo interpretation. When *development* or *site alteration* are proposed, boundaries need to be more precisely interpreted through site-specific fieldwork preparatory to technical studies such as *Environmental Impact Statements,* draft plans of subdivision, and site plans. The purpose of this guideline is to:

a. guide interpretation of the small-scale mapping of *Core Environmental Features* shown on Map 4 in the ROP and at a larger scale in the ROP Environmental Technical Appendix (1:5000 to 1:1000), or as may be required in support of an *application* for *development* and/or *site alteration*;
b. establish a consistent basis for delineating existing *Core Environmental Features* and *Supporting Environmental Features* in *Environmental Impact Statements*, as well as other features which may be identified in the future;
c. document a replicable process for producing credible GIS-based mapping, which can be used as a long-term monitoring tool; and
d. develop a common understanding among agency staff, environmental advisory committees, and *development* proponents for interpreting the boundaries of *environmental features*.

3. Principles

The boundaries of *Core Environmental Features* and *Supporting Environmental Features* can be defined using an appropriate combination of vegetation features, driplines, wetland boundaries, topography, or land use. For the purposes of implementing the policies of the ROP, boundary interpretations are guided by the following principles:

3.1 The establishment of credible boundary interpretations is dependent on scale and resolution, both of the source information and the mapping to be produced. The working scale for this exercise is generally in the range of 1:5000 to 1:2000. Mapping of elements of the Greenlands Network in the 2015 ROP is at a scale of 1: 184,549 (or 1 centimetre = ≈2 kilometres). Mapping of Environmentally Sensitive Policy Areas (ESPAs) and Provincially Significant Wetlands in the 1995 Regional Official Policies Plan was at a slightly smaller scale of 1:250 000. ESPA mapping in the 1985 Technical Appendix was at 1:10 000.

3.2 In defining most *Core Environmental Feature or Supporting Environmental Feature* boundaries, consideration must be given to land uses on both sides of the proposed boundary, as these affect the *ecological functions* of the *environmental feature*. Boundaries should reflect the most abrupt change in land use or habitat type, while recognising that, in reality, the boundary will always be a continuum from an ecological perspective. (This may not apply to certain ESPAs or *Environmentally Significant Valley Features* defined primarily on earth science criteria).

An *environmental feature* needs to be evaluated as a continuous unit containing natural habitats of different types and varying quality. If there is variation around the periphery of an *environmental feature* (i.e. where a wetland or prairie remnant extends beyond the dripline of existing mapped limits of an ESPA or *Significant Woodland*), the extended area will normally be determined to represent the boundary.

3.3 In areas where geomorphology helps define an *environmental feature*, a perceptible break in slope or topographical contour may be interpreted to be the most appropriate boundary of the *environmental feature*.

3.4 Previous site-specific boundary determinations by the Ecological and Environmental Advisory Committee and/or Regional Council of Regionally significant *environmental features* must be respected. However, recognising that changing land uses and/or natural succession over time may have rendered some of these determinations obsolete, there may be a need to revisit them at the time subsequent *development* or *site alteration* is proposed.

3.5 Although the digital format of the boundary mapping implies a high degree of precision, the boundaries should still be regarded as approximate and therefore subject to further site-specific interpretation based on fieldwork carried out in support of *development applications* or in other circumstances.

3.6 Wherever possible, boundaries shall be staked in the field in the presence of the staff of agencies having jurisdiction, surveyed, and shown on planning documents.

4. Guidelines for Interpreting Boundaries of *Environmental Features*

4.1 **"Bays" and "Inlets":** Active cultivation and cropping (including lawns and similar intensive uses) on the periphery of a *Core Environmental Feature* or *Supporting Environmental Feature* are excluded regardless of the size or shape of the intrusion. (Exception: ESPAs or Environmentally Significant Valley Features designated wholly or partly on earth science criteria may include agricultural or other land uses that would otherwise be excluded).

4.2 **"Islands":** Isolated patches of land within the interior of a *Core Environmental Feature* or *Supporting Environmental Feature,* which are experiencing ongoing active land use not consistent with the natural habitat of the designation, are generally excluded if larger than one hectare. Smaller "islands" are included within the feature. Subsequent permanent abandonment of active human use or *ecological restoration* would qualify an "island" for inclusion.

4.3 **Dwellings:** The previous rules apply to dwellings within *Core Environmental Features* or *Supporting Environmental Features*. Generally, if there is lawn frontage on the road, the house and yard are excluded. Otherwise, they are treated as small "islands" within the feature.

4.4 **Roads:** Roads that divide a *Core Environmental Feature* or *Supporting Environmental Feature* are excluded where they pose a significant barrier to the movement of wildlife. In some cases, laneways that connect "islands" to the surrounding land use may be excluded. Roads without shoulders and little-travelled roads are generally included. In no case is a road or lane with a continuous tree canopy excluded.

4.5 **"Peninsulas":** Projections that differ significantly in habitat character from the main body of a *Core Environmental Feature* or *Supporting Environmental Feature* are excluded unless they appear to provide some significant supporting *ecological function*. Thus, a small wetland contiguous to an upland forest would probably be included, whereas a contiguous hedgerow would not (however, note the linkage criterion below).

4.6 **"Ecologically Functional Linkages":** Where habitats of marginal quality abut a *Core Environmental Feature* or *Supporting Environmental Feature*, they may be included where they facilitate the movement of wildlife.

4.7 **Plantations or Thickets:** Plantations or thickets projecting out from *Core Environmental Features* or *Supporting Environmental Features* are generally excluded unless the plantation provides habitat for Regionally significant species or serves an important *buffer* function for sensitive natural habitat within the area. If the exclusion of a plantation would increase the perimeter-to-area ratio of the *environmental feature* (i.e., by creating a "bay"), it is included. Where they occur in the interior of *Core Environmental Features* or *Supporting Environmental Features*, plantations are always included.

4.8 **Old Fields:** Long-abandoned fields or pastures on the margins of *Core Environmental Features* or *Supporting Environmental Features* often consist of successional habitats that may fulfill an important supporting role to the *environmental feature or* contribute significantly to its indigenous biodiversity. In either case, they would normally be included, although fieldwork may be necessary in order to verify the value of the habitat. Where old fields occur in the interior or in narrow bays where they serve to reduce the perimeter-to-area ratio of the *environmental feature*, they are always included.

5. Procedure for the Delineation of *Environmental Features*

5.1 **Wetland Boundary Delineation:** Wetland boundaries should be interpreted by *qualified professionals* in accordance with the most recent edition of the Ontario Wetland Evaluation System (OWES) and GRCA Wetland Evaluation Protocol. Such interpretation should normally be carried out in the field by a certified wetland evaluator who has successfully completed the OWES course on behalf of the applicant for proposed *development* or *site alteration*, and subsequently verified by Ministry of Natural Resources and Forestry or Grand River Conservation Authority staff, as required.

5.2 **Woodlands and other Upland Habitats:** The boundaries of woodlands shall generally be interpreted to coincide with the *dripline* of the trees and/or indigenous shrubs forming the outer perimeter of the woodland. This should normally be augmented by a metre to accommodate the root zone in areas where the adjacent lands have not been regularly ploughed. The initial staking of the boundary shall be carried out by a *qualified professional* on behalf of the applicant for proposed *development* or *site alteration*, and subsequently verified by Regional and/or Area Municipal staff, as required.

5.3 **Earth Science Features:** The boundaries of earth science features shall be interpreted by a *qualified professional* on behalf of the applicant for proposed *development* or *site alteration*, and subsequently verified by Ministry of Natural Resources and Forestry, Regional, and/or Area Municipal staff, as required.

IV. Guideline for Determining *Buffers* around *Environmental Features*

Regional Official Plan

7.B.9 Within the Environmentally Sensitive Landscapes designation, d*evelopment applications* submitted in accordance with the policies in Chapter 6 to:

(a) establish or expand *recreational and tourism uses* or *rural institutional uses*;
(b) create a new lot, or permit a lot addition, for a *recreational and tourism use* or *rural institutional use;*
(c) permit the minor intensification of *existing* industrial, commercial, recreational and/or institutional uses, including minor changes in the uses thereof;
(d) permit new *agriculture-related uses* or *secondary uses;*
may be considered for approval subject to the following additional criteria: . . .
iii) the *development* will be buffered from existing natural features by an appropriate width of natural vegetation, and will otherwise facilitate the enhancement or restoration of new areas and/or corridors and *linkages*;

7.C.11 An *Environmental Impact Statement* submitted in accordance with Policies 7.C.9 or 7.C.10 will identify appropriate buffers to Core Environmental Features to the satisfaction of the Region, in consultation with Area Municipalities and the Grand River Conservation Authority. Such buffers will not only serve to protect Core Environmental Features from *adverse environmental impacts* but will also provide opportunities for net *habitat enhancement* to enhance or, wherever feasible, restore the *ecological functions* of the Core Environmental Feature. The location, width, composition and use of buffers will be in accordance with the approved *Environmental Impact Statement, with* buffers *being a minimum of 10 metres as measured from the outside boundary of the Core Environmental Feature and established and maintained as appropriate self-sustaining native vegetation.*

1. Application

This guideline will apply in assessing an application for *development* or *site alteration* within or contiguous to:

- a *Landscape Level System* (not including Significant Valleys), or
- a *Core Environmental Feature*.

Area Municipalities and/or the Grand River Conservation Authority may also apply them to determine *buffers* around *Supporting Environmental Features*. It will not apply to determining *buffers* around the Habitat of *Endangered or Threatened Species*, however, as such *buffers* are determined by the *Ministry of Natural Resources and Forestry*).

2. Purpose

The purpose of this guideline is to inform sections of E*nvironmental Impact Statements* dealing with the determination of *buffers* around *environmental features*. Policy 2.1.5 of the 2014 Provincial Policy Statement directs municipal approval authorities to prevent negative impacts to the natural features or *ecological functions* of designated *environmental features* that might be caused by new *development* or *site alteration* on *adjacent lands*. To this end, Regional Official Plan Policy 7.C.11 requires a minimum *buffer* of ten metres around a *Core Environmental Feature*, and

Policy 7.B.9 requires that natural features within *Environmentally Sensitive Landscapes* be *buffered* from new *development*. These requirements are very general, however, and are not intended to promote a rigid approach to *buffer* delineation. The policy directions are also not intended to override recommendations in council-approved (sub-)watershed studies, Master Environmental Servicing Plans, or Comprehensive *Environmental Impact Statements* for wider *buffers*. In general, however, the ultimate width and configuration of *buffers* needs to be determined in a context-sensitive fashion. This Guideline sets out matters to be considered in an *Environmental Impact Statement* when a *buffer* is required.

3. Rationale for *Buffers*

Buffers help protect the *ecological integrity* of *environmental features* from *adverse environmental impacts.* As such, they may become something of a functional extension of the features. Effective *buffers* must be based upon the relationship between an *environmental feature* and *contiguous* lands proposed to undergo *development* and/or *site alteration.* This involves identifying lands which help maintain the *ecological functions* and *ecological integrity* of the *environmental feature*. For example, *contiguous* lands that contribute groundwater or surface water flows or trap sediment before it enters wetlands or streams would perform *buffer* functions. *Buffers* may also include upland grassland, waterfowl or turtle nesting habitat, or foraging areas for amphibians or birds (Burke, 1995; Canadian Wildlife Service, 2004). *Buffers* attenuate a range of abiotic and biological “edge effects,” some of which are summarised in Table 2.

A *buffer* can be designed to prevent or minimise a variety of edge effects on an *environmental feature* by:

- filtering out nutrients or contaminants before they enter a wetland or watercourse;
- attenuating noise;
- blocking artificial lighting, or the sight of adjacent developed lands;
- reducing direct human intrusion from the outside through edge treatments such as fences and appropriate plantings;
- accommodating transitional grading, where warranted, between an *environmental feature* with irregular native topography and a graded *development* area;
- containing outlets from stormwater management facilities or naturalised landscaping associated with the facilities; and
- providing for the alignment of community trails outside rather than within *environmental features* in order to reduce impacts to *ecological integrity* and also to enhance human safety.

Table 2: Edge Effects

Edge Effect	Impacts
Abiotic effects	Changes to forest microclimate, including changes in wind velocity, temperature, relative humidity, light levels Increased nutrients Changes in soil chemistry Modified hydrological regimes, i.e. Increase or decrease in flows Introduction of rubbish Increased pedestrian access resulting in greater disturbance
Direct biological effects	Changes in vegetative structure and composition Increased weed diversity and abundance Changes in soil micro-organism populations
Indirect biological effects	Increase opportunities for aggressive fauna Changes in animal behaviour Increased predation

(Source: Adapted from Brisbane City Council, 2003)

4. Principles to Guide *Buffer* Design

Recommendations in an *Environmental Impact Statement* dealing with the establishment and design of *buffers* should demonstrate how the following three principles are being implemented.

4.1 Protection *of environmental features* from *adverse environmental impacts* originating on *contiguous* lands approved for *development* or *site alteration*

Objective: To protect the *ecological integrity* of an environmental feature, including the habitat of *significant* species of concern, from *adverse environmental impacts*, a *buffer* should be designed to:

- *mitigate* edge effects by separating post-*development* land uses from an *environmental feature*;
- maintain the habitat of *significant* species, other sensitive habitats, and *hydrological functions* of the *environmental feature*;
- retain natural catchments of wetlands, ponds, and watercourses within *environmental features* in order to maintain their *hydrological functions;*
- provide upland breeding and foraging habitat for organisms found within wetlands in the *environmental feature*;

- prevent or attenuate the entry of sediments, nutrients, pesticides, and fertilisers into *environmental features;*
- be continuous, to the extent feasible, particularly along riparian corridors;
- shade watercourses and thereby moderate thermal impacts;
- contribute vegetation and woody debris to watercourses; *and*
- prevent the movement of invasive non-indigenous species from landscaped areas into *environmental features.*

4.2 Transition between *new development* or s*ite alteration* and *environmental features*

Objective: To create an intermediate zone between new *development* and/or *site alteration* and a residual *environmental feature*, a *buffer* should:

- allow for appropriate transitional grading (if required) between permitted new *development* and/or *site alteration* and natural topography which is to be maintained within and *contiguous* to *environmental features;*
- be supplemented by building setbacks at least as wide as the potential height of trees from the recommended *buffer* along the edge of the *environmental feature*;
- control pedestrian or vehicular access to *environmental features* by demarcating adjacent property boundaries with fences, bollards, and/or “living fences;”
- prevent encroachments of lawns and gardens and discourage storage of objects and dumping of refuse into *environmental features;*
- require directional exterior lighting on adjacent land uses to shine away from the *environmental feature*;
- accommodate public trails rather than align them within an *environmental feature*, provided this is supported through review of an *Environmental Impact Statement* which balances the need to prevent or minimise impacts to the *ecological integrity* of the *environmental feature* with the obligation of the trail operator to promote the safety of trail users and achieve an appropriate trail network design.

4.3 Opportunities for net *ecological enhancement* or wherever feasible, for restoration, of the *ecological functions* of the *Core Environmental Feature*

Objective: To improve the form and function of an *environmental feature* and enhance its *ecological integrity*, a *buffer* should:

- improve the configuration of the *environmental feature* by reducing the perimeter-to-area ratio by filling in gaps and consolidating linkages;
- enhance *connectivity* for wildlife movement, where feasible, by connecting nearby disjunct *environmental features* or other natural features, by incorporating hedgerows, or by installing eco-passages where a *buffer* is interrupted by a road (if this would not exacerbate mortality);

- use locally appropriate *native species* reflective of historic vegetation communities and of varying successional stages to complement habitat functions of the *environmental feature* (e.g., upland deciduous forest species around wetlands); and
- provide opportunities for public education/interpretation of *environmental features* and *functions*.

5. Design of *Buffers*

The location, width, composition, and use of *buffers* shall be determined through the completion and review of an *Environmental Impact Statement. Buffers* shall be ***a minimum*** of 10 metres measured from the outside boundary (i.e., dripline or wetland boundary) of the *environmental feature* as interpreted consistent with Section III of this Guideline. Wider minimum *buffers* will be implemented where previously recommended in an approved sub-watershed study, Master Environmental Servicing Plan, or Comprehensive *Environmental Impact Statement*, or as recommended through review of a Full or Scoped Environmental Impact Statement, or if required by the policies of another approval agency. Where *buffers* of different widths are required around specific portions of a diverse *environmental feature* (e.g., 15 or 30 metres around wetlands; 10 metres around upland woodlands), the final *buffer* shall be a composite of those *buffers.*

Scientific literature indicates that standard *buffer* widths do not always reflect the requirements of individual *environmental features* and that the resulting *buffers* are often too small to provide adequate protection (Semlitsch & Bodie, 2003). This guideline is intended to inform the design of context-sensitive *buffers* for *Core Environmental Features* and *Supporting Environmental Features*. It seeks to integrate:

- changing land use and *development* patterns on *contiguous* lands;
- physical and topographical characteristics of the *environmental feature* and *contiguous* lands being developed;
- locally-occurring *significant* species and their habitat requirements;
- ecological interactions between the *environmental feature* and *contiguous* lands where *development* or *site alteration* are proposed;
- intensity, frequency, and duration of potential stressors; and
- design options for *buffers*.

While it may not be possible to eliminate all edge effects, appropriate delineation, design, and maintenance of *buffers* can reduce their impact. Table 3 lists potential edge effects, and suggests *buffer* widths to prevent, minimise, or *mitigate* them. If the *buffer* recommended in an *Environmental Impact Statement* differs significantly from the recommended value, this should be justified with reference to relevant scientific literature or by the professional opinion of a *qualified professional*.

While Policy 7.C.11 specifies a minimum *buffer* width, consideration should also be given to creating *buffers* of variable width and shape (Castelle, 1994). This can afford

greater *buffer* protection to particularly sensitive features such as *significant* vernal ponds which need their entire surface catchment areas protected from *development* or *site alteration*. Varying the width can also accommodate highly irregular topography and/or result in better design of adjoining *development* by smoothing out what would otherwise be a line mirroring the irregular boundary of an *environmental feature*.

Table 3: Range of Edge Effects and Suggested *Buffer* Widths

Stressor	**Suggested *buffer* width**	**Reference**	**Notes**
Herbicide drift from agricultural lands	>6 m to 9 m from cultivated fields	Boutin and Jobin, 1998.	Cites other studies suggesting 5 m to 10 m.
Nitrate	16 m to 104 m	Basnyat *et al*., 1999.	Objective was >90 percent nitrate removal.
Non-point source agricultural pollutants	16.3 m grass/woody strip (riparian)	Lee *et al*., 2003.	Removed >97 percent of sediment, narrower (7 m) grass provided some benefits.
Residential stormwater	15 m; 23- 30 m on slopes greater than 12 percent	Woodard and Rock, 1995.	Groundcover type also very important.
Urban cats	190 m	Haspel and Calhoon, 1991.	Predation rates on wildlife variable.
Lawn-related (e.g., wood piles, composting)	19 m to 38 m	Matlack, 1993.	Fencing may achieve same results in less width.
Recreation-related (e.g., camping, hacked trees)	67 m to 130 m	Matlack, 1993.	
Human disturbance on nesting Great Blue Herons	100 m	Rodgers and Smith, 1995. Erwin, 1989.	Flush distance was 32 m plus 5.5 m standard deviation, plus 40 m to *mitigate* antagonistic behaviour.
Introduction of artificial nocturnal light levels	N/A - Species specific response dependent on a number of factors such as type of light, intensity, duration.	Outen (2002)	Review of the literature identifies impacts on mammal, bird, bat, fish, amphibian, insect behaviour.

(Source: adapted from Canadian Wildlife Service, 2004, Outen, 2002)

V. Guideline for Determining *Linkages*

Regional Official Plan

7.B.9 Within the Environmentally Sensitive Landscapes designation, d*evelopment applications* submitted in accordance with the policies in Chapter 6 to:
(a) establish or expand *recreational and tourism uses* or *rural institutional uses*;
(b) create a new lot, or permit a lot addition, for a *recreational and tourism use* or *rural institutional use;*
(c) permit the minor intensification of *existing* industrial, commercial, recreational and/or institutional uses, including minor changes in the uses thereof;
(d) permit new *agriculture-related uses* or *secondary uses;*
may be considered for approval subject to the following additional criteria: . . .
i) there will be no *adverse environmental impacts* on *environmental features* and *ecological functions*, enhancement/restoration areas, existing corridors and *linkages* … within or contiguous to the Environmentally Sensitive Landscape resulting directly from the proposed development or through increases in traffic or development of required servicing *infrastructure* ;
iii) the *development* will be buffered from existing natural features by an appropriate width of natural vegetation, and will otherwise facilitate the enhancement or restoration of new areas and/or corridors and *linkages*;

7.E.6 The Region, Area Municipalities, Grand River Conservation Authority and other stakeholders will identify *linkages* through *watershed studies*, Natural Heritage Inventories, *Environmental Impact Statements* or other appropriate studies. These areas are intended to provide opportunities for plant and animal movement among *environmental features*, support hydrological and nutrient cycling, and contribute to the overall *ecological integrity* of the Greenlands Network.

7.E.7 Area Municipalities will require the incorporation of any *linkages*, identified in accordance with Policy 7.E.6, into the design of new *development* to maintain, enhance or, wherever feasible, restore *linkages* among *environmental features*.

7.E.8 The Region will enhance *linkages,* where appropriate, by restoring natural habitat on lands owned by the Region. The Region encourages the naturalization of inactive sections of parks and open space areas under the jurisdiction of other agencies and in private ownership, wherever appropriate, to enhance *linkages*.

1. Application

These guidelines will apply in assessing an application for *development* or *site alteration* or a stewardship proposal that is within or contiguous to:

- a *Landscape Level System* (not including Significant Valleys), or
- a *Core Environmental Feature*

Area Municipalities may also apply them to identify and design *linkages* associated with *Supporting Environmental Features*. They will not apply to identifying and designing *linkages* affecting the Habitat of *Endangered or Threatened Species*, however, as such *linkages* are determined by the *Province*).

2. Purpose

The purpose of this guideline is to ensure that appropriate *linkages* among *environmental features* are identified, maintained, or established in accordance with the 2014 Provincial Policy Statement and Regional Official Plan. It is the role of (sub-)*watershed studies*, Master Environmental Servicing Plans, Natural Heritage Inventories, *Environmental Impact Statements* or other appropriate studies to identify ecological linkages. In general, landscape scale linkages among larger environmental features should be identified in (sub-)watershed studies, Master Environmental Servicing Plans, Community Plans, or other comprehensive natural heritage or land use studies. *Environmental Impact Statements* should identify existing or potential linkages at a site scale.

This Guideline identifies a variety of means to prevent, minimise, and *mitigate* the fragmentation of the Greenlands Network and other potential *adverse environmental impacts* resulting from *development* and *site alteration contiguous* to *environmental features*. It will also guide efforts to *enhance* and *restore* ecological *linkage* functions and contribute to the *ecological integrity* of natural areas within a landscape.

3. Rationale for *Linkages*

Essentially, a *linkage* is an area of natural habitat within a *landscape matrix* of agricultural fields, urban development, infrastructure, and other land uses that helps connect separated *environmental features* and other natural habitat features. The scientific literature has for many years shown that, in general, maintaining *connectivity* among patches of natural habitat helps ensure better functioning of individual ecosystems. *Linkages can* facilitate the movement of indigenous organisms among what would otherwise be isolated habitat patches. This enhances or maintains the viability of populations of indigenous species in the habitat patches by conserving the potential for genetic variability and allowing populations of indigenous species to meet their habitat needs, disperse, and re-colonise *environmental features* where those species had been extirpated.

Linkages function on multiple scales, and typically vary in width and length as well as structure due to plant species composition (Dougan & Associates, 2005). In the context of the Greenlands Network, *linkages* provide *connectivity* and sufficient habitat to sustain local populations of indigenous species by facilitating their movement among both *Core Environmental Features* and *Supporting Environmental Features*. *Linkages* can, however, provide *ecological functions* beyond simply connecting fragmented habitat patches. *Linkages* can provide valuable feeding and breeding habitat for smaller species in their own right, as well as perform important land use planning functions such as serving as ecological *buffers* along streams, headwaters, and groundwater recharge areas, or even accommodating recreational trails and other amenities, where appropriate (Hess and Fischer, 2001).

4. Principles for Identifying and Designing *Linkages*

4.1 Ecological Context

Understanding the context of *environmental features* and *ecological functions* at the landscape scale is the essential first step in assessing landscape *connectivity.* This permits the identification of *linkages* to be retained and *enhanced* or the delineation and character of new ones to be *restored*. The following should be assessed in the *Environmental Impact Statement*:

4.1.1 The present *landscape matrix*:

- underlying landscape patterns and features (topographical and hydrological);
- extent and pattern of principal land use(s) of the *landscape matrix* (e.g., rural, urban, extraction, infrastructure);
- relative size and distribution of natural areas;
- nature and degree of fragmentation of natural areas; and
- patterns of *connectivity* among *environmental features* and other natural features.

4.1.2 Local *biodiversity*

- diversity and distribution of natural habitat types in relation to landscape patterns, features, and land uses;
- prevalent *native species*;
- ecological integrity of habitats;
- the presence and distribution of *significant native species* of conservation concern in a landscape;
- the habitat requirements at various stages in the life of the *significant* species; and
- nature of ecological relationships and existing movement patterns among the *environmental features* and other natural features of the landscape.

4.1.3 *Connectivity* Assessment

Before determining whether existing *linkages* are to be retained or enhanced, or whether new ones need to be established, the following must be considered:

- Are existing *linkages* sufficient to maintain *connectivity* under present conditions?
- Will the proposed *development* and/or *site alteration* result in the weakening or loss of *connectivity* by isolating *environmental features* or other natural features?

If existing *linkages* need to be *enhanced* or new ones established, the following must be considered:

- What is the scale at which the *linkage* is to function, (i.e., from a landscape scale down to a relatively small part of a landscape such as between two *environmental features*)?

- Which *environmental features* or other natural features are to be connected by the linkage?
- Is there an ecological relationship among the features to be connected?
- For which species are the *linkages* being maintained or re-created, and what is the nature of their need to migrate from one area of natural habitat to another?
- Is there compatible habitat for target species within the destination area?
- Will creating a *linkage* to an *environmental feature* jeopardise its *ecological integrity* by facilitating the introduction of predators or pathogens where they are not currently present?
- Can existing *linkages* be enhanced or must new connections be re-created?
- Are there linear landscape features such as watercourses, floodplains, utility corridors, landforms (escarpments, moraines, eskers, glacial meltwater channels), and the edges of relatively uncultivated agricultural lands which may have relief, terrain, soil, drainage or other characteristics that discourage intensive uses where *linkages* can be established?
- What is the nature of the *landscape matrix* that the *linkage* must cross (i.e., urban area, agricultural fields, or utility or transportation corridors)?
- Are there physical barriers to the movement of animals and plants (e.g., major roads or urban areas) due to urban use, resource extraction, or construction of linear transportation infrastructure, and if so, can passages be created over, under, or around them?

4.2 Design Guidelines for *Linkages*

Linkages must be ecologically functional. They must meet the movement patterns and requirements of identified species or groups of species. To the extent feasible, Environmental Land Classification (ELC) mapping and a comprehensive list of *native species* inhabiting the locality should inform the design in terms of identifying particular species and their various habitat and movement needs. Nevertheless, where such locally-specific information is not available, a precautionary approach should be taken. *Linkages* should be conserved or created with respect to the more vulnerable or conservative plant species (i.e., plants with a Coefficient of Conservatism of 8-10) and herpetofauna documented in an area (MNR, 2010:148).

The alignment, width, species composition, and continuity of a linkage must accommodate the ecological function(s) it is intended to support.

4.2.1 Alignment

The alignment of a linkage is a primary determinant of its effectiveness. In connecting environmental features, *linkages* should be reasonably direct in order to minimise the distance vulnerable organisms have to travel, and to reduce edge effects (Environment Canada, n.d.).

The type and pattern of *connectivity* contributes to habitat quality (Pickett and Cadenasso 1995, Jordán 2000). Providing multiple linkages among *environmental features* enhances *connectivity* by:

- providing greater opportunities for movement (Figure 1).
- embodying a precautionary approach, by enabling the system to retain overall *connectivity* in the event a particular linkage is interrupted by future activities or natural events (MNR, 2010: 148).

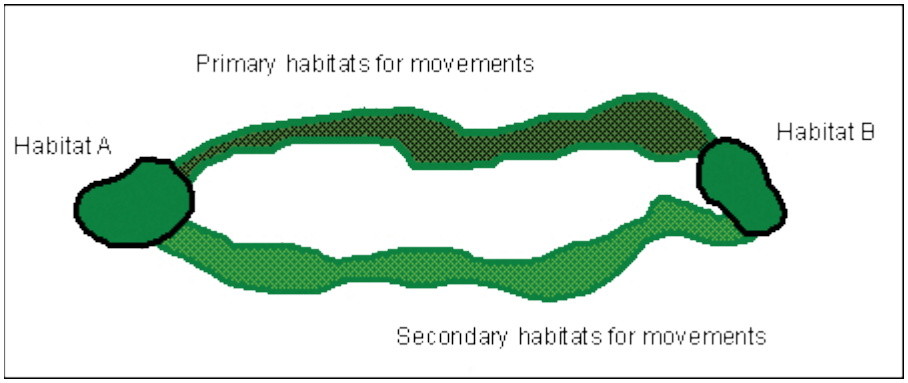

Figure 1: Increased movement options provided by multiple connections (Environment Canada, n.d.)

Linkages and corridors need to be designed to maximise the ability of plants and animals to use them.

- *Linkages* are best aligned along existing natural corridors which follow linear landscape features (e.g., valleys, stream corridors, escarpments, moraines, eskers, and glacial meltwater channels), or along linear cultural features such as utility corridors or along the edge of uncultivated farmland.
- Longer *linkages* should contain 'nodes' of compatible habitat which can serve as a destination or temporary refuge habitat.
- Some animals will disperse along established routes and will learn to use newly created *linkages* while other species may disperse randomly.
- To increase the probability that animals will locate *linkages*, they should be designed with a funnel shape at either end to maximise the "contact surface" between the *environmental features* and the *linkage*. (M.N.R., 2010: 150).
- *Linkages* should be a suitable length for the animals for which they are designed.
- *Linkages* should avoid channelling wildlife into risky situations near development or transportation corridors.

Table 4.1 Optimal Linkage Length Requirements of Different Groups of Wildlife: Examples from the Literature.

Linkage "Type" (Source)	Target Species or Species Group	Sizes/Distances (Distances travelled between environmental features)	Comments
Wetland – Upland Corridor (Helferty 2002)	Amphibians	up to 1 km between wetland and terrestrial habitats	Terrestrial habitat must be naturally forested, but corridors may be open or semi-wooded fields.
Wetland – Upland Corridor (Semlitsch and Bodie 2003)	Amphibians Reptiles	159 – 290 m 127 – 289 m	Range of distances traveled between wetland and terrestrial forested habitats.
Wetland – Upland Corridor (Calhoun and Klemens 2002)	Amphibians	152 – 1510 m; salamanders at lower end of this range and frogs at upper end	Distances traveled between isolated wetlands and between wetlands and upland forests.
Terrestrial Corridor (Merriam 1991)	Eastern Chipmunk	20 – 460 m; most frequent usage in the 20 – 40 m range	Range of distances traveled between isolated upland forests; 90% via wooded linkages.

(Source: Adapted from Dougan & Associates, 2005)

4.2.2 Width

Width is one of the most important design considerations as it generally correlates with the quality and effectiveness of *linkages* (Fleury and Brown 1997; Canadian Wildlife Service, 2004). Unfortunately, there is little quantitative information on the ideal width of linkages; available data vary from region to region (Environment Canada, n.d.). Moreover, optimal widths vary between and within taxonomic groups (see Table 4), site specific habitat structure and quality, the nature of the *landscape matrix*, and human use patterns (Adams and Dove 1989).

Table 4.2 Optimal Linkage Width Requirements of Different Groups of Wildlife: Examples from the Literature.

Linkage "Type" (Source)	Target Species or Species Group	Width	Comments
Stream Corridor (Rudolph and Dickson 1990)	Herpetofauna & Other Vertebrates	at least 30 m width on either side of the stream; more if adjacent landscape is cleared.	The corridor should have mature trees.
Stream Corridor (Burbrink et al. 1995)	Herpetofauna	100 m width on either side of the stream + require habitat heterogeneity outside corridor	Wider corridor not needed if upland woodlands found nearby.
Stream Corridor (Croonquist and Brooks, 1993) (Spackman and Hughes, 1995)	Breeding Birds	at least 25 - 175 m width on either side of the stream.	25 m provided some dispersal & breeding opportunities; 125 m forested corridor supported full complement of bird communities
Stream Corridor (Mactans et al. 1996)	Resident Juvenile Birds	at least 100 m width on either side of the stream	This width facilitated movement of juveniles.
Hedgerows / Fencerows (Wegner and Merriam, 1979)	Resident & Migrating Birds Small Mammals	not available	These groups readily moved along fencerows connecting isolated woods in an otherwise agricultural landscape.
Not specified (Fleury and Brown 1997)	Based on review of corridor width needs for birds	4 – 90 m	

(Source: Adapted from Dougan & Associates, 2005)

In the absence of clear standards, some general principles can be drawn from the literature:

- The longer the *linkage*, the wider it should be in order to provide habitat to organisms that take more than a short time to transit the *linkage* (Diamond et al. 2002; MNR, 2010:148).

- *Linkages* designed to function at the landscape scale may be greater in width (several hundreds of metres or more) and more generalized relative to local scale or site scale connections (MNR, 2010: 148).
- A *linkage* should be wide enough to shelter vulnerable animal species from predators, allow for movement by multiple species, provide nesting and feeding opportunities for slower moving groups of wildlife groups, and not function as a trap (Forman 1995; Spackman and Hughes 1995; Fleury and Brown 1997).
- In general, a *linkage* that is continuously 100 metres wide allows for the movement of many species, but not breeding or feeding (Environment Canada *et al.* 1998; Forman 1995).
- Corridors along watercourses are recommended to be a minimum of 30 metres of naturally vegetated habitat on either side.
- Width determines the quantity and configuration of forest interior habitat and determines the extent of edge effects. Forest *linkages* often have a high ratio of edge habitat to interior habitat. The wider the *linkage*, the better it can provide suitable habitat for forest-interior species as well as reduce mortality risks. (Environment Canada, N.D.).
- Even narrow *linkages*, such as hedgerows connecting woodlands, have been observed to relieve the isolating effects of fragmented landscapes as well as provide temporary habitat for migrating birds and small mammals (Wegner and Merriam 1979; Merriam 1991; Hess and Bay 2000; Aude et al. 2004).
- Barriers may sometimes need to be incorporated in linkages in order to prevent vulnerable wildlife from accessing roadways and to channel them to crossing structures.
- Eco-passages or culverts need to be designed so as not to pose a psychological deterrent to the species for which they are intended.

Based on these principles, the Canadian Wildlife Service (2004) has provided guidelines to the effect that *linkages* to facilitate species movement should be a minimum of 50 to 100 metres wide. However, there is no standard width as *linkages* to accommodate breeding and feeding habitat must be sized according to target species requirements (Canadian Wildlife Service, 2004). Further, the use of any one single species (such as “umbrella” or “keystone species”) as a reference cannot ensure conservation of all co-occurring species. It is best to adopt a multi-species strategy based on systematic selection procedures that meet the needs of all species present (Roberge and Angelstam 2004; Fischer et al. 2004).

4.2.3 Species Composition

In addition to width, the species composition and physical structure of the linkage determines its quality and effectiveness. Birds, small, medium, and large mammals all have different requirements for movement and cover. Vegetation in *linkages* must provide food, cover, and resting areas suitable for target species, particularly those that are smaller or that move more slowly. They should also not be subject to excessive pressure from human activities (Canadian Wildlife Service, 2004;

Environment Canada (n.d.). Individual species have specific requirements of *linkages*. For example, a *linkage* connecting salamanders' core forest habitat to wetland breeding ponds may need to be moist woodland habitat with abundant litter and woody debris. While vegetation composition in the *linkage* should be generally comparable to that in the nodes it connects, there should also be a degree of heterogeneity along the linkage. This is particularly important for species of herpetofauna (Burbrink et al. 1995).

4.2.4 Continuity

Fragmentation can diminish the quality and effectiveness of *linkages*. While some species can tolerate breaks in natural linkages, others such as salamanders and insects are very negatively affected (Beck, n.d).

Several measures can be implemented to reduce fragmentation effects in *linkages*:

- *Linkages* should be continuous maintaining a minimum width along the entire length with as few bottlenecks as possible (Canadian Wildlife Service, 2004).
- If gaps or breaks in continuity are necessary, they should be as small as possible.
- Where *linkages* are bisected by transportation corridors, consideration needs to be given to creating grade-separated "eco-passages" with adjacent exclusion fencing and funnel walls to discourage animals from entering roadways and direct them to the opening of the eco-passage;
- In situations where unbroken natural linkages are not feasible, small patches of closely-spaced natural cover can serve as "stepping stones" for species movement, and thus serve a *linkage* function (MNR, 2010: 148).

C. Glossary

* Indicates a definition in addition to those cited from the Regional Official Plan Glossary

Adverse Environmental Impacts – changes likely to arise directly or indirectly from *development* or *site alteration* within or *contiguous* to an element of the Greenlands Network that result in widespread, long-term, or irreversible degradation of the significant features or impairment of the natural functions of the designated area.

Examples of Adverse Environmental Impacts include, but are not limited to, the following:

a) fragmentation or substantial reduction in size of an element of the Greenlands Network;
b) significant increase in the perimeter-to-area ratio of an element of the Greenlands Network;
c) disruption of corridors and *linkages* to other elements of the Greenlands Network;
d) substantial alteration of natural topography;
e) disruption of ecological relationships among significant or representative native species;
f) increased potential for human or domestic animal intrusion into relatively inaccessible areas;
g) alteration of the quantity, quality, timing (hydroperiod) or, direction of flow of surface or groundwater within or *contiguous* to an element of the Greenlands Network;
h) alteration of the structure, functions, or ecological interrelationships of a natural habitat which sustain representative community associations or populations of significant species;
i) reductions in the populations or reproductive capacity of significant species;
j) mortality in or removal of the predominant vegetation which provides structure to an element of the Greenlands Network;
k) erosion of soils or deposition of sediment;
l) compaction or trampling of soils;
m) increased potential for the introduction of invasive non-native species.
n) disruption of ecological processes due to increased nocturnal artificial light levels; or
o) increases in the level and quality of noise.

***Alvars –** naturally open areas of thin or no soil over essentially flat limestone, dolostone or marble rock pavement, supporting a distinctive vegetation community.

Areas of Natural and Scientific Interest – areas of land and water identified by the Province or the Region that contain natural landscapes or features that have been

identified as having life science or earth science values related to protection, scientific study or education.

***Benthic Community –** the assemblage of interacting populations of organisms, including those forming structural elements, found at or near the bottom of a body of water. The composition of the benthic community is frequently used as an indicator of water quality.

Biodiversity – the variety of life in all its forms. It includes species diversity, ecosystem diversity, and genetic diversity within species.

***Buffer –** an area or band of permanent vegetation, preferably consisting of native species, located adjacent to a natural heritage feature and usually bordering lands that are subject to development or site alteration. The purpose of the *buffer* is to protect the feature and its functions by mitigating impacts of the proposed land use and allowing an area for edge phenomena to continue (e.g., allowing edge trees and limbs to fall without damaging personal property, area for roots of edge trees to persist, area for cats to hunt without intruding into the feature). The *buffer* may also provide area for recreational trails and provides a physical separation from new development that will discourage encroachment. (Natural Heritage Reference Manual)

***Connectivity –** the degree to which key natural heritage or significant hydrologic features are connected to one another by plant and animal movement corridors, hydrologic and nutrient cycling, genetic transfer, and energy flow through food webs.

Contiguous – lands that are situated in sufficiently close proximity such that d*evelopment* or *site alteration* could reasonably be expected to produce one or more of the following impacts: alterations to existing hydrological or hydrogeological regimes; clearing of existing vegetation; erosion and sedimentation; or producing a substantial disruption of existing natural *linkages* or the habitat of a significant species.

***Core Environmental Features –** the *environmental features* identified in Policy 7.C.1 and designated on Map 4 of the Regional Official Plan. They are provincially significant or Regionally significant elements of the regional landscape in that they maintain, protect, and enhance biodiversity and important ecological functions. Core Environmental Features consist of:

(a) Habitat of Endangered or Threatened Species;
(b) Provincially Significant Wetlands;
(c) Environmentally Sensitive Policy Areas;
(d) Significant Woodlands;
(e) Environmentally Significant Valley Features; or
(f) Significant Areas of Natural and Scientific Interest.

Cumulative Impacts – the changes to the environment resulting from a particular activity in combination with the incremental impacts caused by other closely related past, present and reasonably foreseeable future activities. Cumulative impacts may reveal that relatively minor impacts associated with a particular activity may contribute to more significant impacts when considered collectively with other activities taking place over a period of time.

Development – the creation of a new lot, a change in land use, or the construction of buildings and structures, requiring approval under the ***Planning Act***. *Where proposed development or site alteration also requires prior issuance of a permit by the Grand River Conservation Authority in accordance with the applicable regulation approved under the ***Conservation Authorities Act***, the definition of development under the ***Conservation Authorities Act*** will also apply.

Development application – an application for approval under the ***Planning Act***. Development applications may include applications for approval of the following: Plans of Subdivision; Plans of Condominium; Consent; Part Lot Control Exemption By–laws; Official Plan Amendments; and Zone Change Applications. Development applications do not include *site plans*.

***Dripline -** A line located on the ground vertically below the outer extent of the (live) tree crowns forming the perimeter of the woodland or hedgerow.

***Ecological enhancement –** ecological enhancement increases or improves the ecological functioning or resilience of altered or degraded natural areas. It may take the form of:

a. restoring clearings within an *environmental feature* or “bays” around its perimeter to natural habitat similar to that within the environmental feature such that the area is expanded or made more compact by decreasing the perimeter-to-area ratio;
b. adding onto existing *environmental features* new habitat elements such as wetlands, woodlands, or grasslands consisting of indigenous species characteristic of the locality;
c. creating or strengthening natural habitat *linkages* among *environmental features*;
d. eliminating or reducing the prevalence of invasive non-indigenous species of flora and fauna within *environmental features*;
e. converting conifer plantations to communities of indigenous deciduous, coniferous, and herbaceous woodland plants;
f. rehabilitating altered or degraded watercourses or wetlands to sustain populations of locally appropriate flora and fauna;
g. re-introducing indigenous species known to have been extirpated from an environmental feature; or
h. increasing the intrinsic, amenity, cultural, recreational and educational values of the environmental feature.

Such actions should ideally bear in mind the likely medium and long-term effects of climate change.

Discharge Constraint Areas – lands where groundwater naturally discharges to the surface of the soil or other surface water bodies and may pose a serious constraint to the construction, use and occupancy of land and buildings.

Ecological function – the natural processes, products or services that living and non-living environments provide or perform within or among species, ecosystems and landscapes, including *hydrologic functions* and biological, physical, chemical and socio-economic interactions.

***Ecological Integrity –** the condition of an ecosystem in which (a) the structure, composition, and function are unimpaired by stresses from human activity, (b) natural ecological process are intact and self-sustaining, and (c) ecosystem evolution is occurring naturally. Ecological integrity includes hydrological integrity. (Natural Heritage Reference Manual)

***Economic Functions –** natural products and services of value to human beings such as the production of timber, maple syrup, potable water, commercial outdoor recreational opportunities, enhancing property values, pollution abatement, etc.

Endangered or Threatened Species – means a species that is listed or categorised as an "Endangered Species" or "Threatened Species" on the Ontario Ministry of Natural Resources and Forestry official Species at Risk list, as updated and amended from time to time. (PPS)

Environmental Assessment – a process for the authorization of an undertaking under legislation such as the **Environmental Assessment Act**, and the **Ontario Energy Board Act**.

Environmental features – features of the natural environment, including:

a. Habitat of Endangered or Threatened Species:
b. *Fish habitat*;
c. *Wetlands*;
d. Provincially significant life science *Areas of Natural and Scientific Interest*, regionally significant life science *Areas of Natural and Scientific Interest*, or provincially significant earth science *Areas of Natural and Scientific Interest*;
e. Environmentally Significant Valley Features;
f. Significant Woodlands;
g. *Significant* wildlife habitat;
h. Sand barrens, savannas and tallgrass prairies;
i. Alvars;
j. Permanent and intermittent watercourses;
k. Lakes (and their littoral zones);

l. *Environmentally Significant Discharge Areas* & *Environmentally Significant Recharge Areas;* and
m. Regional Recharge Areas.

Environmental Impact Statement – a study prepared in accordance with established procedures to refine the boundaries of elements of the Greenlands Network, identify the potential impacts of a *development application* on such elements, and recommend a means of preventing or minimising these impacts through avoidance or mitigation. *The term “Environmental Implementation Report” is generally synonymous with Environmental Impact Statement.

***Environmentally Sensitive Landscape –** An Environmentally Sensitive Landscape (ESL) is a geographically and ecologically definable landscape that is distinguishable from the surrounding areas by the concentration, proximity, and/or overlap of:

a. designated natural features (such as Environmentally Sensitive Policy Areas, Provincially Significant Wetlands, Significant Woodlands, and Environmentally Significant Valley Features),
b. associated natural features (such as stream valleys and specialised habitats), and
c. ecological functions (such as groundwater recharge areas and ecological corridors or linkages) which together constitute a heterogeneous landscape mosaic that contributes significantly to Regional biodiversity conservation. (See ROP 7.B.5).

An ESL may include lands under active human use or management, but should be predominantly natural, not bisected by major highways, and exclusive of areas irreversibly transformed by concentrated human settlement, or where widespread commitments to development in the form of land use designations have been made in Area Municipal Official Plans. In recognition of the cultural influences that have shaped, and continue to shape, the Region’s landscape, ESLs are considered compatible with a number of limited human uses such as legally permitted agricultural, residential, commercial, and resource extraction uses. In addition to protecting regional and local biodiversity, providing a wide range of ecological functions, and accommodating some human land uses, ESLs also provide continued opportunities for aesthetic enjoyment, low-impact recreation, and scientific, archaeological and/or historical study in the Region’s countryside.

***Environmentally Sensitive Policy Area –** a remnant natural area that fulfills sufficient technical criteria in the Regional Official Plan for designation. ESPAs are Core Environmental Features. (See ROP 7.C.5).

Environmentally Significant Discharge Areas – lands where groundwater discharges to the surface of the soil or to surface water bodies to sustain wetlands, fisheries, or other specialised natural habitats.

Environmentally Significant Recharge Areas – lands where water infiltrates into the ground to replenish an aquifer that sustains, in full or in part, *environmental features*.

Fish habitat – as defined in the **Fisheries Act**, c. F-14, means spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes (PPS)

Floodplain – for rivers, streams, and small inland lake systems, means the area usually low lands adjoining a watercourse, which has been or may be subject to *flooding hazards* (PPS).

***Forest Interior Habitat –** habitat conditions typical of the central or interior part of a forest as distinguished from the edge habitat around the perimeter. Interior habitat is usually relatively stable and less influenced by changing climatic conditions, noise, wind, sunlight, temperature, invasive non-indigenous species, nest parasitism, human presence, and so forth. For Waterloo Region, this is taken to be approximately thirty metres in from the dripline, but may vary depending upon the ecological quality of the forest edge habitat.

Habitat of an Endangered or Threatened Species:
a) with respect to species listed on the Species at Risk in Ontario List as an endangered or threatened species for which a regulation made under clause 55(1)(a) of the *Endangered Species Act, 2007* is in force, the area prescribed by that regulation as the habitat of the species; or
b) with respect to any other species listed on the Species at Risk in Ontario List as an endangered or threatened species, an area on which the species depends, directly or indirectly, to carry on its life processes, including life processes such as reproduction, rearing, hibernation, migration or feeding, as approved by the Ontario Ministry of Natural Resources and Forestry; and
places in the areas described in clause (a) or (b), whichever is applicable, that are used by members of the species as dens, nests, hibernacula, or other residences. (PPS)

Hydrologic function – the functions of the hydrological cycle that include the occurrence, circulation, distribution and chemical and physical properties of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere, and water's interaction with the environment including its relation to living things. (PPS)

***Landscape Level Systems –** are large-scale *environmental features* or significant concentrations of *environmental features* within the Greenlands Network, as defined in ROP Policy 7.B.1. They comprise:
(a) Environmentally Sensitive Landscapes;
(b) Significant Valleys;
(c) Regional Recharge Areas; and
(d) Provincial Greenbelt Natural Heritage System.

***Landscape matrix –** the most extensive and most connected landscape element type present, which plays the dominant role in landscape functioning. (Natural Heritage Reference Manual)

Linkages – areas that connect *environmental features* along which plants and animals can propagate, genetic interchange can occur, populations can move in response to environmental changes and life-cycle requirements, and species can be replenished from other *environmental features*. Linkages can also include those areas currently performing, or with the potential to perform, through restoration, linkage functions. Although linkages help to maintain and improve *environmental features*, they can also serve as important *environmental features* in their own right.

***Mitigate –** actions taken to prevent, modify, or alleviate *adverse environmental impacts* to *environmental features* identified in an *Environmental Impact Statement*. Mitigation may also include actions achieve beneficial effects. Examples of mitigations are provided in the Natural Heritage Reference Manual and Municipal Class Environmental Assessment manual.

***Native species –** species known to be indigenous to Waterloo Region are considered native species.

Normal farm practices – a practice, as defined in the **Farming and Food Production Protection Act, 1998,** that is conducted in a manner consistent with proper and acceptable customs and standards as established and followed by similar agricultural operations under similar circumstances; or makes use of innovative technology in a manner consistent with proper advanced farm management practices. Normal farm practices shall be consistent with the **Nutrient Management Act, 2002**, and regulations made under that Act.

Pre-submission consultation meeting – the opportunity for staff to consult with an owner/applicant prior to the owner/ applicant preparing an application, in order to outline the information and materials that the owner/applicant will be required to submit concurrently with the application form and prescribed fees.

Provincially constrained environmental areas – landscape features where the features are both identified as significant in any applicable official plan or *Provincial plan*, and where the applicable *Provincial plan* or Provincial Policy Statement prohibits development in the features: wetlands, woodlands, Significant Valleys, Environmentally Significant Valley Features, *Areas of Natural and Scientific Interest*, Habitat of Endangered or Threatened species, *significant wildlife habitat* and fish habitat.

***Qualified professional –** a person carrying out studies or evaluations as recommended by the **Natural Heritage Reference Manual**, Regional or Area Municipal Official Plan, or Greenlands Network Implementation Guideline who meets

any specific requirements (e.g., wetland evaluation training) to carry out the study or evaluation and where appropriate meets professional standards in their particular field and is accredited by a professional association. (Natural Heritage Reference Manual)

***Rehabilitation –** restoration of the ecosystem to a higher functioning condition. (PPS)

***Restore –** convert lands whose ecological properties have been substantively degraded, damaged, or destroyed by human activity or natural processes back to natural habitat characteristic of the locality consisting of locally appropriate indigenous species of flora and fauna using active planting, natural succession, prescribed burning, removal of non-native vegetation, other means accepted by the Society for Ecological Restoration, or any combination thereof.

***Savanna –** land (not including land that is being used for agricultural purposes) that:

a. has vegetation with a significant component of non-woody plants, including tallgrass prairie species that are maintained by seasonal drought, periodic disturbances such as fire, or both;
b. has scattered tree cover from 25% to 35%;
c. has mineral soils; and
d. has been further identified, by the Ministry of Natural Resources and Forestry or by any other person, according to evaluation procedures established by the Ministry of Natural Resources and Forestry, as amended from time to time.

Significant – means

a. in regard to wetlands, coastal wetlands and areas of natural and scientific interest, an area identified as provincially significant by the Ontario Ministry of Natural Resources and Forestry vusing evaluation procedures established by the Province, as amended from time to time;
b. in regard to woodlands, an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history. These are to be identified using criteria established by the Ontario Ministry of Natural Resources and Forestry;
c. in regard to other features and areas in PPS policy 2.1, 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;
d. in regard to mineral potential, an area identified as provincially significant through evaluation procedures developed by the Province, as amended from time to time, such as the Provincially Significant Mineral Potential Index;
e. in regard to cultural heritage and archaeology, resources that have been determined to have cultural heritage value or interest for the important

contribution they make to our understanding of the history of a place, an event, or a people (PPS); and

f. in regard to regionally significant features and areas comprising the Greenlands Network, areas identified as being ecologically important to the region based on the specific criteria established by the Region and described in the associated policies in the Regional Official Plan.

Site alteration – activities, such as grading, excavation and the placement of fill that would change the landform and natural vegetative characteristics of a site.

***Social Functions –** community amenity, local heritage, outdoor recreation, camping, education and research, aesthetic pleasure, spiritual experience, some residential use, and so forth.

***Supporting Environmental Features –** *environmental features* not considered Landscape Level Systems or Core Environmental Features which nonetheless perform *ecological functions* which help sustain the Greenlands Network and are designated by an Area Municipality and/or Grand River Conservation Authority.

***Tallgrass prairies –** land (not including land that is being used for agricultural purposes) that:

a. has vegetation dominated by non-woody plants, including prairie grass species that are maintained by seasonal drought, periodic disturbances such as fire, or both;
b. has less than 25 per cent tree cover;
c. has mineral soils; and
d. has been further identified, by the Minister of Natural Resources and Forestry or by any other person, according to evaluation procedures established by the Ministry of Natural Resources and Forestry, as amended from time to time.

***Valleylands –** a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year. (PPS)

Watershed studies – comprehensive scientific studies that describe how surface water and groundwater and terrestrial and aquatic ecosystems function within a defined drainage area. These investigations result in recommendations as to where and how development activity can safely occur so as to minimize flood risks, stream erosion, degradation of water quality, and negative impacts on natural systems. Recommendations may also identify opportunities for ecological enhancement and recreation.

Wetlands – lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface. In either case the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic plants or water tolerant plants. The four major types of *wetlands* are swamps, marshes, bogs and fens. Periodically soaked or

wet lands being used for agricultural purposes which no longer exhibit wetland characteristics are not considered to be *wetlands* for the purposes of this definition.

***Wildlife habitat –** areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific *wildlife habitats* of concern may include areas where species concentrate at a vulnerable point in their annual or life cycle; and areas which are important to migratory or non–migratory species. (PPS)

Woodlands – treed areas that provide environmental and economic benefits to both the private landowner and the general public, such as erosion prevention, hydrological and nutrient cycling, provision of clean air and the long–term storage of carbon, provision of *wildlife habitat*, outdoor recreational opportunities, and the sustainable harvest of a wide range of woodland products. *Woodlands* include treed areas, woodlots or forested areas and vary in their level of significance at the local, regional and provincial levels.

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