

# **LINKAGE ASSESSMENT (LA) GUIDELINES**

**March 2015**

**City of Hamilton**

These Guidelines describe the purpose and information requirements for preparing a Linkage Assessment (LA). They have been prepared to help those individuals, agencies, and environmental consultants who will be involved with preparing Linkage Assessments in the City of Hamilton.

The LA Guidelines were developed by City of Hamilton Planning and Economic Development Department staff. They were adopted by Hamilton City Council on March 31, 2015.

*These Guidelines are general. On a case by case basis, Planning and Economic Development Department staff may refine the scope of a LA and/or give more precise technical guidance regarding the type of information or level of research effort to be included in a LA.*

## **Table of Contents:**

<b>TABLE OF CONTENTS:</b> .....	<b>2</b>
<b>LINKAGE ASSESSMENT GUIDELINES</b> .....	<b>3</b>
<b>1.0 Introduction</b> .....	<b>3</b>
<b>1.1 What are Linkages?</b> .....	<b>3</b>
<b>2.0 POLICIES FOR LINKAGES</b> .....	<b>5</b>
<b>3.0 WHAT IS A LINKAGE ASSESSMENT (LA)?</b> .....	<b>6</b>
<b>4.0 WHAT TYPES OF DEVELOPMENT APPLICATIONS REQUIRE A LA? ....</b>	<b>7</b>
<b>5.0 CONTENT OF LINKAGE ASSESSMENT REPORTS</b> .....	<b>8</b>
<b>6.0 SUBMISSION REQUIREMENTS</b> .....	<b>12</b>
<b>7.0 REVIEW PROCESS</b> .....	<b>13</b>
<b>APPENDIX A:</b> .....	<b>15</b>
<b>8.0 GLOSSARY</b> .....	<b>16</b>
<b>9.0 REFERENCES</b> .....	<b>17</b>

# Linkage Assessment Guidelines

## 1.0 Introduction

These guidelines have been prepared to provide direction to individuals, agencies, and environmental consultants when new development or site alteration is proposed within a Linkage shown on Schedule B (Natural Heritage System) of the Urban and Rural Hamilton Official Plans. They describe the purpose of Linkage Assessments, required contents and format, and the submission process.

The intent of the Linkage policies are to protect and enhance connections between Core Areas to enhance the ecological functions of the Natural Heritage System. It is expected that Linkages are to be maintained or enhanced wherever possible. **Linkage Assessments should integrate the design of a development proposal in a manner that protects or enhances the ecological functions of the Linkage.**

### 1.1 What are Linkages?

In its Official Plans, the City of Hamilton has identified an interconnected, protected Natural Heritage System (NHS) consisting of Core Areas (the most significant natural features) and Linkages (supporting habitat patches which connect Core Areas or contribute to their ecological functions). This NHS is shown on Schedule B in the Hamilton Official Plans.

Linkages are defined in the Official Plans as:

*Natural areas within the landscape that **ecologically** connect Core Areas. They are avenues 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 natural areas. Conserving Linkages also protects and enhances Core Areas.*

Linkages are remnant natural areas in the landscape that connect or support the function of Core Areas. Linkages can also be important natural features on their own, or degraded habitat which can be improved through restoration. They are avenues along which plants and animals can move in response to life cycle requirements and environmental changes. This leads to enhanced biodiversity and a Natural Heritage System that is more resilient.

Linkages also support the function of Core Areas by increasing their size and buffering them from adjacent land uses. Linkages include areas which may be currently isolated from Core Areas (i.e. not physically connected), but which may

provide habitat on their own, or as part of a larger ecological corridor. For example, isolated woodlands along the Lake Ontario shoreline may provide “stepping stones” along the lakeshore corridor to permit the movement of migrating songbirds, butterflies and bats. These remnant habitat areas provide essential resting and feeding areas for migrating wildlife within a fragmented and disturbed landscape. Although Linkages may not actually be touching a Core Area or other natural feature, they still provide habitat and facilitate wildlife movement along corridors. Linkages are not provincially or locally significant habitats on their own, but they support and enhance the ecological functions of Core Areas.

Linkages include various habitat types (such as meadows, thickets, woodlands, and wetlands) and are usually found along ecological corridors, such as streams, shorelines, and the Niagara Escarpment. Anthropogenic features, such as hydro corridors, abandoned rail lines, and utility corridors are also included as Linkages, since they can facilitate wildlife movement.

The City recognizes the importance of Linkages in reducing the adverse impacts of habitat fragmentation. Fragmentation is the degree to which once continuous natural habitat is divided into remnant isolated patches. Excessive fragmentation of the landscape by roads and development not only reduces the amount of available habitat for wildlife, but also affects wildlife movements. This results in loss of species diversity and reduced ecosystem health and resilience. Protecting and enhancing the existing Core Areas and Linkages in the NHS through Official Plan policies is vital to a healthy ecosystem in Hamilton.

When preparing a Linkage Assessment, the City requires that the ecological functions of the Linkage be identified. Some examples of these functions include (but are not limited to):

- facilitating wildlife movement and plant dispersal;
- seasonal movement corridors;
- supporting Core Areas (i.e. increasing their size and habitat diversity, linking Core Areas, rounding out edges of Cores, serving as buffers); and,
- increasing biodiversity by providing habitat for species (feeding, resting, breeding, dispersal).

Linkage policies are intended to protect the ecological functions of the Linkage, which may involve protecting the entire Linkage, protecting the ecologically functional portion of the Linkage, or restoring degraded areas to enhance their ecological function. In this way, there is flexibility in the policy and how Linkages are addressed.

## 2.0 Policies for Linkages

Although protection of Linkages may appear to be a new concept, since 2005 the Provincial Policy Statement (PPS) has recognized the importance of Linkages, as follows:

*Policy 2.1.2. The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored, or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features. (PPS, 2005)*

This policy has been carried forward in the 2014 PPS and the Province has now added the requirement that municipalities identify Natural Heritage Systems in their Official Plans (Policy 2.1.3)

Further to this, a Natural Heritage System (NHS) has been defined in the PPS (2014) as:

*Means a system made up of natural heritage features and areas, and linkages intended to provide connectivity (at the regional or site level) and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species, and ecosystems. These systems can include natural heritage features and areas, federal and provincial parks and conservation reserves, other natural heritage features, lands that have been restored, or have the potential to be restored to a natural state, areas that support hydrologic functions, and working landscapes that enable ecological functions to continue. The Province has a recommended approach for identifying natural heritage systems, but municipal approaches that achieve or exceed the same objective may also be used.*

Policies in both the Urban and Rural Official Plans encourage the protection and enhancement of Linkages through Environmental Impact Statements, Linkage Assessments, Secondary Plans, watershed plans, and other studies. The City recognizes that protection of Linkages is best done at a larger scale, such as Secondary Plans and watershed studies.

On the City's own properties, policies require that Linkages be enhanced by natural restoration where appropriate. For example, natural vegetation could be planted in inactive sections of parks, especially those abutting Core Areas.

For proposals for new development and site alteration, a Linkage Assessment is required to identify the boundaries and functions of the Linkage and to incorporate the Linkage into the design of the development. In the Urban and Rural Official Plans, Linkages are mapped on Schedule B (Natural Heritage

System). When identifying Linkages on Schedule B, the City mapped all natural or planted/cultural habitat (woodlands, thickets, meadows) which were 0.5 hectares or more in size and located within 100 metres of a Core Area.

Once a draft map was prepared, City staff reviewed it to ensure that the ecological principles of corridor design were followed. During this review, City staff considered the following principles, removing Linkages that did not meet these principles:

- generally, wider linkages are best;
- linkages that form continuous connections with Core Areas are better than those which are broken. However, even broken Linkages will provide 'stepping stones' for species movement across the landscape;
- isolated Linkages were identified in a few cases, when they provided remnant natural habitat, such as relatively undisturbed mature woodlands consisting of predominately native species;
- how does the Linkage function? For example, what species are likely moving along the corridor and what are their requirements?;
- preserving as many corridors as possible will provide alternative routes for wildlife movement;
- linkages with high habitat diversity are preferred; they should provide a range of habitat sizes and types;
- linkages with minimal human disturbance are best;
- linkages associated with water (streams, headwaters, recharge and discharge areas, wetlands) are important;
- linkages that round out the shape of a Core Area and minimize its edge are best; and,
- linkages that increase the size of a Core Area are preferred. Include wider sections (nodes) in a corridor to compensate for narrow width and to provide refuges for wildlife.

These areas were then reviewed by City staff to eliminate any areas that had already been developed or had Draft Plan of Subdivision approval. This information was included in the final Schedule B to the Hamilton Official Plans.

### **3.0 What is a Linkage Assessment (LA)?**

The purpose of the Linkage Assessment is to provide the applicant with information to **create a development plan that maintains and enhances the Linkage, so natural areas function as a connected system in the long term.** The LA, through field studies, landscape interpretation, and data analysis, identifies the ecological functions present.

A LA is a study that:

- assesses the ecological features and functions of a Linkage, including its vegetative, wildlife, and/or landscape features or functions;
- identifies the Linkage boundaries based on these features and functions;
- describes its ecological function, condition, and integrity;
- identifies how its function will be maintained or enhanced within a development proposal;
- assesses potential impacts as a result of the proposed development or site alteration; and,
- makes recommendations on how to protect and enhance the Linkage, and/or avoid, minimize, or mitigate impacts on the Linkage and its ecological functions.

A LA must be prepared by a qualified expert (an ecologist or biologist).

## **4.0 What Types of Development Applications Require a LA?**

The City requests a LA when new development or site alteration is proposed within a Linkage mapped on Schedule B of the Hamilton Official Plans. The need for a Linkage Assessment is usually identified during the Formal Consultation process with a landowner who proposes development or site alteration within a Linkage. For City projects, City staff should contact a Natural Heritage Planner to determine whether a LA is required.

Development, as defined in the Hamilton Official Plans, means the creation of a new lot, change in land use, or the construction of buildings or structures, requiring approval under the *Planning Act*, such as:

- Official Plan Amendments;
- Zoning By-law Amendments;
- Subdivisions;
- Severances;
- Variances;
- Site Plans; and,
- Niagara Escarpment Plan amendments or development permits, requiring approval under the *Niagara Escarpment Planning and Development Act*.

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

If the subject property also contains a Core Area, the LA should be completed as part of the Environmental Impact Statement (EIS). Separate studies are not required.

## 5.0 Content of Linkage Assessment Reports

A LA may be scoped to focus on particular issues. Scoping is done by the City of Hamilton Natural Heritage Planner, in consultation with the applicant and their consultant. The LA will include the components listed below, but the detail required may vary. **A Terms of Reference must be prepared to the satisfaction of the City's Natural Heritage Planner prior to completing field surveys.**

### 1. Identify the Linkage

a) Describe the natural and physical environment at the site and in the surrounding landscape, including:

- Ecological Land Classification (ELC) to identify vegetation communities;
- location of physical features (watercourses and water bodies, landforms, drainage patterns, general soil types, areas of groundwater recharge or discharge (if any));
- field surveys to address specific features, including species inventories (i.e. amphibians, reptiles, mammals, fish, butterflies, odonates, breeding or migratory birds, and plants); and,
- field surveys to address specific functions, such as how wildlife are using the area (e.g. feeding, breeding, resting, wintering, and movement patterns).

The LA does not typically require the level of field study that an Environmental Impact Statement (EIS) does. However, any field studies that are required must be completed at the appropriate time of year and must use commonly-accepted survey methods. These methods include ELC, Ontario Breeding Bird Atlas, Ontario Marsh Monitoring Protocol, Ontario Stream Assessment Protocol, and Ontario Benthos Biomonitoring Network Protocol (refer to the City of Hamilton Environmental Impact Statement Guidelines, 2014 for more information). These methods should be clearly listed in the Terms of Reference for the LA.

b) Identify the boundaries of the Linkage. City staff can assist with identifying the boundaries of the Linkage in the field, if necessary. When identifying Linkage boundaries, the following guidance is provided:



- identify Linkage boundaries on a current air photo.
  - if any changes to the Linkage boundary are proposed, these should be clearly delineated on the air photo and justification for the change must be provided.
  - boundaries of the Linkage must be delineated based on ecological features and functions, such as the extent of a vegetation (Ecological Land Classification) community or the habitat used by species within the Linkage.
- c) Assess the ecological functions, condition, viability, and integrity of the Linkage by considering:
- whether the Linkage is currently connecting natural areas. (Is the existing Linkage sufficient to maintain connectivity under present conditions?);
  - if the Linkage is continuous or broken;
  - the scale at which the Linkage will function;
  - the width of the Linkage;
  - the current condition of the Linkage (e.g. naturally vegetated but degraded, remnant natural vegetation, regenerating cultural habitat)
  - the surrounding land uses. (Are they currently impacting the ecological functions of the Linkage?);
  - the wildlife species that are using the Linkage and how they are using it. (Are they using the Linkage daily or seasonally? Do the species have special habitat requirements? If so, it is important to maintain this habitat within the Linkage);
  - whether locally uncommon or rare species are using the Linkage for any part of their life cycle;
  - if the Linkage is important habitat by itself;
  - whether the Linkage provides supporting habitat to the Core Area by providing foraging, resting, or dispersal areas for species that live in the Core Area; and,
  - the location of the Linkage along a corridor, such as a stream, escarpment, or lakeshore.

The Natural Heritage Reference Manual (Second Edition) lists a number of characteristics of Linkages that should be considered when assessing the ecological functions of Linkages within the Natural Heritage System (NHS). Linkages should also be assessed using these principles:

- Ecological Function
  - linkage takes into account the needs of species;
  - linkage corresponds to wildlife movement corridors; and,
  - linkage is composed of suitable habitat and leads wildlife along an ecological corridor (the lake shore, escarpment, or stream).

- Scale
  - linkage dimensions are appropriate to the scale of planning; and,
  - wider Linkages are better
- Redundancy
  - multiple linkages and alternative pathways give species options for movement from one area to another.
- Stepping Stones
  - linkage contains habitat patches that provide temporary refuges that facilitate movement between Core Area or along an ecological corridor; and,
  - this approach can be used where unbroken Linkages are not possible.
- Ecological Appropriateness
  - linkage reflects a natural relationship between Core Areas or features being connected.
- Suitability of the Path
  - linkage provides opportunities for species to cross it successfully.
- Surrounding land uses
  - the uses of lands surrounding the Linkage should be able to mitigate negative impacts versus acting as potential stressors. (E.g. an agricultural field is more likely to permit wildlife movement and dispersal than intensive residential, commercial, or industrial development).
- Connection to Landforms and Areas with High Restoration Potential
  - the Linkage connects areas that could provide habitat in the future.
- Connecting Core Areas
  - the Linkage should allow for movement between Core Areas; and,
  - linkages between two or more Core Areas are more likely to be highly functional.
- Water Features
  - riparian and shoreline linkages are valuable because the land-water interface usually supports a high level of biodiversity and meets multiple species needs.

## 2. Describe the Development Proposal

Provide a brief description of the proposal, including:

- a general location map;
- type of development or site alteration proposed and its location and extent;
- timing of proposed construction/development;

- existing land use and activities on site and in the surrounding area; and,
- preliminary site plan showing the tentative desired location of buildings, grade changes, roads and driveways, servicing, etc., overlaid on a current air photo. **The site plan should be prepared based on the results of the field studies, and it is expected that Linkages will be incorporated into the design of the development proposal.**

### 3. Identify Impacts on the Linkage

When assessing potential impacts, the LA report must include a section addressing the Linkage policies in the Official Plan and how the proposal is consistent with the policies. It is important to take the information from the studies and the development proposal, and relate it back to the Official Plan policies. This policy context section will provide a framework for analyzing impacts.

The LA report must assess short-term impacts (e.g. grading, construction impacts, soil compaction, vegetation removal) and long-term impacts (e.g. encroachment, drainage changes) of the development or site alteration on the Linkage. Will the proposed development or site alteration weaken or eliminate the ecological function of the Linkage and surrounding Core Areas?

**It is important, when assessing the impacts, to look well beyond the boundaries of the subject property, at how the Linkage functions in relation to adjacent land uses and the surrounding landscape.**

If a portion of a Linkage is proposed to be removed, the LA must provide justification through an assessment of the impacts on the Natural Heritage System and mitigation measures to minimize impacts. Can the existing Linkage be enhanced or should new habitat be created (i.e. to better align the Linkage with adjacent Core Areas)? The alignment, width, and habitat within a Linkage to be retained or restored must accommodate the ecological function it is intended to support.

### 4. Recommendations and Conclusions

The LA report must provide recommendations on site design and mitigation measures to avoid impacts to the Linkage and a conclusion summarizing the main findings of the LA study. This information can include:

- if impacts to the Linkage cannot be avoided, provide recommendations on how to mitigate them through site design and construction practices, restoration plantings, or habitat management;

- if a portion of the Linkage is to be removed or altered, identify how its ecological features or functions will be replicated on site. Clearly identify the location and size of the area proposed to be removed on a figure;
- identify if the Linkage will be enhanced by habitat restoration or management. These areas should be identified on a figure. It is important that any restoration or management maintains or enhances Linkage functions;
- monitoring of the Linkage function may be required, especially where habitat restoration or management (i.e. invasive species control) are proposed; and,
- opportunities to permit wildlife movement should be provided, such as ecopassages (wildlife crossings built over or under roads that allow wildlife to safely cross roadways, different pavement treatments, seasonal closures, signage, etc.).

## 5. Appendices

The LA report should include Appendices which provides the following information:

- data collected (e.g. ELC data sheets, wildlife and plant species lists); and,
- tables of species, species occurrence records, and rarity status rankings from the Hamilton Natural Heritage Database and the Natural Heritage Information Centre in addition to those species detected during field work. This will provide important information on the presence of a particular species and its rarity within the local area. To obtain the local data (Hamilton Natural Heritage Database), contact the Ecologist at the Hamilton Conservation Authority at (905) 525-2181. Similarly, Conservation Halton maintains additional natural heritage information within its jurisdiction. For applications in Conservation Halton's watershed, information can be obtained by submitting a data request through the web site (<http://conservationhalton.ca/>).

## 6.0 Submission Requirements

Three hard copies of the LA and one digital (pdf) copy should be submitted to the Planning Division as part of a complete application. On sites where an Environmental Impact Statement (EIS) is also being prepared, the LA can be included as part of the EIS report.

## 7.0 Review Process

The process outlined below is designed for timely review of development applications. The purpose of the LA is to guide the design of the development proposal, so that there are no impacts to the NHS and the NHS is enhanced wherever possible. **For this reason, the LA must be submitted as part of a complete development application.**

The following procedure should be followed:

### 1. Formal Consultation

The need for a LA will be identified by City staff during the Formal Consultation process. Severances, Variances, and Niagara Escarpment Permits do not go to Formal Consultation, so the requirement for an LA report may be flagged after an application is submitted to the City. For City projects, City staff should contact a Natural Heritage Planner for any projects proposed within a Linkage shown on Schedule B of the Official Plans. The proponent must follow the LA Guidelines and retain a qualified expert to prepare the LA.

### 2. Preparing the LA Report

Before beginning work on the LA, the proponent (or their qualified expert) should contact a Natural Heritage Planner at the City of Hamilton to discuss the requirements (level of study required, issues to be addressed, and timing of field work). A Terms of Reference must be prepared, to the satisfaction of the City of Hamilton's Natural Heritage Planner. Planning staff can also direct the applicant to data resources and provide advice on Official Plan policy. This early discussion provides guidance to the applicant that can minimize the time and cost of preparing a LA.

A site visit with the consultant, applicant, and City's Natural Heritage Planner may occur at this time.

### 3. Submission

When it is completed, one hard copy and one digital pdf copy of the LA report should be submitted to the Planning Division as part of a complete development application.

#### 4. Review of the LA report

Natural Heritage staff will be responsible for reviewing the report. There may be occasions where the City's environmental advisory committee, ESAIEG, is also asked to review the Linkage Assessment, particularly when it is submitted as part of an EIS (i.e. there is also a Core Area on the property). A site visit may be required at this time.

If additional information is necessary, the applicant will need to revise the LA or provide an addendum. Staff may ask to review other related studies, such as storm water management, grading, and tree protection and landscape plans.

#### 5. Implementation of Recommendations

The LA will provide guidance to the applicant on how to design the development site layout to maintain or enhance the ecological functions of the NHS. The recommendations from the final version of the LA report will be incorporated into development agreements (usually as conditions or through an Undertaking Agreement) between the City and the applicant or implemented through the Zoning By-law and Site Plan Control.

## Appendix A:

### Guidelines for Determining Linkage Boundaries

To provide guidance to applicants and their ecological experts, City staff has prepared a list of principles to identify boundaries of Linkages in the field. Since each site is unique and must be considered based on its own characteristics, deviations from the principles are possible. However, applicants and their ecological experts should be aware of these principles so that they understand the reasoning behind Linkage boundary delineation.

Linkage boundaries will be identified based on the following principles:

- It is expected that ELC communities form the basis for delineating Linkage boundaries. If a particular ELC community is to be included, the boundary of the Linkage should include the entire ELC unit.
- Linkages may contain degraded habitat, but they are delineated based on the ecological functions that they provide. An area may be regenerating, but still providing an ecological function, such as linking two Core Areas, facilitating wildlife movement, and providing foraging or resting places for species within nearby Core Areas. It is important to consider the way the Linkage functions in the landscape. Examples of these functions include:
  - migratory bird, butterfly, or bat stop-over areas;
  - wildlife movement corridors (seasonal, daily use);
  - supporting wildlife habitat in an adjacent Core Area by providing foraging, resting, dispersal areas, etc.;
  - enhancing biodiversity by providing a variety of habitat types adjacent to Core Areas; and,
  - increasing the size, viability, and connections between Core Areas.
- In cases where ecological Linkages are broken, it will be beneficial to consider restoring these areas to reconnect them. In this way, Linkages present opportunities to restore and enhance the Natural Heritage System. Linkages are often fragmented and require restoration to reach their full potential. Linkages based only on existing features may be insufficient to provide for the needs of more sensitive species. Function is more important than features.

## **8.0 Glossary**

Qualified Expert: means a technical expert in fields relevant to the natural environment, including an ecologist, biologist, hydrogeologist, arborist/forester, or geologist, depending on the area of expertise required. In some cases, expertise in storm water management, geology, aquatic ecology, terrestrial ecology, hydrogeology, or fluvial geomorphology will be required.

For other definitions, please refer to the Glossary in the Urban and Rural Hamilton Official Plans.



## **9.0 References**

City of Hamilton, EIS Guidelines, 2004.

City of Hamilton, Rural Hamilton Official Plan, approved by the Ontario Municipal Board March 7, 2012.

City of Hamilton, Urban Hamilton Official Plan, approved by the Ontario Municipal Board, August 16, 2013.

Ontario Ministry of Natural Resources. March 2010. Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005. Second Edition. Toronto, Queen's Printer for Ontario. 248 pp.

Ontario Ministry of Municipal Affairs and Housing. Provincial Policy Statement, 2005 and 2014.