

Report to Planning and Environment Committee

To: Chair and Members
Planning & Environment Committee

From: George Kostifas, P.Eng
Deputy City Manager, Planning and Economic
Development

Subject: Environmental Management Guidelines Update
Public Participation Meeting

Date: December 13, 2021

Recommendation

That, on the recommendation of the Director, Planning and Development, the following actions be taken with respect to the Environmental Management Guidelines Update:

- (a) That the Environmental Management Guidelines attached as Appendix 1 to Appendix "A", **BE ADOPTED** as a Municipal Guideline Document.
- (b) The proposed by-law, attached hereto as Appendix "A" **BE INTRODUCED** at the Municipal Council meeting on December 21, 2021 to adopt the Environmental Management Guidelines, attached hereto, in accordance with London Plan policy 1713;

Executive Summary

The purpose of the report is to recommend that Council adopt the Environmental Management Guidelines (EMGs) as a Guideline Document in conformity with The London Plan. These EMGs are an update to the existing 2007 version, and have been developed with substantial public and stakeholder participation. The EMGs are to be used as a guideline document to implement the policies of The London Plan by setting out in more detail the requirements of environmental studies required to permit development and site alteration within or adjacent to the City's Natural Heritage System.

Linkage to the Corporate Strategic Plan

The preparation of revised Environmental Management Guidelines contributes to implementing the Strategic Plan through the Strengthening our Community and Building a Sustainable City areas of focus. The Guidelines outline measures to protect and enhance waterways, wetlands and natural areas, and to ensure that new development fits within and enhances the City's Natural Heritage System.

Analysis

1.0 Background

Environmental Management Guidelines (EMGs) are identified by The London Plan as a guideline document that can be adopted by Council to assist in the implementation of the policies of The London Plan by setting out in more detail the requirements of environmental studies necessary to allow development and site alteration within or adjacent to the City's Natural Heritage System. Environmental studies are used to establish the boundaries of natural features and areas and the ecological functions within them. They also are required prior to the approval of development to assess potential development impacts on the Natural Heritage System and demonstrate that there will be no negative impacts on natural heritage features and areas or their ecological functions.

The current EMGs were adopted by Council in 2007. Since that time, significant changes to the planning framework have occurred including two new Provincial Policy

Statements and the approval of The London Plan. This update is intended to improve the EMGs so that they are current with respect to applicable policy and legislation, incorporate the latest best practises and scientific knowledge (as well as create space for available Traditional Knowledge), continue to combine several existing separate guideline documents into one consolidated document for easier use, and provide a clearer understanding of City expectations for the completion of environmental studies.

Consistent with the 2007 EMG's, the updated EMG's continue to include six complementary guidelines: the Data Collection Standards for Ecological Inventory, Guide to Plant Selection for Natural Heritage Areas and Buffers, Environmentally Significant Areas Identification Evaluation and Boundary Delineation, Determining Setbacks and Ecological Buffers, Evaluation of Ecologically Significant Woodlands, and Preparation and Review of Environmental Impact Studies guideline documents as identified in policy 1719_ of The London Plan.

1.1 Previous Documents/ Reports Pertinent to this Matter

October 18, 2021– Planning and Environment Committee – [Environmental Management Guidelines Update](#)

October 5, 2020– Planning and Environment Committee – [Draft Environmental Management Guidelines Update](#)

August 26, 2014 – Planning and Environment Committee Report – Environmental Impact Study, Performance Evaluation for the City of London

January, 2007 – City of London – Environmental Management Guidelines

1.2 Process for this Review

As set out in the report dated October 18 2021, significant consultation has been ongoing since 2019. Pre-consultation for the EMG update was initiated in August 2019 with External Resource Groups (ERGs) and First nations being invited to shape the consultation process. Terms of Reference were developed, a procurement process initiated, and AECOM was retained in November 2019.

Phase 1 of the project included workshops and meetings with the ERGs, including the Advisory Committee on the Environment, Environmental & Ecological Planning Advisory Committee, The London Development Institute, London Home Builders Association, Nature London, The Urban League of London, Upper Thames River Conservation Authority, Lower Thames Valley Conservation Authority, and Kettle Creek Conservation Authority. In addition, five meetings were held with three First Nation communities including Chippewas of the Thames First Nation, Munsee-Delaware Nation, and Oneida Nation of the Thames. Draft EMGs were circulated for review in October 2020.

Following the circulation of these first draft EMGs, additional meetings were held with each ERG and First Nation community to discuss any comments identified through the review of the draft EMGs. These meetings reviewed and resolved comments where possible and explained previous comment responses as required. The City and AECOM reviewed the comments and adjusted the EMGs document as appropriate.

On April 15, 2021, the Local Planning Appeal Tribunal (LPAT) issued an Order approving the Environmental policies of The London Plan. This approval included several additions, deletions and modifications to the policies as adopted by City Council and approved by the Ministry of Municipal Affairs and Housing in 2016. Staff reviewed the approved policies and made further revisions and refinements to the draft EMGs where necessary to provide appropriate direction. On October 18, 2021, Staff circulated updated draft Environmental Management Guidelines to Planning and Environment Committee and the public in advance of a future public participation meeting.

2.0 Discussion and Considerations

Following the October 2021 circulation, an additional opportunity for review and consultation was offered to the External Resource Groups, local First Nations Communities and the public beyond what was communicated in the Terms of Reference. Meetings on the updated draft have since been held with the Upper Thames River Conservation Authority, Lower Thames Valley Conservation Authority, Environmental & Ecological Planning Advisory Committee, Nature London, London Home Builders Association and the London Development Institute to receive feedback and resolve issues where possible. Comments received as of the preparation of this report are identified in Appendix “B”.

All participants agreed that the updated draft EMGs represent an improvement over the current EMGs. Nonetheless, some outstanding concerns remain. Identified below are key outstanding concerns raised from participants and how they’ve been addressed:

Minimum Ecological Buffer Requirement Changes

To implement the April 2021 LPAT decision approving the London Plan environmental policies, revisions in the October 2021 draft were made to Table 5.2 which identifies required minimum buffer widths for protected Natural Heritage components. ‘Less than’ language was included in some instances to allow for site-specific flexibility consistent with the approved policies. Concern with this language and the potential for no buffer was raised by various groups. In response, the ‘less than’ language has been replaced with a note identifying that a lesser buffer must be demonstrated through the EIS process.

Pathways in Ecological Buffers

Within ecological buffers, pathways are used as a mitigation measure to prevent encroachment and direct passive recreational uses away from protected sensitive features. However, some groups view pathways as development and thus incompatible with the purpose of a buffer as protection for a natural feature. Easements were suggested as a solution, however it is preferable that the City maintain ownership of the lands on which pathways are constructed for maintenance purposes. Staff recommend maintaining the ability to include pathways in ecological buffers. The Guidelines support the consideration of pathways at the beginning of the EIS scoping to ensure any impacts of a pathway are assessed through the process. Pathways site selection will be focused on the outer half of the buffer (i.e., further away from the feature rather than closer) whenever possible.

Uses within Ecological Buffers

Stormwater Management infrastructure that relies on infiltration and is vegetated, such as Low Impact Development (LIDs), have been included as permitted buffer uses. Stakeholders identified specific instances of LIDs in buffers that require maintenance that interrupts the buffer function. In response, the language has been adjusted to clarify what stormwater infrastructure will be permitted within the ecological buffer.

EIS Updates at Draft Plan Extension

For multiple phased subdivision projects, there is the potential for build out to occur over several years after an EIS has been completed and approved. To provide certainty and set clear expectations, the document has been revised to identify that an EIS tied to a draft approved subdivision can be updated within six years – the typical timeframe associated with a second draft plan extension. This timeframe is compatible with the data standards that considers data current for 5 years post approval.

Focused EIS

The requirement to request a EIS is tied to London Plan policy. An abbreviated – or Focused EIS – process is contemplated in instances where applicants meet the minimum buffer requirements around evaluated features or assume the greatest significance around unevaluated features. To address comments during the consultation, further revision of the language has been provided to clarify this section.

Monitoring

Several groups requested further specifics regarding the Monitoring section, including templates and clear timelines. The Post Development EIS Monitoring project is currently being developed as a separate process from the EMGs which is intended to provide greater detail on monitoring requirements and recommend templates where appropriate. Once developed, specifics can be incorporated into a future EMG update.

All comments received throughout this additional consultation was considered, however all comments may not have been incorporated in the updated guidelines.

Changes Resulting from Meetings

Appendix “C” provides the redline version of changes that were made from the October 18, 2021, to the December 13, 2021, draft. Revisions were made to address typographical errors, improve document clarity and consistency, and as a response to comments including those identified above. Key areas of substantive redline changes:

- Clarification of “subject lands” versus broader “study area” (s. 2.1.1)
- Clarification of purpose of Subject Land Status Report (SLSR) (s. 2.4)
- Clarification of Full vs Scoped vs Focused EIS (s. 2.6)
- Clarification of purpose of and process for Focused EIS (s. 2.6.3)
- Refinements to Table 2-1 to ensure alignment with Table 13 in The London Plan
- Clarification of approach to be used for impact assessment and net effects assessment (included in Section 2.6.6.7 and Appendix D)
- Buffers (Section 5)
 - Refinements to Table 5-2 (Minimum Buffer Widths) to clarify:
 - All Natural Heritage System features require buffers
 - Minimums are encouraged in all cases and may only be refined with an EIS, for Wetlands under 0.5 ha and Sig Woodlands under 2 ha
 - A Focused EIS requires application of the required minimums
 - Clarification of why Woodlands have smaller required minimum buffers than Significant Woodlands
 - Expanded text and rationale supporting pathways and trails in buffers, and “passive” Low Impact Development Storm Water Management Systems

2.1 Environmental Management Guidelines Document

EMGs are identified as a guideline document in policy 1719_ of the London Plan that are intended to set out in more detail the requirements of environmental studies for development and site alteration (policy 1423_). Environmental studies are how the City establishes the precise boundaries of natural features and areas and are used to assess potential development impacts on the natural heritage system. The EMGs are to be updated as required to reflect changes to provincial policy and technical documents, and to reflect improvements in scientific knowledge (policy 1424_).

As the London Plan already identifies EMGs as a guideline document, the adoption of these guidelines will not result in a change to the Plan, thus no Official Plan Amendment is required. However, policy 1713_ requires guideline documents to be adopted by resolution of Council and policy 1714_ requires that before adopting or amending a guideline document, a public meeting be held to provide input from interested parties.

The attached EMG document in Appendix “A” was completed with input from the External Resource Groups and First Nations, and reflects in-force municipal and provincial policies, guidance documents, current scientific literature, and industry best practices. The document includes seven sections. An introduction describing the policy and consultation scope is followed by six complementary guidelines that have been ordered to outline the processes sequentially.

3.0 Next Steps

As the EMGs were last updated in 2007, a comment throughout the process has been that the guidelines need to be reviewed on a more frequent basis to reflect

improvements in scientific knowledge, changes to provincial policy and technical documents, and to address implementation concerns.

Moving forward, it is the intent that the EMGs will be reviewed on a bi-annual basis to ensure the document remains up to date. Regular updates and the scoping of matters with stakeholders early in the update process will be essential to conducting future reviews that are focused and completed in an expeditious manner.

Conclusion

The EMGs are used as a guideline document to implement the policies of The London Plan by setting out in more detail the requirements of environmental studies for development and site alteration. Extensive consultation has been ongoing since 2019 and has resulted in a document that is a marked improvement from the previous 2007 version. Moving forward, undertaking EMG reviews on a more frequent basis will help ensure that this document remains up to date.

Prepared by: Emily Williamson, MSc
Ecologist, Long Range Planning, Research and Ecology

Reviewed by: Kevin Edwards, MCIP RPP
Manager, Long Range Planning, Research and Ecology

Recommended by: Gregg Barrett, AICP
Director, Planning and Development

Submitted by: George Kotsifas, P. Eng.
Deputy City Manager, Planning and Economic
Development

December 6, 2021
EW/ew

Y:\Shared\Sustainability and Resiliency\05- Environmental Management Guidelines\10 - Dec 13 PEC Report PPM\Environmental Management Guidelines PEC Report December 13, 2021 FINAL.docx

Appendices

Appendix A: By-law to Adopt Environmental Management Guidelines

Appendix B: Comments Received Since October 18, 2021

Appendix C: Redline Revisions from October 18, 2021 Draft

Appendix A – By-law to Adopt Environmental Management Guidelines

Bill No. (number to be inserted by Clerk's Office)
2021

By-law No. (to be inserted by Clerk's Office)

A by-law to adopt Environmental
Management Guidelines

WHEREAS the London Plan for the City of London Planning Area – 2016 includes policies for environmental management guidelines for setting out in more detail the requirements of environmental studies for development and site alteration;

AND WHEREAS the attached Environmental Management Guidelines are environmental management guidelines pursuant to policy 1423_ of the London Plan for the City of London Planning Area – 2016;

THEREFORE the Municipal Council of the Corporation of the City of London enacts as follows:

1. The Environmental Management Guidelines, as attached hereto and forming part of this by-law, is adopted.

PASSED in Open Council on December 21, 2021.

Ed Holder
Mayor

Catharine Saunders
City Clerk

First Reading – December 21, 2021
Second Reading – December 21, 2021
Third Reading – December 21, 2021



City of London Environmental Management Guidelines

Prepared for the
City of London

December, 2021

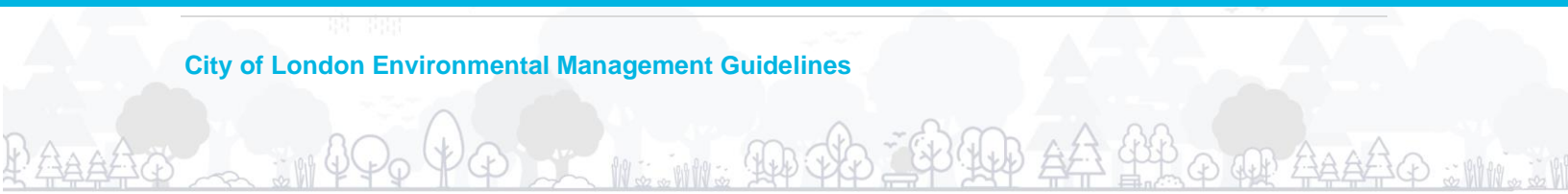
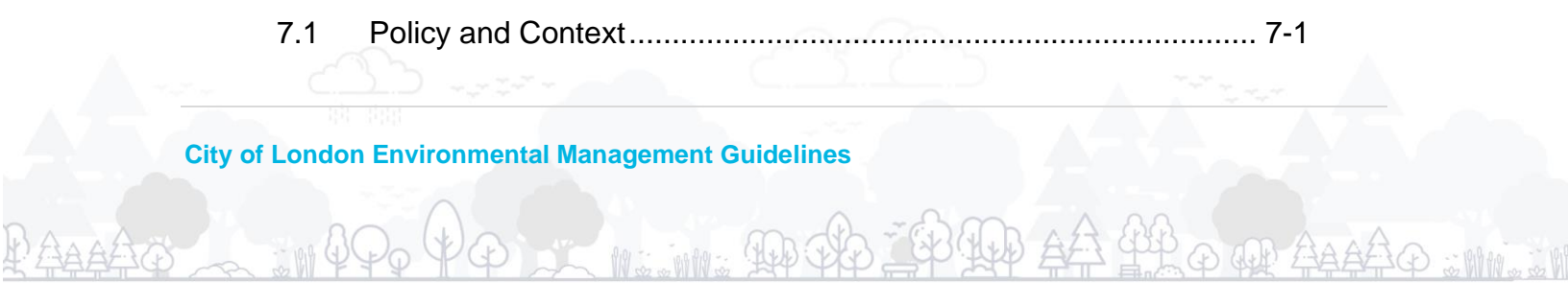


Table of Contents

1.	Introduction	1-1
1.1	The London Plan	1-1
1.2	First Nations Engagement & Consultation	1-2
1.2.1	Chippewas of the Thames First Nation	1-2
1.2.2	Munsee-Delaware Nation	1-3
1.2.3	Oneida Nation of the Thames	1-3
1.3	Guideline Document Organization	1-3
2.	Preparation of Environmental Studies	2-1
2.1	Pre-consultation and Determination of Required Studies	2-1
2.1.1	Subject Lands versus Study Area	2-1
2.2	Environmental Study Scoping	2-2
2.2.1	Environmental Study Scoping Checklist (ESSC) / Terms of Reference	2-2
2.2.2	SLSR and EIS Study Scoping Meeting	2-2
2.2.3	ESSC Approval	2-3
2.3	Background Information Review & Field Investigations	2-3
2.4	Subject Lands Status Reports (SLSR)	2-4
2.5	Environmental Assessment for Infrastructure Projects	2-4
2.6	Environmental Impact Studies	2-5
2.6.1	The Purpose of an Environmental Impact Study (EIS)	2-5
2.6.2	The Requirement for an EIS	2-5
2.6.3	Focused EIS	2-7
2.6.4	Overview of the EIS Process	2-8
2.6.5	EIS Report Requirements	2-9
2.6.6	Report Content	2-10
3.	Evaluation of Significance and Ecological Function ...	3-1
3.1	Significant Woodlands and Woodlands	3-2
3.1.1	Policy and Context	3-2
3.1.2	Significant Woodland Evaluation Criteria	3-4
3.2	Environmentally Significant Areas (ESAs)	3-17
3.2.1	City of London Subwatershed Regions Policy and Context	3-17
3.2.3	Environmentally Significant Areas (ESAs) Evaluation Criteria ...	3-20
3.3	Provincially Significant Wetlands, Wetlands and Unevaluated Wetlands	3-27
3.4	Significant Wildlife Habitat (SWH)	3-28
3.5	Significant Valleylands and Valleylands	3-28

4.	Boundary Delineation of Natural Heritage Features and Areas.....	4-1
4.1	Policy Context and General Guidance.....	4-1
4.2	Wetlands.....	4-2
4.3	Significant Woodlands and Woodlands.....	4-3
4.4	Valleylands and Significant Valleylands.....	4-3
4.5	Significant Wildlife Habitat	4-4
4.6	Environmentally Significant Areas (ESAs)	4-4
4.7	Vegetation Patches.....	4-5
4.8	Boundary Delineation Guidelines.....	4-5
5.	Determining Ecological Buffers.....	5-1
5.1	Definition of a Buffer	5-1
5.2	Approach	5-2
5.3	Buffer Determination Process	5-2
5.3.1	Step 1 – Determine feature to be protected, delineate boundaries and determine potential impacts.....	5-3
5.3.2	Step 2 – Apply Minimum Buffer Widths	5-5
5.3.3	Step 3 – Determination of Site-Specific Buffer Widths	5-7
5.3.4	Step 4 - Buffer Restoration and Enhancement	5-9
5.4	Permitted Uses within a Buffer.....	5-11
6.	Ecological Replacement and Compensation.....	6-1
6.1	Context and Process.....	6-2
6.1.1	Policy Context	6-2
6.1.2	Scientific and Technical Context.....	6-3
6.2	Approval Process.....	6-3
6.3	Guiding Principles for Ecological Compensation	6-5
6.4	Ecological Replacement and Compensation Plan	6-6
6.5	Determining Appropriate Measures	6-6
6.5.1	Wetlands	6-7
6.5.2	Significant Woodlands and Woodlands	6-7
6.5.3	Other Features	6-7
6.6	Implementing Replacement and Compensation	6-7
6.6.1	Site Selection	6-8
6.6.2	Replicating Ecosystem Structure and Functions.....	6-9
6.6.3	Plant Selection	6-9
6.7	Tracking Compensation	6-9
7.	Environmental Monitoring.....	7-1
7.1	Policy and Context.....	7-1



7.2	Environmental Management Plan (EMP) Requirements	7-2
7.2.1	Environmental Management Plan Report Requirements	7-3
7.2.2	Monitoring Timeline and Responsibilities	7-4
7.2.3	Pre-Construction Monitoring	7-5
7.2.4	Construction Monitoring.....	7-5
7.2.5	Post-Construction Monitoring	7-6
8.	Glossary of Terms	8-1
9.	References.....	9-1

List of Tables

Table 2.1:	Areas Subject to Environmental Impact Studies
Table 3.1:	Rare Plant Species Presence / Absence
Table 5.1:	Summary of Overall Buffer Width Determination Process
Table 5.2:	Recommended Minimum/Maximum Buffer Widths
Table 5.3:	Criteria for the Determination of Greater than Minimum Buffers
Table 5.4:	Potential Buffer Enhancement Measures

List of Figures

Figure 2.1:	Environmental Process Stages for Infrastructure Projects
Figure 2.2:	The EIS Process, including Subject Land Status Report and EIS Approval Process Steps
Figure 3.1:	City of London Glacial Geomorphology of the dominant physiographic units
Figure 3.2:	City of London Subwatershed Regions
Figure 4.1:	Boundary Delineation Guideline Legend
Figure 4.2:	Guideline 1 Illustration
Figure 4.3:	Guideline 2 Illustration
Figure 4.4:	Guideline 3 Illustration
Figure 4.5:	Guideline 4 Illustration
Figure 4.6:	Guideline 5 Illustration
Figure 4.7:	Guideline 6 Illustration
Figure 4.8:	Guideline 7 Illustration
Figure 4.9:	Guideline 8 Illustration
Figure 5.1:	Illustration of a buffer implemented for the protection of a Natural Heritage Feature adjacent to a development
Figure 5.2:	Illustration of buffer profile
Figure 6.1:	Illustration of the required approach whereby all options for avoiding and / or mitigating impacts must be explored with the City before compensation can be considered
Figure 7.1:	Environmental Monitoring Process

List of Appendices

Appendix A	– EMG Process Flow Chart
Appendix B	– Environmental Study Scoping Checklist
Appendix C	– Data Collection Standards
Appendix D	– Woodland Evaluation Form
Appendix E	– Net Effects Table Template

List of Acronyms and Abbreviations

ANSI	Areas of Natural and Scientific Interest
CFZ	Critical Function Zone
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
COTTFN.....	Chippewas of the Thames First Nation
EA.....	Environmental Assessment
EEPAC	Environmental and Ecological Planning Advisory Committee
ELC	Ecological Land Classification
ESSC.....	Environmental Study Scoping Checklist
EIS.....	Environmental Impact Study
EMG	Environmental Management Guidelines
ER	Environmental Review
ESA	Environmentally Significant Areas
GIS	Geographic Information System
IPR	Initial Proposal Report
LIO.....	Land Information Ontario
MBCA	Migratory Bird Convention Act
MCC	Mean Coefficient of Conservatism
MDN	Munsee-Delaware Nation
MECP	Ministry of Environment, Conservation and Parks
MNRF	former Ministry of Natural Resources and Forestry
MNDMNRF.....	Ministry of Northern Development, Mines, Natural Resources and Forestry
NHS.....	Natural Heritage System
Oneida.....	Oneida Nation of the Thames
OWES	Ontario Wetland Evaluation System
PSW	Provincially Significant Wetlands
SAR	Species At Risk
SWH.....	Significant Wildlife Habitat
SLSR	Subject Land Status Report
TRT	Technical Review Team

Please note these Environmental Management Guidelines (2021) incorporate updates to and supersede the former Environmental Management Guidelines (2007) in accordance with **The London Plan** (Policies 1432_ and 1424_). The specific locations and cross-references to the updated guidelines are summarized below.

Former Natural Heritage System Guideline (as listed in The London Plan Policy 1719)	Superseded by the Section in these Environmental Management Guidelines (2021) (as listed below)	The London Plan Policy Cross-Reference
<i>4. Guide to Plant Selection for Natural Heritage Areas and Buffers</i>	Key guidance included in Section 5 Determining Ecological Buffers.	1719_
<i>5. Guideline Documents for Environmentally Significant Areas Identification, Evaluation and Boundary Delineation</i>	Section 3 Evaluation of Significance and Ecological Function, Section 3.2 Environmentally Significant Areas (ESAs)	1367_, 1369_, 1719_
<i>6. Guidelines for Determining Setbacks and Ecological Buffers</i>	Section 5 Determining Ecological Buffers	1350_, 1414_, 1719_
<i>7. Guidelines for the Evaluation of Ecologically Significant Woodlands</i>	Section 3 Evaluation of Significance and Ecological Function, Section 3.1 Significant Woodlands and Woodlands	1340_, 1342_, 1719_
<i>8. Guidelines for the Preparation and Review of Environmental Impact Studies</i>	Section 2 Preparation of Environmental Studies, Section 2.6 Environmental Impact Studies	1413_, 1719_

Acknowledgements and Commitment to Review

The process for updating the former Environmental Management Guidelines (2007) involved a two year exercise over 2019, 2020 and 2021 that included three rounds of engagement and more than 20 meetings with various external resource groups including local nature groups, development organizations, Conservation Authorities, the City's Environmental and Ecological Planning Advisory Committee (EEPAC) and the First Nations communities within close proximity to the City of London. Through this process hundreds of comments from various perspectives and disciplines were received and many have been incorporated in this document.

This collaborative process has facilitated a comprehensive review of and update to these guidelines, and resulted in a document that is:

- more streamlined
- clarifies how environmental planning under the City's jurisdiction is intended to be implemented, and
- is aligned with the environmental policies in ***The London Plan***.

The City sincerely thanks all partners and participants for their input to date, and looks forward to continuing to work together to ensure that these guidelines help implement environmental policy in the City in accordance with ***The London Plan***, while also complementing other applicable regulations, policies and guidelines at the federal, provincial and regional levels.

The City recognizes that while these Environmental Management Guidelines (EMGs) represent a comprehensive update to the prior guidelines, that it is desirable and appropriate to provide a transparent process for regular refinements and updates to this document (e.g., in response to new information, opportunities to provide additional clarification, etc.). To this end, the City is committed to continuing to accept comments, engaging with its partners and considering comments received. The intent is to undertake such reviews on a biennial basis.

Special thanks to Dr. Gary Epp, Jillian deMan and many others at AECOM for undertaking the research, facilitating the engagement, and providing multiple drafts of and graphics for this document. Thanks also to Margot Ursic of Grounded Solutions Services Ltd. for her input.

1. Introduction

The following Environmental Management Guidelines (EMGs) are intended to provide technical guidance in implementing the environmental policies of **The London Plan** (2016a; hereafter **The London Plan**) as they relate to the identification, delineation and protection of the natural heritage features and areas that form the City of London’s Natural Heritage System (NHS). The Natural Heritage policies of **The London Plan** provide direction for the identification and protection of natural heritage features and areas and the ecological functions, processes, and linkages that they provide over the long term.

The City of London has prepared these EMGs for the effective, consistent, and streamlined implementation of City policies and legislation related to the protection of the NHS. These guidelines have been developed to align with and complement the applicable federal, provincial and Conservation Authority regulations and policies, and are not meant to supplant those policies. These guidelines have also been developed with careful consideration for relevant municipal planning processes, data sources, current scientific knowledge and best management practices. As an integral part of the environmental planning process in the City, these guidelines also include the provisions for stakeholder and First Nations engagement and consultation.

These guidelines provide an overarching framework, criteria and technical guidance for implementing environmental policies related to the NHS. However, it is recognized that each planning application and each study area is unique, and that these EMGs do not replace the need for professional and technical expertise to both scope and undertake the work required. It remains the responsibility of the proponent to review the full suite of applicable policies and regulations, be familiar with the current and relevant scientific and technical literature, and to work with the City and other agencies as needed (e.g., local Conservation Authorities, the Province) to ensure the policies and regulations are implemented as intended.

This document replaces the previous Environmental Management Guidelines (2007) and consolidates a series of other guideline documents as listed in 1719_ including 1340_, 1342_, 1350_, 1367_, 1369_, 1413_, and 1414_.

1.1 The London Plan

The London Plan identifies these EMGs as a source of technical guidance to facilitate in the implementation of its Natural Heritage policies. These policies are based on the *Provincial Policy Statement* which represents minimum standards. “*Within the framework of the provincial policy-led planning system, planning authorities and decision-makers may go beyond these minimum standards to address matters of importance to a specific community, unless doing so would conflict with any policy of the Provincial Policy Statement* (MMAH, 2020). The requirement for the preparation and up-date of these guidelines is outlined in **The London Plan**:

The City may prepare environmental management guidelines setting out in more detail the requirements of environmental studies for development and site alteration. Environmental studies are the means by which the City establishes the precise boundaries of natural features and areas and the significant ecological functions within them. They also assess the potential impacts of development and site alteration on the Natural Heritage System and on their adjacent lands, and are required prior to the approval of development to prevent negative impacts on the Natural Heritage System, and to demonstrate that there

will be no negative impacts on the natural heritage features and areas or their ecological functions. (Policy 1423_)

These guidelines shall be updated as required to reflect changes to provincial policy and technical documents and to reflect improvements in scientific knowledge regarding natural features and ecological functions” (Policy 1424_).

These EMGs also identify related requirements from other policies and legislation (e.g., *Provincial Policy Statement, Endangered Species Act*, etc.) that must be considered, where appropriate. Additional related requirements and / or studies may be required as part of the approvals process under provincial, federal, or Conservation Authority’s jurisdiction (e.g., Overall Benefits Permits for Species at Risk, additional hydrogeological studies under the *Conservation Authorities Act*, etc.) which will be identified by those agencies through the approvals process.

1.2 First Nations Engagement & Consultation

The City of London recognizes the importance of creating a working relationship with neighbouring First Nations communities and exploring opportunities for collaboration on common objectives, and has incorporated feedback from the following First Nation communities in to the EMG update process:

- Chippewas of the Thames First Nation (COTTFN);
- Munsee-Delaware Nation (MDN); and,
- Oneida Nation of the Thames (Oneida).

Early engagement and consultation with local First Nation communities within the vicinity of the Thames River (typically 120 m) provides important insight, and information, and is critical in protecting the NHS within and beyond the City of London’s boundaries. Consultation is based on whether a proposed development will have a direct or indirect effect on the Thames River.

COTTFN, MDN and Oneida have a deeply spiritual, cultural and practical reliance on the river that flows downstream of the City of London, through their communities. Early engagement and consultation will allow the communities sufficient time to assess, conduct early consultation with their respective advisory committees, and Chiefs and Councils (if required) and formulate a response back to the developer. Proponents are expected to plan and budget for First Nations engagement and consultation. It is expected that the applicable consultation protocols will be followed for each of the First Nations being engaged.

The following subsections, provided by each of the respective First Nations, outlines the background and distinctiveness of each Nation and provides links to information about how they can and should be contacted for engagement.

1.2.1 Chippewas of the Thames First Nation

Chippewas of the Thames First Nation (COTTFN) is an Anishinabek community also known as Deshkan Zibiing (At/On/In Antlered [Thames] River in the Ojibway language). Their community is approximately 10,800 acres in size, and is located southwest of London, Ontario. There are roughly 3000 members, with nearly 1000 members living on-reserve. Their people and ancestors have lived and travelled throughout Turtle Island (North America) for countless generations. Traditions of hunting, fishing, and storytelling endure to this day, and will be passed on for countless generations to come.

COTTFN has developed its own consultation protocol called Wiindmaagewin (to talk through) — a document and a process that will guide the development of positive working relationships. The

background to the consultation process, along with Wiindmaagewin can be reviewed at the following link: <https://www.cottfn.com/consultation/>.

1.2.2 Munsee-Delaware Nation

The traditional lands of the Munsee speaking peoples covered an area in what is now the United States, from the mouth of the Delaware River up to its source, then east to the Hudson River and then south to its mouth and including Manhattan and Staten Islands. Their language is one of the oldest of the Algonkian languages and is acknowledged by the Algonkian speaking peoples as Grandfather.

The ancestors of Munsee-Delaware Nation (MDN) moved to their present location in 1783 based on a promise from the Crown for land lost in the United States. MDN has developed its own policy for “receiving free, prior and informed consent from Munsee-Delaware Nation” outlined in the Munsee-Delaware First Nation Consultation and Accommodation Policy. General and contact information for MDN can be found at their website: <http://munseedelaware.squarespace.com/>.

1.2.3 Oneida Nation of the Thames

Established in 1840 as the ‘Oneida Settlement’, the Oneida people are known within the Iroquois Confederacy as Onyota’a:ka (People of the Standing Stone). Much like their ancestors, the Oneida peoples of today, maintain a deeply rooted connection to the land and to their Iroquois culture and traditions.

The Oneida Nation of the Thames (Oneida) is home to 2,172 residents and has a total membership of 6,270. Located in picturesque southwestern Ontario, the Oneida Nation Settlement borders lush and fertile agricultural lands and is nestled along the eastern shore of the Thames River 30 kilometres south of the City of London. General and contact information for the Oneida Nation can be found at their website: <https://oneida.on.ca/>

1.3 Guideline Document Organization

This Environmental Management Guidelines document is comprised of the following six separate, but complementary guidelines:

- Section 2: Preparation of Environmental Studies (superceding *1.0 Guidelines for the Preparation and Review of Environmental Impact Statements (EIS)*);
- Section 3: Evaluation of Significance and Ecological Function (superceding *2.0 Data Collection Standards for Ecological Inventory* and *4.0 Guidelines for the Evaluation of Ecologically Significant Woodlands*);
- Section 4: Boundary Delineation (superceding *3.0 Guideline Documents for Environmentally Significant Areas Identification, Evaluation and Boundary Delineation*);
- Section 5: Buffer Determination (superceding *5.0 Guidelines for Determining Setbacks and Ecological Buffers*);
- Section 6: Ecological Compensation; and,
- Section 7: Environmental Monitoring.

In general, these guidelines are organized in chronological order in which they are intended to be undertaken. However, there is considerable reference between and among sections and some of the work must be undertaken iteratively to ensure that the processes are being completed efficiently and effectively. It is important to consider information from all of the guidelines outlined in this document, as well as external sources of information, as applicable.

2. Preparation of Environmental Studies

2.1 Pre-consultation and Determination of Required Studies

The London Plan identifies various studies that may be required to ensure the protection of the City's NHS. The determination of the type of studies, plans and reports that are needed to support an application for development, or site alteration project requires pre-consultation with the City of London and conformance with these Environmental Management Guidelines (EMGs). In cases where the proponent or applicant is a party other than the City pre-consultation will involve the preparation of the study Terms of Reference (ToR) by the proponent/applicant through engagement with City staff, including the Ecologist Planner.

The City of London's Development Application Approval Process includes mandatory pre-consultation through the submission of an Initial Proposal Report (IPR) followed by a Proposal Review Meeting. A depiction of the Environmental and Development / Infrastructure Process Timeline including where IPR stage occurs in the process can be found in **Appendix A**.

One of the key components of the Proposal Review Meeting is the identification of the studies required for a complete application. The information and level of detail required for the IPR submission is outlined in the City of London's Initial Proposal Report Guidelines (2008) as updated from time to time.

An environmental study will often be coordinated with, and draw on information from, other inter-related technical studies that may or may not include: hydrogeological, hydrological/stormwater management, geotechnical, noise and vibration, air quality, etc.

2.1.1 Subject Lands versus Study Area

To determine if an environmental study is required and, if one is required how it should be scoped, there must be consideration for natural heritage features and areas as well as their adjacent lands. As per **The London Plan** Policy 1382_ "Adjacent lands are defined as lands contiguous to a specific natural heritage feature or area where it is likely that development or site alteration would have a negative impact on the feature or area". **The London Plan** (Table 13) specifies that adjacent lands, which are 120 m for most NHS components and 30 m for a few others¹.

- **Subject lands:** The **subject lands** are typically the limits of the lands owned by the proponent, but can also be the limits of disturbance associated with proposed works (e.g., in the case of infrastructure upgrades on public lands).
- **Study area:** Environmental studies typically need to consider features and functions beyond the subject lands. Confirmed, unevaluated or potential natural heritage features identified through the initial screening process and their adjacent lands need to be considered where they intersect with the subject lands. These features and areas are to be considered through the environmental study scoping process and, potentially, as part of the environmental study itself, as part of what can be referred to as the "study area",

¹ As per Table 13 of **The London Plan**, environmental studies must be considered for areas within 120 m of Fish Habitat, Habitat of Endangered and Threatened Species, Provincially Significant Wetlands (PSWs), Unevaluated Wetlands, Significant Woodlands, Significant Valleylands and Valleylands, Significant Wildlife Habitat, Areas of Natural and Scientific Interest, and Environmentally Significant Areas. Environmental studies must also be considered for areas within 30 m of Woodlands, Upland Corridors and Wetlands while distances from mapped Environmental Review lands will depend on the nature of the feature.

While in some cases the subject lands and the study area may be the same, generally when natural heritage is involved, the study area encompasses the subject lands plus:

- natural heritage features and areas that fall within the subject lands and extend beyond the subject lands boundaries (in whole or in part), and / or
- natural heritage features that are outside the subject lands but whose adjacent lands fall within the subject lands boundaries.

The boundaries of the study area should be confirmed as part of the environmental study scoping process outlined below. It is understood that it may only be possible to collect site-specific data within the subject lands, and that information related to the broader study area outside the subject lands will often be based on other sources of available information.

2.2 Environmental Study Scoping

Following the determination of the type of environmental study required, scoping of the study requirements must be completed. Study scoping ensures that the proponent, the City of London, relevant agencies, and the applicable City Advisory Committees agree to the required investigations, assessments and documentation.

Environmental study scoping shall include the following:

- **Preconsultation** to confirm the study area and determine the type of environmental study(ies) anticipated to be required (see **Section 2.1**) Completion of a Draft **Environmental Study Scoping Checklist (ESSC)** (see **Section 2.2.1** and **Appendix B**)
- An environmental study **scoping meeting**(see **Section 2.2.2**), and
- **Finalizing the environmental study scope** and ESSC Checklist (see **Section 2.2.3**).

The following sub-sections outline the general requirements for environmental study scoping.

2.2.1 Environmental Study Scoping Checklist (ESSC) / Terms of Reference

The completion of the ESSC is the first step in determining the scope of the environmental study, whether it is for the Natural Environment component of an Environmental Assessment (EA) for an infrastructure project, a Subject Land Status Report (SLSR) or an Environmental Impact Study (EIS) for a land development application. The ESSC constitutes the Terms of Reference (ToR) for the study and is referred to as the ESSC hereafter.

The proponent and / or their consultant is required to complete the ESSC as a draft for submission to the City of London.

Appendix B provides a template for the ESSC.

2.2.2 SLSR and EIS Study Scoping Meeting

The proponent for an environmental study must prepare and submit an environmental study scoping letter that includes a brief summary of the project, identifies the study area, provides the draft ESSC and a request to the City of London to convene an environmental study scoping meeting (scoping meeting). The environmental study scoping letter should be circulated to the Technical Review Team (TRT) prior to the scoping meeting. The intent of the scoping meeting is to review, discuss and agree to the ESSC for the environmental study to the satisfaction of the City.

The scoping meeting should be held with the proponent and the Technical Review Team (TRT). Typically the TRT will include a City Ecologist Planner and the City's Planner or Project Manager for the file, a representative from the local Conservation Authority, a representative from the City's applicable City

Advisory Committees , and, where applicable, a First Nations community representative. Other TRT members may include representatives from the Province² (e.g., related to Species at Risk), or other agencies.

During the scoping meeting the attendees will discuss comments and review the draft ESSC. The limits of the study area, the scope of the study investigations, the required evaluations and assessments, considerations for avoidance, mitigation and compensation, and required documentation and coordination with other studies / disciplines, where required, shall be discussed and agreed to. The TRT is to provide comments on the draft ESSC.

The City of London may request a site visit, including TRT members, as part of the scoping process if it is determined that a site visit would inform the study scoping.

2.2.3 Environmental Study Scoping Checklist Approval

Once all comments regarding the draft ESSC have been received by the proponent, the ESSC shall be finalized and sent to the City of London for approval. The City of London will then send written (e-mail or letter) approval and finalized copy of the ESSC to the proponent and the scoping meeting attendees.

The final ESSC will form the basis for the Environmental Study scope. The proponent and their consultant(s) may then proceed to conduct the required investigations.

In cases where field investigations are time-sensitive, the proponent may choose to initiate investigations prior to finalization of the ESSC. However, conducting investigations prior to ESSC finalization is done at the proponent's risk should the investigations conducted not meet the finalized ESSC requirements.

2.3 Background Information Review & Field Investigations

While the level of effort required to undertake a SLSR and / or EIS may vary significantly in level of effort and detail, they both require a background information review and field investigations.

A comprehensive background review of existing reports, atlases, information centers, databases, etc. is an important first step in establishing an understanding of the environmental conditions of a project site. Agency, First Nations, stakeholder and environmental organization consultation and / or engagement is an integral part of the background review and should include information requests for the study. Further details regarding background review requirements are provided in the City of London's **Data Collection Standards** found in **Appendix C**.

In some cases, field investigations may not be required if recent investigations have been completed to an appropriate level of detail, or if there are no natural heritage features within or adjacent to the subject lands. In such cases a site visit to confirm the absence of features and other conditions requiring assessment should be completed. Further details regarding field investigation requirements are provided in the City of London's **Data Collection Standards** found in **Appendix C**.

² To avoid having to update this document every time a provincial ministry is renamed or re-organized, for all references to Provincial data sources, regulations, policies and guidelines this document simply refers to "the Province" rather than a specific ministry (e.g., Ministry of Environment, Conservation and Parks) or branch (e.g., Species at Risk).

2.4 Subject Lands Status Reports (SLSR)

Consistent with **The London Plan** policies 1425 to 1428, a SLSR shall provide an assessment of natural features and areas on the subject lands with consideration for natural heritage features and areas in the broader study area including, but not limited to:

- those areas included in the Green Space or Environmental Review (ER) Place Types on Map 1 (**The London Plan**)
- any components of the NHS identified or delineated on Map 5 (**The London Plan**), and
- any unmapped features identified through the scoping process.

The objective of an SLSR is to inventory, evaluate, assess the significance of, delineate boundaries of, and make recommendations for protection of the NHS components on the subject lands in accordance with the applicable environmental regulations, policies and guidelines. This information may be used to inform refinements or updates to the applicable land use designation.

An SLSR must be scoped with the City and in consultation with relevant agencies. The SLSR shall address all of the items identified in the final site-specific ESSC and may require technical information from other disciplines (e.g, geotechnical, hydrogeology) to inform the assessment of natural heritage features and functions.

In cases where the initial scoping identified a need for a SLSR but the proponent wished to move forward with an EIS, the information and analyses within a SLSR may be carried forward into the EIS, as appropriate.

Alternately, rather than submitting a SLSR a proponent, in consultation with the City and other agencies, may submit a Draft EIS that addresses existing natural heritage conditions, and related constraints and opportunities related to development for review and confirmation by the City, in consultation with relevant agencies, prior to completing the balance of the EIS.

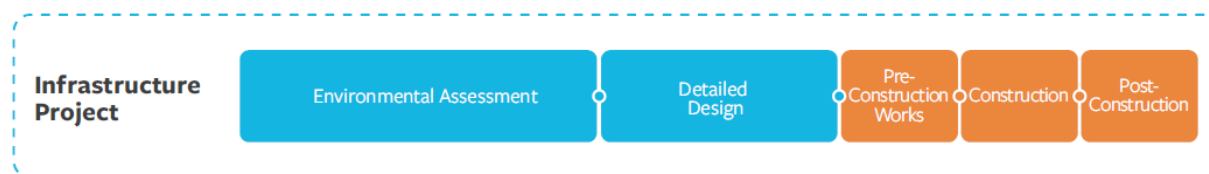
2.5 Environmental Assessment for Infrastructure Projects

As per policies set out in **The London Plan** (Policy 1395_), new infrastructure should generally not be located within the NHS, but new or infrastructure upgrades / expansions may be permitted within the NHS where it is clearly demonstrated through an EA process under the *Environmental Assessment Act*, that it is the preferred alternative for the location of the infrastructure.

In addition, as per policies set out in **The London Plan** (Policy 1397_), where new or expansions to existing infrastructure is proposed, an EIS is required as part of the EA process. The EIS shall (a) confirm no significant features are anticipated to be impacted such that they lose their significance and (b) further assess other potential impacts, identify mitigation measures, and determine appropriate compensatory mitigation, if required. Any alternative where the impacts of the proposed works as identified in the EIS would result in the loss of the ecological features or functions of the component of the NHS affected by the proposed works, such that the natural heritage feature would no longer be determined to be significant, shall not be permitted.

The Natural Environment and EIS component of an EA are to be scoped and completed in accordance with these EMGs.

Figure 2.1: Environmental Process Stages for Infrastructure Projects



2.6 Environmental Impact Studies

As per **The London Plan** (Policy 1427_) “If the subject lands status report identifies any lands that, in the estimation of the City, may meet the criteria for determining significance for specific components of the Natural Heritage System, the City shall require the preparation of an environmental impact study for these lands”.

This section outlines the three different types of EIS that may be required in the City depending on the type and extent of natural heritage features and areas within or adjacent to the subject lands, as follows:

- a) **A Full EIS** (comparable to a “Comprehensive EIS”, a term used by others such as UTRCA): A comprehensive range of aquatic, wetland assessment and terrestrial studies over multiple seasons are required.
- b) **A Scoped EIS**: Selected aquatic and / or wetland assessment and / or terrestrial studies are required, with seasonal requirements potentially scoped to reflect the species known or anticipated in the study area.
- c) **A Focused EIS**: Will allow for the typical aquatic and / or wetland assessment and / or terrestrial studies required as part of a Scoped EIS to be waived if the proponent commits to providing the minimum ecological buffers (as per **Table 5.2**) in conjunction with other mitigation measures as required and as a result does not anticipate negative impacts to the NHS components in relation to the proposed development.

Although in some cases a Full EIS is warranted, in most cases for site-specific development proposals a Scoped EIS will be required. The requirements for a Scoped EIS can vary from relatively simple (e.g., a site with limited natural heritage features and areas which only requires a Species at Risk screening and impact assessment) to fairly complex (e.g., a site with woodlands and wetlands adjacent to a valley requiring data collection for and assessment of these features as well as screening for Significant Wildlife Habitat, habitat of Threatened and Endangered species and an accompanying water balance study).

A Focused EIS may be permitted at the City’s discretion under specified circumstances (see **Section 2.6.3**).

2.6.1 The Purpose of an Environmental Impact Study (EIS)

An EIS is required where development or site alteration is proposed within or adjacent to components of the City of London’s NHS. The purpose of an EIS is to demonstrate that there will be no net negative impacts to the NHS’ features and functions as a result of the proposed development or project works. This is to be achieved through environmental investigations of the NHS components and the adjacent lands, typically completed as part of the Draft Plan approval process. An EIS will contain recommendations for avoidance of impacts and mitigation of unavoidable impacts, (including environmental management strategies, monitoring requirements and / or other measures to protect NHS features and functions before, during and following construction). In many cases, an EIS will be completed in conjunction with complimentary studies (e.g., hydrogeological assessment), and the results of each report will inform the other.

An EIS must be completed to the City’s satisfaction in accordance with **The London Plan** policies, provincial policies, and in consultation with the relevant public agencies prior to the approval of planning and development applications.

2.6.2 The Requirement for an EIS

When is an EIS Required?

An EIS is typically required for development and infrastructure projects that are proposed wholly or partially within or adjacent to the NHS.

Table 2.1 identifies the NHS component types and the extent of adjacent lands to those components whose presence typically trigger an EIS. Most of these components are delineated on Map 5 and Map 1 of *The London Plan*. However, the City may require the EIS to include additional lands if (a) environmental study scoping process (as outlined in Section 2.2) identifies one or more previously unmapped natural heritage features for assessment or (b) to ensure the protection of identified natural heritage features and / or functions based on site-specific conditions and / or the proposed land uses.

Table 2.1. Areas Requiring Environmental Study

Natural Heritage System (NHS) Components*	Trigger Distance Requiring an Environmental Study and Area of Adjacent Lands
<ul style="list-style-type: none"> • Fish Habitat • Habitat of Endangered and Threatened Species • Locations of Endangered and Threatened Species • Provincially Significant Wetlands (PSW) • Unevaluated Wetlands • Significant Woodlands • Significant Valleylands and Valleylands • Significant Wildlife Habitat • Areas of Natural and Scientific Interest (ANSI) • Environmentally Significant Areas (ESAs) 	Within 120 metres
<ul style="list-style-type: none"> • Woodlands • Significant groundwater recharge areas, wellhead protection areas and highly vulnerable aquifers • Upland Corridors • Wetlands 	Within 30 metres
<ul style="list-style-type: none"> • Environmental Review (ER) lands 	As appropriate (i.e., within a distance appropriate to the specific components of the NHS contained on the lands)

* As per Table 13 in *The London Plan*.

Currency of EIS Data and Updates to EIS at Draft Plan Renewal

Site specific data and field work for an EIS is generally considered “current” for a period of up to five (5) years.

For convenience and keeping the development approvals process intact, the renewal of an EIS tied to a draft approved subdivision can be updated with an extension of the draft plan, provided the extension occurs within six (6) years of draft approval. This is consistent with the current practice where draft plan approvals lapse after three (3) years and extensions can be considered by Council provided the draft plan remains consistent with the in-force policies. To align with this process, in cases where draft plan extensions are being sought using an EIS that is older than five (5) years, the EIS can be updated with an extension draft plan, provided the extension occurs within six (6) years of draft approval.

This update is to be scoped in consultation with City staff to focus only on elements of the EIS related to recommendations that are still being or remain to be implemented. The scope of that review could be a reaffirmation of updates to status of SAR habitat, status of enhancements to protections for existing NHS features or other elements that have been discovered through the build-out.

2.6.3 Focused EIS

The Focused EIS process and report requirements offer the possibility of meeting the policy and application requirements with an abbreviated submission, where determined to be appropriate. A Focused EIS allows for the typical aquatic and / or wetland assessment and / or terrestrial studies required as part of a Scoped EIS to be waived in cases where the proponent is committing to provide the minimum ecological buffers (as per **Table 5.2**) in conjunction with other mitigation measures to protect all significant features associated with the subject lands, and as a result of this approach, can demonstrate no negative impacts to the NHS in relation to the proposed development.

The desire to submit a Focused EIS should be flagged by the proponent at the pre-consultation stage. The proponent should not proceed with this approach before obtaining in principle agreement from the City.

In order for a Focused EIS to be considered by the City, ecological buffers to natural heritage features must meet or exceed the City's minimum buffer requirements as shown in **Table 5.2** and also include mitigation requirements if stipulated by the City, intended to help ensure buffer effectiveness (e.g., fencing without gates at the development limit, buffer naturalization).

A Focused EIS shall include:

- A description of the land use and biophysical context of the subject lands and study area
- A description of the natural heritage features and areas in the study area
- Staked limits (see **Section 4**) for features on the subject lands, and an assessment of their significance based on the available information
- Mapping and a description of the proposed buffers, including any proposed enhancements
- A conceptual drawing and a description of the proposed development
- A description of the proposed servicing and other amenities potentially associated with the development
- A commitment that the proposal will not require any refinements to the identified buffers
- An outline of the the type(s) and scope of the enhancements and monitoring as part of the mitigation, and
- An assessment that demonstrates no negative impacts to the identified NHS components are anticipated in relation to the proposed development.

This plan and the associated mapping will be discussed during an EIS scoping meeting prior to waiving the requirements of the full-EIS and associated studies. All provincial and federal legislative requirements are still applicable.

The timing of a Focused EIS must align with the approvals process, with the report submitted and approved in principle prior to Draft Plan approval, and then the details of the measures approved (e.g., fencing, buffer naturalization, etc.) submitted in conjunction with focused design studies and / or engineering drawings. Details related to the proposed enhancements and related ecological monitoring may be finalized during later project stages as part of an Environmental Management Plan (see **Section 7**), but the type(s) and scope of the enhancements and monitoring shall be agreed upon and outlined in the Focused EIS prior to Draft Plan approval.

A Focused EIS may be permitted at the City's discretion and will typically only be considered by the City for simpler applications such as:

- subject lands associated with NHS components that are already well defined (e.g., redevelopment adjacent to an existing feature already characterized through previous studies completed) and / or
- study areas that are of limited complexity (e.g., an isolated upland significant woodland, as opposed to a Significant Woodland containing Wetlands adjacent to a Significant Valleyland).

2.6.4 Overview of the EIS Process

The EIS process is generally depicted in **Figure 2.2** below, and involves the following steps regardless of scope:

1. **EIS Scoping** – Study scoping should be completed before field investigations are initiated. EIS scoping shall follow the process and requirements as outlined in **Section 2.2** of these guidelines, including the completion of the ESSC (**Section 2.2.1**). If determined as a requirement during study scoping, a site visit may be included as part of this process.
2. **Background Review and Information Requests** - The proponent must complete a comprehensive review of background information to form the basis for a description of existing conditions, as outlined in **Section 2.3**. The background review should follow the City of London's Data Collection Standards found in **Appendix C**.
3. **Field Investigations** – Field investigations are to be completed at the appropriate times and frequencies, and include appropriate locations, in accordance with the approved ESSC. Field investigations must be completed in compliance with the City of London's Data Collection Standards found in **Appendix C**. Dates of investigations, names of investigators, conditions at the time of investigations, any variance of methods, data sheets, and photographs, should all be recorded at the time of investigations. Quality assurance and quality control measures to verify the accuracy of the data collected should be implemented as part of the proponent's (or their consultant's) internal EIS review process.
4. **Evaluation of Significance** – The evaluation of significance should be conducted for natural heritage features within the study area in accordance with the applicable federal, provincial and City of London policies. The City of London evaluation criteria, as outlined in **Section 3**, should be applied to unevaluated vegetation patches and other features not previously evaluated as appropriate. The evaluation criteria to be applied to a specific feature or subject lands should be identified in the ESSC. In instances where a Woodland Evaluation is appropriate, the evaluation shall be completed in the Woodland Evaluation Form found in **Appendix D**. However, if during the course of investigations it becomes evident that other evaluation criteria are appropriate, then they shall also be applied.
5. **Impact and Net Effects Assessment** – The impact assessment for any project should identify the potential impacts that may be generated from the design and layout, the construction, and the operations of the project and / or the post-construction conditions. The proponent should identify any existing impacts to study area natural heritage features prior to project initiation (as part of existing conditions), and the potential long-term and short-term impacts (e.g., construction related) of the project. For each potential impact, possible avoidance, mitigation and / or compensation measures shall be proposed and discussed. For any proposed development or works adjacent to a Natural Heritage Feature, ecological buffers (see **Section 5**) shall be applied as required (see **Table 5.2**) as part of the mitigation measures. The net effects of the project should then be assessed based on the anticipated net impacts after avoidance, mitigation and or compensation measures are implemented as recommended. If the project is assessed to result in a net negative effect, then the proponent should include additional mitigation and / or compensation measures, or re-work the proposed project plan and / or design to minimize or avoid such effects. The objective for any EIS is to achieve no net negative impact, or a net environmental benefit.

The Province's **Natural Heritage Reference Manual (2010b)** provides a "Sample Checklist for Use in Assessing Impacts of Development" which can be referred to, however the proponent must consider of development activities and potential impacts on a site specific basis as outlined in the Net Effects Table Template is provided in **Appendix E**.

6. **Environmental Management Recommendations** – The environmental management recommendations for a proposed development or project is the primary "deliverable" of an EIS. Recommendations should be developed based on the avoidance, mitigation and compensation

measures identified in the Impact Assessment and Net Effects Assessment. An important mitigation measure is recommending appropriate ecological buffers (**Section 5**). Another important mitigation measure is the identification of appropriate pre-, during and post-construction/ post-development monitoring. The recommendations for monitoring should outline the monitoring objectives, timeframe and protocols for each monitoring component. The EIS should also indicate if and how net environmental benefit will be achieved through the implementation of these recommendations. These recommendations will be carried forward to provide the basis for the Environmental Management Plan, as per **Section 7.2**.

7. **EIS Report Submission** – The proponent, or their consultant, is to submit the EIS report to the City of London for review and comments. The EIS report and its appendices should be submitted in electronic format to the City's Project File Handler.
8. **EIS Report Review and Approval** – Once received the City of London will distribute copies of the EIS report to the TRT for their review and comments. All comments from the TRT will be sent to the City of London for consideration and forwarding to the proponent and their consultant. The City may decide to:
 - **Approve the EIS** – the City may approve the EIS with no required revisions, or with minor revisions
 - **Return the EIS for revisions** – the City may return the EIS report for revisions based on the comments received from the TRT
 - **Reject the EIS** – the City may reject the EIS based on non-conformance with **The London Plan** policies, or based on the inadequacies of the EIS report itself

The final acceptance of an EIS report is to be provided in written correspondence (e-mail or letter) to the proponent.

Figure 2.2: The Subject Land Status Report and EIS Approval Process Steps.



Further details and the documentation requirements for the above steps are outlined in **Section 2.6.5**.

2.6.5 EIS Report Requirements

The following section outlines the required format and minimum standards for an EIS.

An EIS report for submission to the City of London shall include the following components and sections:

- Title Page
- Executive Summary
- Authors' Signature Page
- Table of Contents
- 1.0 Introduction
- 2.0 Physical Environment

- 3.0 Natural Environment
 - 3.1 Aquatic Habitat & Species
 - 3.2 Wetlands
 - 3.3 Terrestrial Habitat & Species
- 4.0 Evaluation of Significance
- 5.0 Proposed Development or Works
- 6.0 Impact & Net Effects Assessment
- 7.0 Avoidance, Mitigation & Compensation
- 8.0 Environmental Management Recommendations
- 9.0 Conclusions
- 10.0 References
- Appendices

Additional subsections to the above sections maybe required based on the scope and complexity of the study area and / or the proposal. Further details regarding the required content for the above report components and sections provided below.

2.6.6 Report Content

2.6.6.1 Title Page & Pre-Report Body Components

Title Page - The EIS Title Page should provide basic information for the EIS report including the following:

- Project name and study type (i.e., EIS)
- Any relevant File Reference numbers
- The proponent's company name, address, and primary contact name
- The consultant's company name, address, and primary contact name
- The City of London department to which the report is being submitted
- The date of report submission

Executive Summary - The Executive Summary for the EIS report should provide a brief summary of the report including the purpose of the EIS, the subject lands and study area locations, study scoping information, field investigations completed, study findings, identification of significant natural heritage features, summary of potential impacts and net effects, and a summary of the environmental management recommendations. The Executive Summary should be 1-4 pages in length.

Authors' Signature Page - A page with the names, signatures and qualifications of the principal authors of the EIS report should be provided. The names, signatures and qualifications of the senior reviewers should also be provided.

Table of Contents - A Table of Contents with page references should be provided for the EIS report. This should also include a List of Figures, List of Tables, and List of Appendices.

2.6.6.2 Introduction

The Introduction of the EIS report may stand as one complete section or it may be separated into several sub-sections, at the author's discretion. Regardless, the Introduction should include the following information:

Introductory Statement – The Introduction should state the purpose of the EIS report, and identify the proponent. Since most EIS reports are technical documents supporting a larger study or an application, the Introduction should reference the study or application that the EIS is supporting.

Background – The Introduction should provide some background regarding the project and any planning or studies for the subject lands that preceded the EIS.

Subject Lands and Study Area – The subject lands for the EIS should be clearly identified with the address (or other municipal reference numbers) along with the limits of the study area and identification of any pertinent reference points (e.g., watercourses, major streets or roads, railways, etc.). A figure delineating the subject lands and study area boundaries and showing local streets/roads, watercourses, buildings/structures over a recent aerial photograph base must be included. A secondary figure should also delineate the mapped natural heritage features identified on Map 5 of *The London Plan*.

Policy Context – The policy context for the EIS should be identified in the Introduction. This should include the trigger for the EIS and the relevant policies in *The London Plan* that apply to the project/application. Other relevant federal, provincial and Conservation Authority legislation and policies should also be identified.

EIS Scope – A subsection or paragraph should be provided in the Introduction that summarizes the EIS scoping process and some of the key aspects of the study scope. The final ESSC should be referenced and should be provided in the Appendices of the report.

Agencies, First Nations and Stakeholders Consultation – Consultation with government agencies, Conservation Authorities, First Nations communities, and stakeholders should be identified and referenced as part of the Introduction. Any relevant correspondence and consultation documentation should be provided in the Appendices.

2.6.6.3 Physical Environment

The physical environment provides key context for the natural heritage features on the broader landscape and on the subject lands because of the direct interrelationship between the physical and natural environment. The description of the physical environment is, therefore, an important part of the EIS report. The physical environment section of the EIS should include information on the following:

Soils and geology – Soils and the underlying geology of the study area and surrounding landscape should be described in sufficient detail as to provide context for the ecological communities and ecosystems of the subject lands and broader study area (e.g., including adjacent lands as appropriate). If a soils or geotechnical investigation has been undertaken for the project, its findings should be summarized in this section. Key local sources of information include:

- The Canadian System of Soil Classification (1978)
- Pleistocene Geology of the St. Thomas Area (west half and east half respectively) (Dreimanis 1964a; 1964b), including Sardo and Vagners (1975) which accompanies the Dreimanis reports, but is for north London.
- <https://data.ontario.ca/dataset/surficial-geology-of-southern-ontario>, and
- Map of surficial geology of southern Ontario that can be viewed in Google Earth.

Surface water and drainage – The surface water and drainage patterns within and adjacent to the subject lands determine the extent and characteristics of aquatic habitat features, wetlands and terrestrial vegetation communities. The watershed, subwatershed, surface water features (water bodies and watercourses) and drainage patterns for the study area should be described in this section of the EIS report.

A surface water and drainage figure showing all watercourses, water bodies, wetlands, and drainage patterns should be provided for the study area, as applicable. If a surface water or storm water management investigation has been completed for the project the findings with regard to existing

conditions should be summarized in this section of the report. Where available from other disciplines, pre- and post-development catchment boundaries and flow paths should be referenced and potentially included in EIS mapping.

Hydrogeology – The hydrogeology of a study area is often an important determinant of the area's aquatic, wetland and / or terrestrial features and their functions. The existing hydrogeology for the study area should be described in this section, particularly as it relates to natural heritage features that depend on groundwater discharge and the depth of the shallow water table. If a hydrogeological study has been conducted for the project or as part of previous works in the area, the findings related to existing conditions should be summarized in this section of the report.

2.6.6.4 Natural Environment

As noted above, the existing condition for the natural environment section of the EIS should be divided into four (4) main ecological system types:

- (1) aquatic habitat and species
- (2) wetlands and species
- (3) terrestrial habitat and species, and
- (4) animal movement corridors and ecological linkages.

Each of these sections may be further subdivided depending on the complexity of the study area features and the investigations required by the ESSC.

For each discipline within a subsection of the Natural Environment section the following should be included:

Background Information – a summary of information obtained from the background review and information requests should be included to provide a baseline understanding of the features. Previous studies and reports should be referenced and any data or information of particular interest to the study should be highlighted.

Methods – the methods used for the investigations for each discipline should be detailed with reference to standard protocols used. The City of London's **Data Collection Standards** found in **Appendix C** provide the recommended protocols for ecological investigations. The date and time of investigations should be provided, in Table format along with the names of field staff who conducted the surveys. Any variance with standard protocols should also be noted in this section.

Results and Discussion – the results of the field investigations should be presented in an organized manner by feature or area. The discussion should include a comparison of findings from previous relevant studies with those of the current study, where applicable. Summary tables with metrics relevant to the discipline should be used wherever possible. For large data sets, spreadsheets should be included in the **Appendices** with summary tables included in the text where needed.

The following provides an outline of the four main ecological system types to be addressed in the EIS and the possible biological components to be included within each system. If no biological components with the given ecological system occur within the study area, then the system heading should be retained in the report with a single sentence stating that no biological components related to this ecological system are present within the study area (e.g., no aquatic habitat or species are present within the study area). For the specific biological components, only those for which investigations were conducted should be included.

Aquatic Habitat and Species	Terrestrial Habitat and Species
<ul style="list-style-type: none">• Fish & Fish Habitat• Benthic Invertebrates• Mussels	<ul style="list-style-type: none">• Vegetation Communities & Plant Species• Breeding Birds

- | | |
|--|---|
| <ul style="list-style-type: none"> • Water Chemistry & Physical Attributes • Vegetation Communities & Plant Species • Breeding Birds • Other Birds including Waterfowl • Amphibians • Reptiles • Butterflies & Dragonflies / Damselflies • Terrestrial Crayfish • Mammals | <ul style="list-style-type: none"> • Raptors, Crepuscular Species, Colonial-Nesters & Other Birds • Amphibians • Reptiles • Butterflies & Dragonflies / Damselflies • Terrestrial Crayfish • Mammals (e.g., Bat Habitat & Bats, Deer Congregation Areas) • Seeps & Springs |
| <p>Wetlands</p> <ul style="list-style-type: none"> • PSWs • Wetlands • Unevaluated Wetlands | <p>Animal Movement Corridors and Ecological Linkages</p> <ul style="list-style-type: none"> • Aquatic / Lowland • Terrestrial / Upland |

At a minimum the following figures should be included in the EIS or Natural Environment section of the EA report:

- Field Investigations – showing the locations of the field investigations completed;
- Aquatic Habitat – showing watercourses, spawning habitat, habitat characteristics, barriers to fish passage, etc.; and,
- Vegetation Communities – showing the delineation of Ecological Land Classification (ELC; as per Lee *et al.*, 1998) communities.

Other figures may include:

- Breeding Bird and Raptor Habitat – showing suitable habitat, nest locations, etc.
- Amphibian and Reptile Habitat – showing breeding areas, hibernacula, etc.
- Plant species – showing location(s) of one or more rare species
- Notably, for species whose location data is considered sensitive, mapping should be provided to the City separately in a map clearly labelled as confidential and for internal use only.

2.6.6.5 Evaluation of Significance

The Evaluation of Significance section of the EIS should identify previously evaluated and recognized or identified features and species by jurisdiction: federal, provincial and local. For those features or species not previously evaluated or identified, this section should present the evaluation and the recommended designation. The following lists some of the potential features or categories that may apply for each jurisdiction:

- **Federal**
 - Fish Habitat as defined under *the Fisheries Act*
 - Species at Risk (SAR) as listed under *the Species at Risk Act*
- **Provincial**
 - Provincially Significant Wetlands (PSWs) – for wetland evaluations the Ontario Wetland Evaluation System (OWES) shall be used by a certified wetland evaluator. Once completed the wetland evaluation shall be submitted to the Province and the City of London. A summary of the evaluation should be included in this section of the EIS, and a copy of the evaluation should be provided in the Appendices. See **The London Plan** policies 1330_ to 1336_.

- Areas of Natural and Scientific Interest (ANSIs) – as identified by the Province of Ontario. See **The London Plan** policies 1356_ to 1360_.
- Significant Woodlands – see **The London Plan** policies 1337_ to 1342_ and the City of London’s Woodland Evaluation Criteria in **Section 3.1.2**
- Species at Risk (SAR) as listed under *the Endangered Species Act*
- **City of London and local Conservation Authorities**
 - *Significant Woodlands* – see above
 - *Woodlands* (non-significant) – see **The London Plan** policy 1343_
 - *ESAs and Potential ESAs* – See **The London Plan** policies 1367_ to 1371_ and **Section 3.1.2** for the *City’s Guidelines for the Evaluation of Environmentally Significant Areas*
 - *Significant Wildlife Habitat* – for habitats not already evaluated, the proponent’s Ecologist should complete a Significant Wildlife Habitat Assessment in accordance with the Province’s Significant Wildlife Habitat Technical Guide (MNR 2000) and Criteria Schedules for Ecoregion 7E (MNR 2015), or subsequent updates to these documents. These are provincial criteria that are approved at the municipal level. **The London Plan** policies 1352_ to 1355_ shall also be applied
 - *Significant Valleylands* – valleylands not already identified or evaluated should be evaluated in accordance with **The London Plan** policies 1347_ to 1350_ and Conservation Authority policies as applicable (e.g., UTRCA 2017)
 - *Wetlands and Unevaluated Wetlands* – see **The London Plan** policies 1330_ to 1336_ and Conservation Authority policies as applicable (e.g., UTRCA 2017)
 - *Upland Corridors* see **The London Plan** policies 1372_ to 1377_.

Further details regarding the evaluation of significance is provided in **Section 3**.

2.6.6.6 Proposed Development or Works

In this section of the EIS report the proposed development or project works should be summarized in a manner that describes all aspects and stages of the project that may affect natural heritage features and their functions. The EIS should be based on, at a minimum, the Preliminary Design for the project. This enables the recommendations from the EIS to be incorporated into the Detailed Design for the project.

It is expected that the Preliminary Design presented in the EIS will be a product of an iterative process wherein the design has taken into consideration avoidance and mitigation recommendations provided by the proponent’s Ecologists for the project. Documentation of this iterative process should be provided where applicable.

The following information should be included in the description of the proposed development or works:

- A description of the project layout and design
- Changes to surface water drainage and site grading which may include predevelopment, post-development and interim variations when works are adjacent to natural areas
- An outline of project staging and timing
- Details regarding construction relating to potential impacts to natural heritage, including any proposed de-watering plans that depict preferred zones where discharge should be directed and potential impacts from dewatering activities (e.g., cutting off groundwater baseflow from potential receptors).
- Proposed protection measures, including erosion and sediment control (ESC) measures in accordance with the City of London’s *Design Specifications & Requirements Manual* (City of London, 2019)
- Any details regarding post-construction operations or maintenance

The proposed layout and design shall be shown on a figure as an overlay depicting the site and plan over a recent air photo, and include the natural heritage features and ELC communities delineated. This figure shall recommend areas for protection with their associated recommended buffers and / or setbacks.

Further Preliminary Design and Detailed Design drawings and supporting documentation can be provided in the Appendices.

2.6.6.7 *Impact and Net Effects Assessment*

The Impact and Net Effects Assessment section of the report is critical to:

- a) determining whether a project can meet the test of “no net negative impacts”, and
- b) identify where net environmental benefits”, referred to in this document as “positive net effects”, can be achieved.

While every EIS is required to meet the no negative impacts test (in accordance with the Provincial Policy Statement), to help build resilience in the NHS in response to urban and climate change stressors, opportunities for net environmental benefits should also be identified through the EIS process.

The following types of anticipated impacts to components of the NHS as a result of the proposed development should be assessed and described in this section of the EIS and may each form a subsection in the Impact and Net Effects Assessment section:

- **Existing Impacts** – The report should identify any impacts from previous or existing land uses or activities that have affected the natural heritage features of the study area. This provides a baseline for comparison with potential project related impacts.
- **Direct Impacts** – The potential direct impacts of a project should be identified and described based on the proposed development plan. A figure showing the proposed project overlaid on the natural heritage features for the study area should be provided with an indication of any areas where direct impacts are anticipated.
- **Indirect Impacts** – Many indirect impacts can be associated with the during or post-construction stages of land development or an infrastructure project. Indirect impacts that can be reasonably anticipated in relation to the proposed development should be described in this section of the EIS.

For each of the above categories of impact, the source of the impact, the feature that may be affected, possible avoidance, mitigation and / or compensation measures where appropriate, and the resulting net effects should be described in detail. A summary of the impact assessment and net effects should be provided in a Net Effects Assessment Table. **Appendix E** provides a table template for the assessment of net effects, to be used in any EIS submitted to the City of London.

Net environmental effects are considered to be those impacts that are expected to remain or are residual after the recommended avoidance, mitigation and compensation measures, as applicable, are implemented.

Through the EIS, all anticipated negative impacts should be addressed through a combination of avoidance, mitigation and compensation measures as appropriate so that the net effects are either neutral (i.e., No Net Effect = no measurable impact to the NHS is anticipated) or positive (i.e., Positive Net Effect = there is a gain in the area extent and / or improvement to the quality of one or more NHS feature / area identified for inclusion within the NHS).

In addition to the Net Effects Assessment, the proponent should have consideration for effects of development that may increase or decrease in magnitude with a changing climate (e.g., increased flooding, drought, invasive species range shifts, etc.) and, where feasible, identify enhancement measures to help build resilience to these stressors in the NHS. Tools may be developed or adopted by the City of London to assess anticipated climate change impacts to the NHS, and once available should be considered as part of the impact assessment process.

2.6.6.8 *Avoidance, Mitigation & Compensation*

While the Impact and Net Effects Assessment identifies avoidance, mitigation, and compensation measures that should be implemented, each of these will require development into detailed recommendations to be carried forward into the Environmental Management Plan (see **Section 7.2**). This section of the EIS should carry forward the avoidance, mitigation and compensation measures identified in the previous section and elaborate on each.

Avoidance – Avoidance of potential impacts should always be considered the preferred option where feasible. As noted in the Proposed Development (**Section 2.6.6.6**) avoidance of potential impacts should be considered iteratively through collaboration between the project Planners, Engineers and Ecologists prior to plan finalization. Consequently, this section may refer to the iterative process described in the Proposed Development Section, or it may propose additional avoidance measures for consideration.

Mitigation – Mitigation measures may take various forms and may apply to direct or to indirect impacts that are short-term (e.g., may occur only during the construction phase of the project) or long-term (e.g., may occur in the post development scenario). For example, during-construction impacts tend to be temporary in nature and preventable / manageable through proper construction practices, site inspections, and other standard mitigation measures. Each of these measures should be identified and described in this section of the report.

One of the most important mitigation measures that will apply to natural heritage features identified for protection is the implementation of ecological buffers. The identification of appropriate ecological buffers must follow the guidance provided in **Section 5**. In this section of the EIS, the application of the guidelines to the project and site-specific rationale should be provided.

Compensation – Compensation for impacts to, or removal of, a natural heritage feature is only permitted under limited circumstances, but may be permitted in accordance with the applicable policies and, where appropriate, in consultation with agencies whose regulated areas encompass the feature in question. Where alternatives for avoidance and mitigation have been considered and compensation has been determined as the preferred alternative for a project, the details of the compensation must be described in this section.

The development of compensation plans must comply with the applicable policies and follow the guidelines provided in **Section 6** of these Environmental Management Guidelines.

2.6.6.9 *Environmental Management Recommendations*

The Environmental Management Recommendations section is the primary deliverable of the EIS. The environmental management recommendations must be clearly articulated and must be specific enough to be translated into Conditions of Draft Approval, Development Agreement and / or Subdivision Agreement for a project. The recommendations should be organized by project phase, from planning and design, through construction, to post-construction and post-development. Depending on the size and complexity of the project, the environmental management recommendations may form the basis of an Environmental Management Plan (EMP, as per **Section 7.2**).

The following are typical components of an EMP:

- Natural Heritage System components on and adjacent to the subject lands
- Ecological Buffers
- Restoration, Enhancement and Compensation Measures/Areas
- Construction Mitigation and Monitoring Plans
- Post-Construction Monitoring
- Post-Development Monitoring

Environmental management recommendations identified during Preliminary Design that should appear on the contract drawings must be explicitly stated. Text should provide direction to include the complete EIS

with the tender documents for later project stages. In instances where a detailed Construction Monitoring Plan is anticipated, the EIS should include a draft field inspection form template in the Appendices.

To effectively develop a post construction monitoring program, baseline conditions must be established through the EIS process and stations for long-term / post-construction monitoring in the protected NHS should be identified along with the recommended type(s) and frequency of monitoring. Assessing the success of the avoidance, mitigation and compensation will be determined based on various metrics.

Section 7 outlines the context and specific requirements of the EMP, and should be carefully reviewed and referenced as appropriate.

2.6.6.10 Conclusions

The Conclusions section of the EIS report should provide the following elements:

Summary of Key Findings – A brief summary of the key findings of the EIS report should be provided to indicate the confirmed natural heritage features and other NHS components on the subject lands and with reference to the broader study area as needed.

Key Recommendations – Either a summary of key recommendations should be provided, or a reference to the Environmental Management Recommendations section of the report must be made. Where applicable, direction regarding the implementation of the recommendations must be stated.

Conclusion Statement – A clear statement of the conclusions of the EIS must be made as to whether the proposal can meet the test of “*no negative impacts on the natural features or on their ecological functions*” (MMAH, 2020) must be included in this section. This can be demonstrated through an Impact and Net Effects Assessment that results in no net effects or positive net effects assuming the recommended avoidance, mitigation and / or compensation measures are implemented as recommended (as per Section 2.6.6.7). The conclusions should also state whether the project meets the intent and requirements of the environmental policies of **The London Plan**, the *Provincial Policy Statement* and any other relevant legislation or policies, including applicable environmental regulations and / or policies from the Conservation Authorities, Province or Federal government. A summary of the rationale for the conclusion statement must be provided to support the statement.

2.6.6.11 References, Appendices, and Figures

References – All relevant references used in the preparation of, or cited in the EIS report should be listed in a References section. References should be in alphabetical order by author. Each reference should indicate author(s), year of publication, title, and publisher. For journal articles the journal name, volume, and pages should be provided. For websites, the full website address should be provided.

Appendices – Supporting documentation as referenced in each section of the report should be provided in the Appendices section and separated by appendix title pages. The order of appendices should follow the order of reference in the sections of the report. Appendices will typically include many or all of the following:

- Environmental Study Scoping Checklist (ESSC)
- Resumes (two-page) for each of the study’s authors, reviewers, and field staff
- Aquatic habitat field sheets and sketches
- Aquatic species list and life history information
- Ecological Land Classification (ELC) data sheets including soil characterization
- Plant species list by ELC community type with rarity rankings
- Bird species list by survey location with rarity rankings

- Amphibian survey data sheets and species list
- Additional wildlife lists by survey locations with rarity rankings, as applicable (e.g., mammals, herpetofauna)
- Significant Wildlife Habitat (SWH) data sheets
- Significant Wildlife Habitat Assessment
- Species at Risk (SAR) screening and habitat assessment
- Photographs

Figures – All figures for the EIS report should be either embedded in the body of the report and presented on the first full page following the first reference in the text to the figure, or compiled in the Appendices. All figures should be sequentially numbered and have the following:

- A recent colour aerial photograph base
- The subject lands and study area boundaries
- Roads/streets (labelled), utility corridors, and other “surface” infrastructure such as rail lines
- Watercourses and natural heritage features boundaries
- North arrow
- A scale
- A Legend with all symbols and shading labelled

Where appropriate, figures should be prepared at a consistent scale to facilitate comparison and cross-referencing.

3. Evaluation of Significance and Ecological Function

The City's NHS is a system 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 native species, and ecosystems (The London Plan – Policy 1298). Evaluation of the significance and ecological functions of the various NHS components through the planning process informs the protection of the NHS and may lead to the addition, removal or refinement of NHS features included on City of London mapping (see Map 5 in The London Plan).

While these components are all generally protected within the broader system, the process for evaluating these components and the jurisdictional responsibility confirming their significance and enforcing the policies for their protection are not the same for all features and areas. As outlined in the *Provincial Policy Statement* and in *The London Plan*, the following applies to the City's NHS components:

- Fish habitat and the Habitat of Endangered and Threatened Species are to be assessed in accordance with the applicable federal and / or provincial regulations, policies and guidance in consultation with the appropriate federal and / or provincial agency, sometimes with technical support from the local Conservation Authority
- Provincially Significant Wetlands (PSWs) and provincially significant Areas of Natural and Scientific Interest (ANSIs) are identified and confirmed by the Province in accordance with provincial systems and criteria;
- Significant Woodlands, SWH and Significant Valleylands are identified and confirmed by the City using locally-developed criteria aligned with the criteria and guidance established by the Province, sometimes with support from the local Conservation Authority, particularly for valleylands which they typically regulate;
- As per *The London Plan* Policies 1361_ and 1362_, Water Resource Systems capture a range of surface and groundwater features and areas that are to be assessed in accordance with the applicable provincial regulations, policies and guidance in consultation with the appropriate provincial agency and local Conservation Authority;
- Environmentally Significant Areas may be assessed by the proponent but are identified and confirmed by the City using locally-developed criteria, sometimes with support from the local Conservation Authority, particularly when the area overlaps with lands they regulate (e.g., wetlands, watercourses, valleylands and the related adjacent lands); and
- Upland Corridors and Naturalization Areas are identified and confirmed by the City as per the policies in *The London Plan*.

The Environmental Policies section of *The London Plan* defines and provides policy guidance for the evaluation of all the NHS components, including locally-developed criteria where applicable, and points to applicable sources of additional technical guidance at the federal, provincial and / or local (i.e., municipal and Conservation Authority) levels. This section of the EMGs provides additional guidance related to the evaluation of NHS components where the City of London and, where applicable, the local Conservation Authority, are responsible for confirming the evaluation of significance.

The specific NHS components addressed in this section of the EMGs are:

- Provincially Significant Wetlands, Wetlands and Unevaluated Wetlands
- Significant Woodlands and Woodlands
- Significant Valleylands and Valleylands

- Significant Wildlife Habitat (SWH), and
- Environmentally Significant Areas (ESAs)

with more detailed guidance for the criteria application provided for Significant Woodlands and ESAs based on the current science and natural heritage studies completed in the City.

The locally-developed criteria and the related guidance in this section have been developed in accordance with the *Provincial Policy Statement* with careful consideration for the local biophysical and land use planning context, and for the applicable technical and scientific literature. Notably, the *Provincial Policy Statement* states that: “*planning authorities and decision-makers may go beyond these minimum standards to address matters of importance to a specific community, unless doing so would conflict with any policy of the Provincial Policy Statement*”. It further states that for NHS components that are to be locally confirmed that: “*Criteria for determining significance for the resources ... are recommended by the Province, but municipal approaches that achieve or exceed the same objective may also be used*” (MMAH, 2020).

In all cases, the proponent is expected to comply with the most current applicable policies and guidelines related to the evaluation of significance and ecological functions of NHS components in the City, including any that may be adopted following the approval of these EMGs.

3.1 Significant Woodlands and Woodlands

The objective of these guidelines is to provide a standardized and scientifically-based approach for the evaluation of woodlands that is consistent with **The London Plan** policies, the *Provincial Policy Statement*, and the *Natural Heritage Reference Manual* (MNRF 2010b). This section describes the required methods for evaluating the ecological significance of all Unevaluated Vegetation Patches, woodlands and vegetation patches greater than 0.5 ha (as per **The London Plan** Policies 1337_ through 1343_, and 1383_ through 1386_).

3.1.1 Policy and Context

Policies outlined in the *Provincial Policy Statement* protect Significant Woodlands by not permitting development and site alteration within or in the lands adjacent to Significant Woodlands south and east of the Canadian Shield, unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

According to the *Provincial Policy Statement*, woodlands are defined as: “*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*” and “*include treed areas, woodlots, or forested areas and vary in their level of significance at the local, regional, and provincial levels*”.

Furthermore, the *Provincial Policy Statement*, considers woodlands significant when an area “*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 MNRF, with the most current guidance provided in the *Natural Heritage Reference Manual* (MNRF 2010b).

The London Plan has built on the provincial guidance and incorporated local considerations to ensure the identification and evaluation of significance for woodland components of the City’s NHS that is aligned with local objectives and conditions. The policy framework for the identification and evaluation of Significant Woodlands and Woodlands are outlined in **The London Plan** – Significant Woodlands and

Woodlands.

Most potential Woodlands are shown as Unevaluated Vegetation Patches on Map 5 – Natural Heritage and as Environmental Review Place Type on Map 1 in **The London Plan**. However, as outlined in **The London Plan** – Policy 1216_, the absence of vegetation patches from the aforementioned mapping, does not necessarily mean that additional unevaluated vegetation patches do not exist where none have been mapped. Therefore, proponents must assess the subject lands in question to screen for the presence of any additional Unevaluated Vegetation Patches and / or other vegetation patches larger than 0.5 ha.

As per the *Provincial Policy Statement* definition above, woodlands are “treed areas”. Using the Ecological Land Classification (ELC) System for Southern Ontario (Lee *et al.*, 1998), individual vegetation communities are typically delineated as discrete polygons. One or more ELC polygons can make up a woodland patch.

According to the Ecological Land Classification (ELC) System for southern Ontario (Lee *et al.*, 1998), a treed area is any community with tree cover >10%. As such, the following ELC Community Classes and Series are potential components of woodland patches:

- **FOREST** - deciduous forest (FOD), mixed forest (FOM) or coniferous forest (FOC);
- **SWAMP** - deciduous swamp (SWD), mixed swamp (SWM) or coniferous swamp (SWC);
- **BLUFF** - treed bluff (BLT);
- **TALLGRASS** - savannah (TPS), woodland (TPW);
- **CULTURAL** - cultural woodland (CUW), cultural savanna (CUS) or cultural plantation (CUP).; and
- **SHRUB / THICKET** - shrub bluff (BLS), cultural thicket (CUT), and swamp thicket (SWT).

Note: In the *Middlesex Natural Heritage Study* (UTRCA, 2014), communities with shrub cover >25% may also qualify as woodland. In the ELC system shrub and thicket communities are similarly defined. Therefore, shrub and thicket communities that are contiguous with other woodland Community Classes may also be included in a woodland patch.

Other communities that contribute to the biological diversity and ecological function of woodlands include old fields (CUM), open prairies (TPO) and wetland communities (MAM, MAS, SAF, OAO, FEO, and BOG) as defined by the ELC. While these communities will not comprise entire woodland patches, they are important components and contribute to the ecological significance of the vegetation patch. As such they are included in the evaluation of significance for applicable criteria.

Evaluation criteria for woodland significance are outlined in **The London Plan** (Policy 1341) The following sections provide further detail with respect to how each of these criteria should be implemented and which specific measures should be applied for the evaluation of significance and ecological function for woodlands in London.

Based on the above information, a vegetation patch is considered to have a woodland component within the City of London if tree cover is greater than 10% or shrub cover is greater than 25%. To determine if a vegetation patch meets this criteria, appropriate ecological inventory (as described in **Section 4.3**) and significant woodland evaluation (described in the following sections) methods shall be used.

The woodland evaluation review summary sheet shall be completed and included as an EIS Appendix, where appropriate. The blank summary sheet can be found in **Appendix D**.

Consistent with **The London Plan** a woodland will be considered significant if it meets either of the following evaluation scores:

- If one or more criteria meet the standard for High; or
- If five or more criteria meet the standard for Medium.

3.1.2 Significant Woodland Evaluation Criteria

The London Plan – Criterion 1341_1.

The woodland contains natural features and ecological functions that are important to the environmental quality and integrity of the NHS. These include site protection (hydrology and erosion / slope) and landscape integrity (richness, connectivity and distribution).

Criterion 1.1. – Site Protection

Ecological Function Measure

A) Presence of hydrological features within or contiguous with the patch.

This measure relates to *Hydrological and Related Values* as outlined in the *Natural Heritage Reference Manual* and the following concepts:

- a) “Waterbodies, including wetlands, often represent a relatively small percentage of the total land area, yet they can be disproportionately more valuable than other areas”, and
- b) “It is recommended that measures be taken to protect water features, wetlands and other areas of significant hydrological importance (e.g., headwaters, recharge areas, discharge areas) within natural heritage systems” (MNR 2010b).

Further, this measure relates to other concepts identified in subwatershed studies completed for the City of London to recognize the following:

- a) the linkage between protection of groundwater and vegetation on the surface;
- b) the interface between aquatic and terrestrial systems which have high biodiversity and are the focus of important ecological functions; and,
- c) the important hydrological functions of wetlands that complement and enhance those provided by woodlands.

For the purposes of this evaluation, hydrological features include the following features and / or areas:

- Groundwater discharge and recharge areas or evidence of groundwater dependent species
- Headwaters and watercourses;
 - Flood plain (as regulated by the local Conservation Authority)
 - River, stream, and ravine corridors (Valleylands) outside of flood plain regulated lands, and
- Wetlands³ (evaluated and unevaluated).

Criterion Ranking:

³ Notably, the Conservation Authorities regulate and protect natural hazards, including all features that meet the definition of “wetlands” under the *Conservation Authorities Act*.

- **HIGH** – One (1) or more hydrological features (as described above) located within or contiguous with the patch.
- **MEDIUM** – Within 50 m of a hydrological feature.
- **LOW** – No hydrological features present within 50 m of the patch.

B) Erosion and Slope Protection

Soil erosion may adversely affect a feature by removing nutrient rich soils, destroying vegetation, and the deposition of eroded soil material (MNRF, 1997b). As slopes increase, the erosion risk also increases; however, slopes less than 10% generally experience minimal erosion (MNRF, 1997b; MNRF, 2010b).

This measure relates to the need “*to protect runoff processes, ground stability, and aquatic habitat (erosion potential) for slopes > 10%*” (MNRF, 2010a).

Slopes are mapped in the Slope Stability Mapping Project (UTRCA, 1996) and can also be determined using Geographic Information System (GIS) applications such as ArcMap in combination with up-to-date contour mapping.

Additionally, this measure requires knowledge of the soil textures and types as described in the ELC Manual (Lee *et al.*, 1998) based on the Ontario Institute of Pedology (1985) and Canadian Soil Classification System (Soil Classification Working Group, 1998).

Criterion Ranking:

- **HIGH** – Patch present on steep slopes >25% of any soil type, OR on a remnant slope associated with other features such as moraines or remnant valley slopes no longer continuous with the river system OR on moderate to steep slopes >10% - 25% with erodible soils (silty loam, sandy loam and loam, fine to coarse sands).
- **MEDIUM** – Patch present on moderate to steep slopes > 10% - 25% with less erodible soils (heavy clay and clay, silty clay)
- **LOW** – Patch present on gentle slopes < 10% with any soil type.

Score for **Criterion 1.1** is based on the highest standard achieved between the two measures.

Criterion 1.2 – Landscape Integrity (Richness, Connectivity and Distribution)

Ecological Function Measures

A) Landscape Richness

The density of landscape fragmentation, or patchiness, as measured by the total area of all patches per unit area of land. Based on the demonstration that “*Native plant richness and flora quality are significantly related to local forest cover*” (UTRCA, 1997; Bowles and Bergsma, 1999). Further, the *Natural Heritage Reference Manual* outlines the following concepts:

- “*Clusters of areas that span a range of topographic, soil, and moisture conditions contain a wider variety of plant species/communities, and may support a greater diversity of ecological processes*”; and,
- “*Where large core areas do not exist, groupings of habitat patches with potential for restoration should be included to maintain ecological function at the landscape scale*” (MNRF 2010b).

For the purpose of this evaluation, local vegetation cover is defined as percent cover of vegetation (all habitat types) within a 2 km radius circle from patch centroid. Thresholds reflect cumulative frequency distribution of patches within London (Bergsma, 2004).

Criterion Ranking:

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

B) Landscape Connectivity (linkage and distance between patches not separated by permanent cultural barriers).

This measure relates to *Proximity, Connectedness, and Naturalness and Disturbance* outlined in the *Natural Heritage Reference Manual* and the following concepts:

- a) Blocks of habitat that are arranged close together limit fragmentation and are usually better than those that are located farther apart; and,
- b) Relatively undisturbed natural areas are generally more desirable than highly altered areas (MNR 2010b).

Criterion Ranking:

- **HIGH** – patches directly connected by:
 - i. waterways or riparian habitat (generally primary or secondary aquatic corridors and streams with bridges and / or underpasses: for example, Thames, Dingman, Medway, Stoney, Pottersburg, Kettle, Dodd, Sharon, Oxbow, Kelly, Stanton, Mud, Crumlin);
 - ii. Contiguous or semi-contiguous habitat.
- **MEDIUM** – patches indirectly connected by:
 - i. habitat gaps < 40 m;
 - ii. areas identified as Anti-fragmentation, Terrestrial Corridor, Big Picture Corridor (https://caroliniancanada.ca/legacy/ConservationPrograms_BigPictureMaps.html) to enhance the viability of isolated woodlands by re-connection, buffering, expanding OR to infill disturbed areas or replace abandoned fields (Riley & Mohr, 1994);
 - iii. abandoned rails, utility rights-of-way (hydro corridors, water/gas pipeline);
 - iv. Open space greenways and golf courses;
 - v. Active agriculture or pasture;
 - vi. Watercourses connected by culverts; and,
 - vii. First or second order streams that exhibit channelized morphology.
- **LOW** – patches not connected due to the presence of permanent cultural barriers:
 - i. major roads and highways with no culverts;
 - ii. urban or industrial development, large parking lots;
 - iii. infrastructure;
 - iv. dams, buried watercourses, channelized third or greater order watercourses; and,
 - v. active recreational land-uses (campground, parks with major facilities – community centres, arenas).

C) Patch Distribution (isolation & arrangement of patches / patch clusters).

This measure relates to *Proximity, Connectedness, Size and Distribution* outlined in the *Natural Heritage Reference Manual* and the following concepts:

- a) Blocks of habitat that are arranged close together limit fragmentation and are usually better than those that are located farther apart; and,

- b) Large patches of natural area are more valuable than smaller patches (MNRF 2010b), although smaller habitat patches can also have value in supporting biodiversity, particularly when they are clustered (Fahrig 2020) .

Following a review of the empirical evidence in the literature, Fahrig (2020) concluded that;

The interaction or flow of organisms among patches appears to be influenced by the size of patches and the distance separating them. Patch clusters are defined as patches within 250 m of each other that are not separated by major roads, highways, or urban development.

Criterion Ranking:

- o **HIGH** – patch clusters with total area > 40 ha OR identified as a Big Picture Meta Core (Carolinian Canada, 2000).
- o **MEDIUM** – patch clusters with total area 20 – 40 ha.
- o **LOW** – patch clusters with total area < 20 ha.

Score for **Criterion 1.2** based on the highest standard achieved for any one of the three standards.

The London Plan – Criterion 1341 2.

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

Criterion 2.1 – Age and Site Quality

A) Community Successional Stage / Seral Age

This measure relates to *Uncommon Characteristics of Woodlands* as described in *Natural Heritage Reference Manual*, and the concept that: “*Older woodlands are particularly valuable for several reasons, including their contributions to genetic, species, and ecosystem diversity*” (MNRF 2010b).

For the purpose of this evaluation, community age is determined based on definitions in the provincial ELC for Southern Ontario (Lee *et. al.*, 1998). Seral age reflects the composition of the plant community (especially trees) with respect to light tolerance and moisture conditions). Generally, mature or advanced seral stage community types are under-represented in the London Subwatershed (Bowles, 1995), Middlesex County (UTRCA, 2003) and Oxford County (UTRCA, 1997).

Criterion Ranking:

- o **HIGH** – patch contains one (1) or more mature or older growth communities
- o **MEDIUM** – patch contains one (1) or more mid-aged communities
- o **LOW** – patch contains only pioneer to young communities

B) Mean Coefficient of Conservatism (MCC) of communities or whole patch

This measure relates to *Species Rarity and Uncommon Characteristics of Woodlands* as outlined in the *Natural Heritage Reference Manual* and the following concepts:

- a) In general, habitats that contain rare species are more valuable than those that do not; and,
- b) Woodlands that are uncommon in terms of species composition should be protected (MNRF 2010b).

The MCC can provide useful information on the susceptibility of communities to adverse anthropogenic effects (Francis *et al.*, 2000; Catling, 2013). The MCC thresholds identified below

have been based on the Floristic Quality Assessment System for Southern Ontario (Oldham *et al.*, 1995), analysis of distribution in the London subwatershed area (Bowles and Bergsma, 1999), results of the Middlesex Natural Heritage Study (UTRCA, 2014), and Oxford County Terrestrial Ecosystem Study (UTRCA, 1997).

Criterion Ranking:

- **HIGH** – one (1) or more vegetation community with an MCC ≥ 4.6 ; OR MCC of patch > 4.5
- **MEDIUM** – one (1) or more vegetation community with an MCC 4.2 – 4.5; OR MCC of patch ≥ 4.0 – 4.5
- **LOW** – all vegetation communities with an MCC < 4.2 ; OR MCC of patch < 4.0 .

Score for **Criterion 2.1** based on the highest standard achieved for any one of the two standards.

Criterion 2.2 – Size and Shape

A) Patch Size

This measure relates to *Size* as described in *Natural Heritage Reference Manual*, and the concept that “*large patches of natural area are more valuable than smaller patches*” (MNRF 2010b).

Patch size is generally positively correlated with ecological function. Larger patches can provide functions that smaller patches cannot such as habitat for area-sensitive species, , reduced forest edge/increased forest interior, and increased resiliency from human disturbance (MNRF, 2010b).

The following thresholds have been derived from a cumulative frequency curve distribution for vegetation patches within the City of London (Bergsma, 2004).

Criterion Ranking:

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

B) Patch Shape and Presence of Interior

Patch shape influences the amount of edge and interior habitat, and thus can influence resilience, disturbance, and species-specific habitat requirements (as described above) (MNRF, 2010a). Edge habitat, specifically for woodlands, has increased across southern Ontario with increased fragmentation; and subsequently the area of forest interior has decreased.

This measure relates to *Shape* as described in *Natural Heritage Reference Manual*, and the following concepts:

- a) The shape of natural heritage areas affects their value as wildlife habitat and their resilience to disturbance effects; and,
- b) Round or block-shaped patches contain less edge per unit of area than long, narrow patches.

As edge effects can extend into woodlands (Environment Canada, 2013), the interior area for a patch is calculated based on a 100 m distance from the interior of the edge habitat (MNRF, 2010b). The locally-specific thresholds for perimeter:area ratios listed below have been based on analysis of London subwatershed studies patches and calculation of perimeter to area ratios (Bergsma, 2004).

Criterion Ranking:

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

C) Bird Species

This measure relates to *Species Diversity and Rarity* as described in *Natural Heritage Reference Manual*, and the following concepts:

- a) Areas that contain a high diversity of native plant and animal species are generally more important than areas that contain a lower diversity of species; and,
- b) In general, habitats that contain rare species are more valuable than habitats that do not (MNRF 2010b).

Birds can be indicators of habitat quality and the degree of forest fragmentation. The following criteria rankings have been developed based on the guidance from the: Significant Wildlife Habitat Ecoregion 7E Criteria Schedules (MNRF, 2015a) for "Habitat of Species of Conservation Concern, Special Concern and Rare Species" and the Avian Conservation Assessment Database (Partners in Flight, 2020) for "Regional Concern" species for the Lower Great Lakes/St. Lawrence Plain Bird Conservation Region.

Criterion Ranking:

- **HIGH** Patch provides breeding habitat for any three (3) or more bird species of conservation concern, including provincially rare bird species (MNRF, 2015a) or species of regional concern (Partners in Flight, 2020).
- **MEDIUM** Patch provides breeding habitat for one (1) or two (2) bird species of conservation concern, including provincially rare bird species (MNRF, 2015a) or species of regional concern (Partners in Flight, 2020).
- **LOW** Patch does not provide breeding habitat any bird species of conservation concern, including provincially rare bird species (MNRF, 2015a) or species of regional concern (Partners in Flight, 2020).

Score for Criterion 2.2 based on the highest standard achieved for any one of the three standards
--

Criterion 2.3 Diversity of Communities, Landforms and Associated Species

A) ELC Community Diversity

This measure relates to *Habitat Diversity, Complexity, and Uncommon Characteristics of Woodlands* as described in *Natural Heritage Reference Manual*, and the following concepts:

- a) Natural areas (or clusters of areas) that span a range of topographic, soil and moisture conditions tend to contain a wider variety of plant species and plant communities, and may also support a greater diversity of ecological processes;
- b) Older woodlands are particularly valuable for several reasons, including their contributions to genetic, species, and ecosystem diversity; and,
- c) Woodlands that are uncommon in terms of species composition, cover type, age, or structure should be protected.

Native plant species diversity is related mainly to the number of communities in the patch, but also to patch area and landscape richness (UTRCA, 1997; MNRF, 2010b).

The following thresholds were developed based on an analysis of all vegetation communities (including cultural) identified at the Community Series level in the City of London digital GIS layer. Thresholds were derived from cumulative frequency distribution of London patches for a total of 23 Community Series categories (Bergsma, 2004). Assessments are to consider all Community Series types within a woodland patch, including cultural communities.

Criterion Ranking:

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

B) Community and Topographic Diversity (variation and heterogeneity)

This measure relates to *Habitat Diversity* and *Complexity* as described in *Natural Heritage Reference Manual*, and the concept that: “*natural areas (or clusters of areas) that span a range of topographic, soil and moisture conditions tend to contain a wider variety of plant species and plant communities, and may also support a greater diversity of ecological processes*” (MNRF 2010b).

This is applied to all communities as defined by this study and based on ELC Community tables (Lee *et. al.*, 1998) and topographic feature description. The seven (7) topographic feature categories for the City of London are as follows: riverine, bottomland, terrace, valley slope, tableland, rolling upland, bluff.

Criterion Ranking:

- **HIGH** – Patch contains three (3) or more Ecosites in one (1) Community Series OR four (4) or more Vegetation Types OR three (3) or more topographic features (e.g. tableland, rolling upland, valley slope, terrace, bottomland).
- **MEDIUM** – Patch contains two (2) or more Ecosites in one Community Series OR by three (3) Vegetation Types OR two (2) topographic features, or one (1) Vegetation Type with inclusions or complexes.
- **LOW** – Patch relatively homogenous; one (1) Ecosite OR one (1) to two (2) Vegetation Types on one (1) topographic feature.

C) Diversity (species and individuals) and Critical Habitat Components for Amphibians

This measure relates to *Species Diversity* and *Rarity* as described in the *Natural Heritage Reference Manual*, and the concept that: “*areas that contain a high diversity of plant and animal species are generally more important than areas that contain a lower diversity of species*”.

Amphibians are indicators of healthy woodlands with well-functioning processes (MNRF, 2000b; MNRF, 2010b).

This measure is applied at the patch level based on the presence of amphibians and / or important habitat components including the following:

- 1) shallow water that remains wet for the breeding season (presence of vernal pools);
- 2) emergent and submergent aquatic vegetation (presence of aquatic ELC community types);
- 3) presence of instream logs and shoreline shrubs (fish habitat);
- 4) closed canopy offering a shaded moist understory environment (presence of forest or treed swamp communities); and,
- 5) abundance of coarse woody debris (deadfall/logs, firm or decayed in the 10-24, 25-50 or >50 cm size classes).

Criterion Ranking:

- **HIGH** – three (3) or more species of amphibians present in the patch, OR one (1) species of amphibian that is abundant* in one (1) or more communities; OR two (2) or more critical habitat components present in the patch.
- **MEDIUM** – 1-2 species of amphibians present in the patch; OR one (1) species of amphibian that is occasional* in one (1) or more communities; OR one (1) critical habitat components present in the patch.
- **LOW** – No species of amphibian present in the patch, OR no critical habitat components present in the patch.

* *Abundance is based on call codes from the amphibian survey protocol as part of the Marsh Monitoring Program (Bird Studies Canada [BSC], 2009a). Presence is determined with a call code ≥ 1 ; occasional is defined as any species with a call code 2; abundant is defined as any species with a call code 3.*

D) Presence of Conifer Cover

This measure relates to *Representation* and *Habitat Diversity and Complexity* as described in *Natural Heritage Reference Manual*, and the following concepts:

- a) The full range of natural features that occur in an area, including both rare and common features, should be protected as a fundamental step in NHS planning to preserve biodiversity at the species and community levels; and,
- b) Natural areas (or clusters of areas) that span a range of topographic, soil and moisture conditions tend to contain a wider variety of plant species and plant communities, and may also support a greater diversity of ecological processes.

Important for providing winter food and shelter for a variety of wildlife species (MNRF, 2000a; MNRF, 2010b). For this measure, conifer communities are based on ELC (Lee *et al.*, 1998) and include FOC, FOM, SWC, SWM, and CUP.

Criterion Ranking:

- **HIGH** – Patch contains one or more conifer communities that are > 4.0 ha in size.
- **MEDIUM** – Patch contains one or more conifer communities that are between 2.0 and 4.0 ha in size.
- **LOW** – Patch contains conifer communities < 2.0 ha in size.

E) Fish Habitat Quality

This measure relates to *Hydrological and Related Values* and *Water Protection* as described in *Natural Heritage Reference Manual*, and the following concepts:

- a) Waterbodies, including wetlands, often represent a relatively small percentage of the total land area, yet they can be disproportionately more valuable than other area; and,
- b) Source water protection is important and natural hydrologic processes should be maintained (MNRF 2010b).

The health of an aquatic habitat is determined by the health of the water body and surrounding land use practices. Both permanent and intermittent watercourses can provide critical habitat for many species.

Criterion Ranking:

- **HIGH** – Dissolved oxygen > 8.0 mg/L OR abundant instream woody debris and rocks and watercourse with a natural channel located within or contiguous with the patch.
- **MEDIUM** – Dissolved oxygen 5.0 – 8.0 mg/L OR moderate amount of instream woody debris and rocks and portions of channelized watercourses within or

contiguous with the patch.

- **LOW** – Dissolved oxygen < 5.0 mg/L OR no instream woody debris and sparse structure and entire watercourse channelized within or contiguous with the patch.

Score for **Criterion 2.3** based on the highest standard achieved for any one of the five standards.

The London Plan – Criterion 1341 4.

The Woodland provides significant habitat for endangered or threatened species.

Criterion 4.1 – Significant habitat for endangered or threatened species.

A) Species At Risk Habitat This measure relates to *Species Rarity* as described in the *Natural Heritage Reference Manual*, and the concept that in general, “habitats that contain rare species are more valuable than habitats that do not” (MNR, 2010b).

Identification, evaluation, and listing of provincially endangered or threatened species is the responsibility of the Province. Federally endangered or threatened species, as outlined in the *Species at Risk Act*, that are not covered under provincial legislation should also be considered. Planning authorities may wish to have assessments of the significant portions of the habitat of SAR reviewed by the Province.

SAR habitat present or previously identified: **YES** or **NO**

The presence of SAR habitat will add one **HIGH** score to the overall assessment

The London Plan – Criterion 1341 5.

The Woodland contains distinctive, unusual or high-quality natural communities or landforms.

Criterion 5.1 – Distinctive, unusual or high-quality communities.

This criterion relates to *Habitat Complexity and Diversity*, *Species Diversity and Rarity*, and *Uncommon Characteristics of Woodlands* as described in the *Natural Heritage Reference Manual*, and the following concepts:

- Natural areas (or clusters of areas) that span a range of topographic, soil and moisture conditions tend to contain a wider variety of plant species and plant communities, and may also support a greater diversity of ecological processes;
- Areas that contain a high diversity of plant and animal species are generally more important than areas that contain a lower diversity of species;
- Woodlands that are uncommon in terms of species composition, cover type, age or structure should be protected (MNR 2010b).

A) ELC Community SRANK

Conservation status ranks for the province (SRanks) are based on vegetation communities’ risk of elimination. This measure should be evaluated based on the most up-to-date conservation status rank as applied by Natural Heritage Information Centre.

Criterion Ranking:

- **HIGH** – One (1) or more communities with an SRANK of S3 or lower.
- **MEDIUM** – No communities with an SRANK lower than S4.
- **LOW** – No communities with an SRANK lower than S5.

B) Significant Wildlife Habitat

Significant Wildlife Habitat (SWH; including habitat for species of conservation concern and rare species) occurrences within the patch as determined through the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF, 2015a). This criteria applies to any SWH that is not evaluated through any other criteria within these guidelines (e.g., Criteria 2.2c).

SWH habitat present or previously identified: **YES** or **NO**

The presence of SWH habitat will add one **HIGH** score to the overall assessment

C) Rare Plant Species Presence / Absence

This measure assesses the number of element occurrences of regionally uncommon or regionally rare vegetation (further outlined in the glossary) and the presence of S1-S3, SRank species (which are also identified as SWH) within a patch. Oldham (2017) identifies the regionally rare and regionally uncommon vascular plant species in Middlesex for this criterion. **Table 3.1** includes the Criterion Ranking.

Criterion Ranking:

- **HIGH** – One (1) Rare Plant (S1-S3) or 4 Regionally Rare plants.
- **MEDIUM** – One to three (1-3) Regionally Rare plants.
- **LOW** – One (1) Regionally Uncommon plant.

Table 3-1: Rare Plant Species Presence / Absence

Type and Status of Species	HIGH	MED	LOW
Rare Plant (S1-S3)	1		
Regionally Rare plant	4	1-3	
Regionally Uncommon plant			1

D) Size and distribution of trees

Criterion Ranking:

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

Relative abundance, as it related to this criterion (i.e., rare, occasional, abundant), is described in **Section 8**.

E) Basal Area

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

Criterion Ranking:

- **HIGH** – Average basal area of trees for any community in the patch $\geq 16\text{ m}^2/\text{ha}$ for trees $>25\text{ cm DBH}$; OR $> 24\text{ m}^2/\text{ha}$ for trees $> 10\text{ cm DBH}$; OR all diameter class sizes are represented in the stand (saplings $< 10\text{ cm}$; polewood $10\text{-}24\text{ cm}$; small sawlog $26\text{-}36$; medium sawlog $38\text{-}48\text{ cm}$; large sawlogs $50\text{-}60\text{ cm}$; x-large or veteran trees $> 62\text{ cm}$.
- **MEDIUM** – Average basal area for any community in the patch $12 - 24\text{ m}^2/\text{ha}$ of trees $>10\text{ cm DBH}$; OR missing one of polewood, small, medium, or large size classes.
- **LOW** – Average basal area for all communities in the patch $< 12\text{ m}^2/\text{ha}$ for trees $> 10\text{ cm DBH}$; OR missing two or more of polewood, small, medium, or large size classes.

Score for **Criterion 5.1** based on the highest standard achieved for any one of the five standards

NOTE: 5.1d and 5.1e may require field investigations to determine size, distribution, and basal areas of trees within a given vegetation community.

Criterion 5.2 – Distinctive, Unusual or High-Quality Landforms

This criterion relates to *Habitat Complexity and Diversity* as described in *Natural Heritage Reference Manual*, and the following concepts:

- Natural areas (or clusters of areas) that span a range of topographic, soil and moisture conditions tend to contain a wider variety of plant species and plant communities, and may also support a greater diversity of ecological processes (MNR 2010b).

A) Distinctive landform types

Analyses of the five broad landform types listed below that occur in the City were undertaken to assess landform-vegetation representational significance. This was derived by calculating the proportion of all vegetation patches overlapping with each of the five landforms areas that are considered protected (i.e., as Earth Science ANSIs, Environmentally Significant Areas, PSWs or river corridors) :

- Beach Ridge** landform is unusual and rare in the City with portions identified as Earth Science ANSI and PSW/ESA.
- Sand Plain** landform has very little protected areas present. It is considered high quality for the aggregate extraction industry.
- Spillway** is the 2nd largest landform unit with the greatest proportion of protected areas and contains most of the ESA's. It is the most distinctive landform unit including the Thames River, Stoney Creek, Medway Valley and Dingman Creek.
- Till Plain** is the largest landform unit with the least amount of protected areas and the highest amount of vegetation. Most of the land is considered high quality agricultural.
- Till Moraine** is the 3rd largest landform unit with fair amount of protected land. It accounts for the patches that fall on the upland landforms (Westminster Ponds – Pond Mills ESA / Meadowlily Woods).

Refer to **Figure 3.1** for glacial geomorphology mapping of landforms within the City of London.

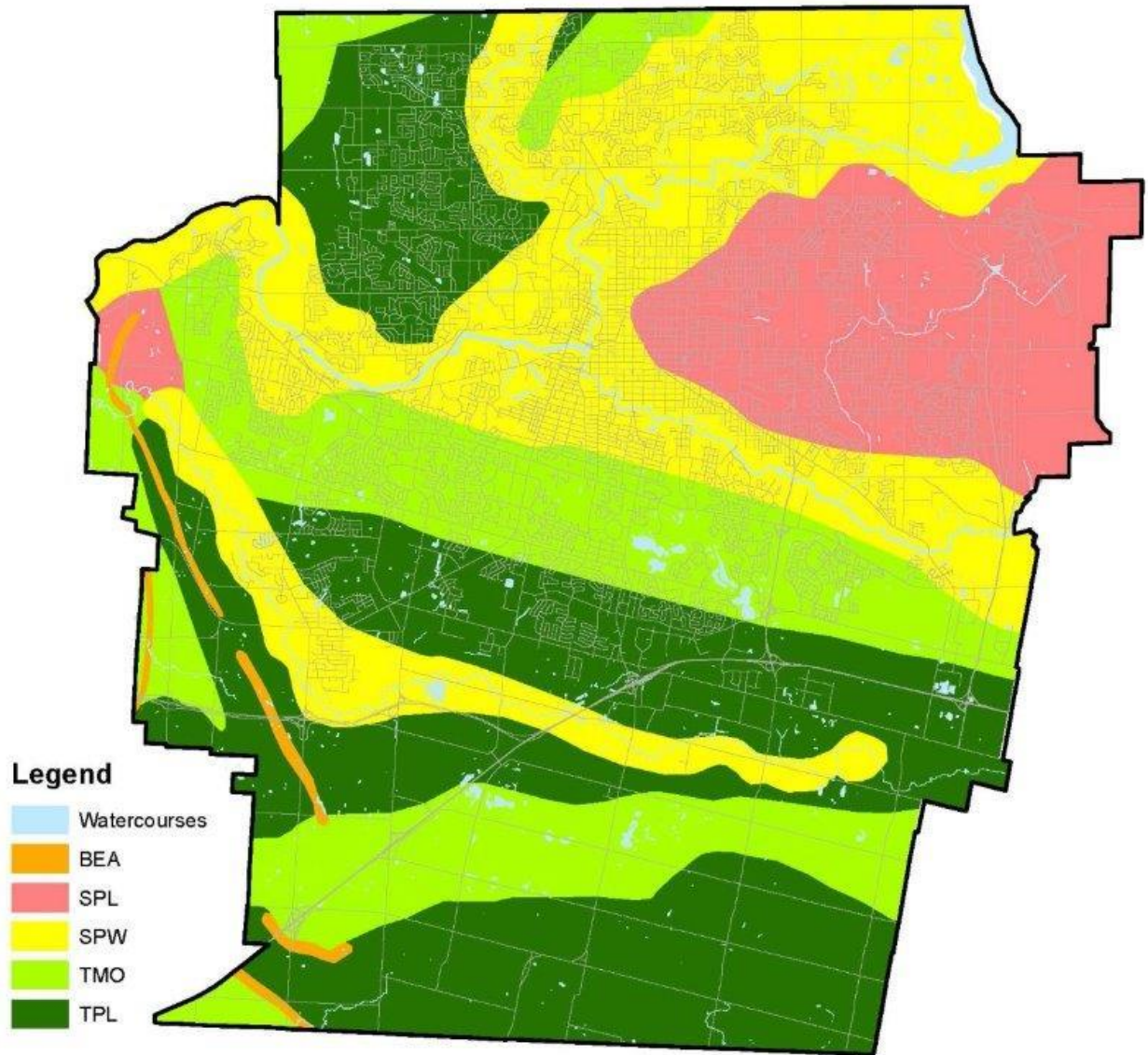
Criterion Ranking:

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

Score for **Criterion 5.2** (based on the highest standard achieved).

The woodland evaluation review summary sheet shall be completed and included as an EIS Appendix, where appropriate. The blank summary sheet can found in **Appendix D**.

Figure 3.1: City of London Glacial Geomorphology of the dominant physiographic units



3.2 Environmentally Significant Areas (ESAs)

As outlined in *The London Plan*, ESAs are relatively large areas in the City that contain natural features and perform ecological functions that warrant their retention in a natural state. ESAs often capture a complex of wetlands, woodlands, SWH, and / or valleylands. The approach for delineation of wetlands, valleylands and SWH is described in **Section 4**.

In the City of London there are ESAs which have been confirmed as meeting the established criteria (which are included in the Green Space Place Type) and Potential ESAs that still require evaluation (which are included in the Environmental Review Place Type). ESAs that clearly satisfy two (2) or more of the criteria (as outlined in **Section 3.2.3**) will be considered for recognition as an ESA. These criteria are to be applied to all potential ESAs delineated on Map 5 of *The London Plan*.

3.2.1 City of London Subwatershed Regions Policy and Context

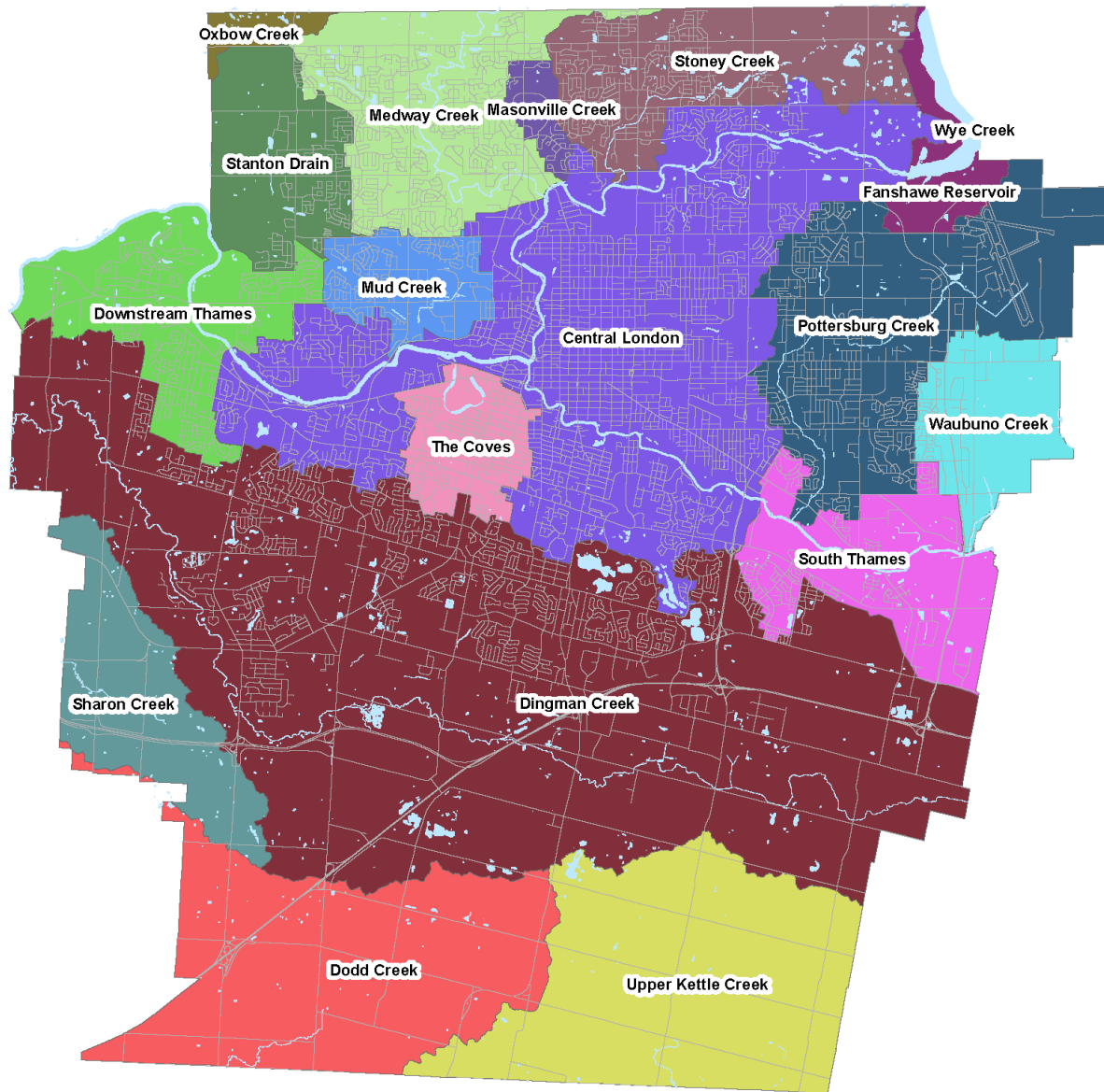
The policy framework for the identification and evaluation of ESAs is outlined in *The London Plan – Policies 1367_ to 1371_*. These policies provide the basis for the following guidelines and should be considered in conjunction with the Guidelines for Boundary Delineation as outlined in **Section 4**.

The following interpretations of the application guidelines should be noted:




















- These ESA guidelines are to be applied to Potential ESAs. Please refer to **Section 4.6** related to boundary delineation to determine whether Potential ESA(s) form part of an ESA patch. If a Potential ESA is not included in an ESA patch boundary, it must be assessed as a separate patch.
- The same natural heritage feature cannot be counted to satisfy more than one criterion for a given area. However, each feature shall be evaluated and listed under the criterion that it meets.
 - For example, if a community is identified as rare or uncommon, it would meet Criterion 1 listed below. If this community also contained high-quality, natural landform-vegetation communities representative of typical pre-settlement conditions, it would also meet Criterion 2 listed below. The community would be listed under both criteria but would only be applied towards the evaluation of significance for one of the criteria.
 - However, if there were other high-quality, natural landform-vegetation communities representative of typical pre-settlement conditions identified within the Potential ESA, Criterion 2 could also be applied towards the evaluation of significance.
- “Regional level” refers to the lands covered by the City of London subwatershed studies, including Oxbow Creek Subwatershed, Dingman Creek Subwatershed and the Central Area Subwatershed. For mapping of subwatersheds, refer to **City of London Subwatersheds** mapping and / or submit a **GIS Data Request** to the City of London – Geomatics Department.
- The term “County” refers to Middlesex County.
- Appropriate expertise, provided by a qualified professional (as outlined in **Section 2.6.6.11**) may be required to apply certain elements of Criterion 1 (unusual landforms), Criterion 4 (significant hydrological processes), Criterion 5 (aspects of biodiversity), Criterion 6 (important wildlife habitat or linkage functions), and Criterion 7 (significant habitat). Each time a criterion is applied, the rationale and source of expertise should be documented.
- The minimum data requirements to apply certain measures of a criterion, such as diversity indices, are detailed in the guidelines below, as well as the **Data Collection Standards** outlined in **Appendix C**. A standardized approach to data collection will enable more consistent application of these indices, and can inform long term planning.

- For documentation of rare community and species status, the most up-to-date resources and authorities will be utilized. Lists of rare and unusual communities and species will be considered open-ended, since data collected from other natural areas inventories may result in additions and deletions.
- For vegetation communities, the ELC system for Southern Ontario (Lee *et al.*, 1998) will be the standard protocol used to differentiate natural vegetation communities within patches.
- The term "area" in this document refers to patches or patch clusters (i.e., the combined area of contiguous patches), which are defined during boundary delineation (as outlined in **Section 4**).
- The focus of each criterion is to identify features of significance for protection.

Figure 3.2: City of London Subwatershed Regions



Legend

	Watercourses		Medway Creek		Stoney Creek
	Central London		Mud Creek		The Coves
	Dingman Creek		Oxbow Creek		Upper Kettle Creek
	Dodd Creek		Pottersburg Creek		Waubuno Creek
	Downstream Thames		Sharon Creek		Wye Creek
	Fanshawe Reservoir		South Thames		
	Masonville Creek		Stanton Drain		

3.2.3 Environmentally Significant Areas (ESAs) Evaluation Criteria

The London Plan 1371 - Criterion 1:

The area contains unusual landforms and / or rare to uncommon natural communities within the country, province or London subwatershed region.

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

Application: Unusual Landforms

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

Provincial level: Provincially significant Earth Science ANSIs

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

Rare to Uncommon Natural Communities

National/Provincial level: Significance as interpreted from the Carolinian Zone community Subnational (Ontario) S-Ranks outlined in the **Natural Heritage Information Centre** (MNRF, 2020) or subsequent updates and / or amendments. A natural community is considered rare to uncommon if the S-Rank is between S1 and S3. Community identification can be determined through existing data and / or data obtained from the Subwatershed Studies. Rare vegetation communities can also be identified as evaluated through the SWH Criteria Schedules for Ecoregion 7E (MNRF, 2015a).

Regional level: Regionally significant Earth Science ANSIs and vegetation communities identified as rare to uncommon based on an analysis of the London Subwatershed Studies Life Science Inventories (Bowles *et al.*, 1994) or the best available data. This list will be open-ended to incorporate any new data collected from the London subwatershed region. It will include communities or "species assemblages" that have limited distribution and occurrence within the region (e.g. fens, older growth forests, boreal species assemblages), or that are at the limits of their distributional ranges (e.g. bogs), or that are remnants of original habitat (e.g. prairie and oak savanna). Vegetation communities meeting the criteria for SWH as outlined in **The London Plan – Policy 1354** are also considered rare.

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

There may be special cases where rare to uncommon vegetation communities are described by the presence of Nationally, Provincially, or Regionally rare plant species, if they are abundant or dominant (as described in **Section 8**) in one or more strata (i.e., canopy, understorey, etc as described in Lee *et al.*, 1998). In these situations, the presence of the rare plant would not be used to meet **Criterion 7** for rarity.

The London Plan 1371 - Criterion 2:

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

Background: The focus of this criterion is to identify representative examples of the full range of landform-vegetation types that occur on each of the five dominant physiographic units within the London subwatershed region (**Figure 3.1**). By representing all landform-vegetation associations in a protected areas system a significant portion of the biodiversity of an area will be maintained (Crins, 1996). By capturing representative native vegetation in the NHS, examples of pre-European settlement landscapes are also protected.

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

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

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

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

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

Provincial level: Presence of Provincially significant ANSIs as identified in Land Information Ontario (LIO). Presence of PSWs as defined by the **OWES** (MNRF, 2014a).

Regional level: All wetlands within the City of London are protected in accordance with **The London Plan**.

Presence of regionally significant ANSIs identified in LIO.

Presence of Ecosite vegetation community types (as outlined in ELC; Lee *et al.*, 1998) of high quality on distinctive topographic, landform, or cultural features, applied through existing data and data obtained from the Subwatershed Studies.

The following community types are examples, and thus not an exhaustive list:

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

Comments: Ecosite vegetation communities, as classified through ELC (Lee *et al.*, 1998), can be considered high-quality and thus applicable for this criterion based on the following:

- Rare vegetation communities as evaluated through the SWH Criteria Schedules

for Ecoregion 7E (MNRF, 2015a);

- Vegetation communities meeting the criteria for SWH as outlined in ***The London Plan – Policy 1354***; and, Vegetation communities with an SRank 1-3 as described by the Natural Heritage Information Centre.

The London Plan 1371 – Criterion 3:

The area, due to its large size, generally more than 40 hectares, provides habitat for species intolerant of disturbance or for species that require extensive blocks of suitable habitat.

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

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

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

Application: This criterion can be met in any one (1) of two (2) ways:

1. The size of a patch is generally greater than 40 ha or the combined size of patches is generally greater than 40 ha and the patches are not interrupted by gaps wider than 20 m; or,
2. The area either a) contains some interior forest habitat which is at least 100 m from all forest edges and is not interrupted by gaps wider than 20 m, OR b) there is confirmed presence of one or more breeding birds which are either forest-interior species or area-sensitive species.

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

Comments: For patches or patch clusters straddling the City boundary, the area determination shall be based on the whole patch or patch cluster since this represents the ecological unit to which the criterion is applied.

The minimum size limit will result in the inclusion of only the largest areas in the London subwatershed region, as determined through available data and data from the subwatershed studies. [Note: Of 25 ESAs or Potential ESAs, four (4) fell within the range of 150 to 500 ha and two (2) were greater than 500 ha].

The London Plan 1371 - Criterion 4:

The area, due to its hydrologic characteristics, contributes significantly to the healthy maintenance (quality or quantity) of a natural system beyond its boundaries.

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

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

Application: Presence of indicators of hydrological processes noted during subwatershed studies include but are not limited to:

- water storage;
- water release (discharge);
- wetlands;
- water quality improvement;
- first order stream / headwater;
- groundwater recharge and discharge areas identified on subwatershed maps as high potential; and,
- water conveyance (i.e. floodplain and overland flow paths).

For wetlands, those that meet three or more of five key hydrologic functions as identified in the hydrology section of the **OWES** (MNR, 2014a) would be considered significant by the City of London. [Threshold was determined based on a review of ten evaluated wetlands within the City of London].

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

Permanent, non-channelized first-order streams containing Type I-II habitat (DFO, 1994) qualify for inclusion as part of the ESA.

Source References: Sources of information include but are not limited to wetland and hydrologic information presented by the UTRCA and by the Subwatershed Studies Aquatic Resources Management Reports for Vision '96 Subwatersheds (Beak Consultants 1995).

[The London Plan 1371](#) – Criterion 5:

The area has a high biodiversity of biological communities and / or associated plant and animal species within the context of the London subwatershed region.

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

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

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

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

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

Comments: Evaluation of biodiversity should consider the variability of data obtained through different

levels of field efforts.

Vegetation community classification will be based on *An Ecological Land Classification for Southern Ontario* (Lee *et al.*, 1998).

The London Plan 1371 – Criterion 6:

The area serves an important wildlife habitat or linkage function.

Background: The focus of this criterion is to identify significant wildlife habitats or linkages between significant natural features as identified in SWH Criteria Schedule for Ecoregion 7E. These habitats and linkages contribute to overall landscape richness and provides habitat for wildlife (MNRF, 2015a).

Application: Important wildlife habitat functions are outlined in depth in the SWH Criteria Schedule for Ecoregion 7E (MNRF, 2015a) and are grouped under the following four broad categories:

- Seasonal Concentration Areas of Animals;
- Rare Vegetation Communities or Specialized Habitat for Wildlife;
- Habitat for Species of Conservation Concern; and,
- Animal Movement Corridors.

The site fulfills an external linkage or corridor function between two or more significant habitats. The value of a linkage or corridor will be based upon characteristics such as habitat, shape, width, and length. Linkage function and attributes are described in the *Natural Heritage Reference Manual* (MNRF, 2010b). Linkages may include, but are not limited to, the following:

- early successional woodlands and plantations;
- water bodies, watercourses and valleylands;
- riparian zones;
- steep slopes and groundwater discharge areas;
- old fields;
- hydro and pipeline corridors;
- abandoned road and rail allowances; and,
- recreational greenway parks.

Source References: Provincial files and maps; subwatershed studies; other data obtained through site specific field investigations; MNRF (1997); Riley and Mohr (1994).

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

The London Plan 1371 – Criterion 7:

The Area provides significant habitat for rare, threatened, or endangered indigenous species of plants or animals that are rare within the country, province, or county.

Background: The focus of this criterion is to identify populations of rare, threatened or endangered species for protection. This criterion is focused on SAR and rare species not covered

under significant wildlife habitat under Criterion 6 (e.g., species of conservation concern).

Definitions of significant habitat are given under each of the categories of vascular plants and animals. The most current sources of rarity designations will be used. Lists of rare species are considered open-ended as new information will result in amendments over time. Data from the Subwatershed Studies Life Science Inventories (Bowles *et al.*, 1994) were used to update Middlesex County status for plants.

Application: Plant Species

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

Federal SAR : COSEWIC Status reports

NHIC Global Ranks (GRANK) for Rare Vascular Plants (Oldham, 1994a) and Mosses (Oldham, 1994b).

- Species listed with a global rank of G1 to G3
- SAR listed under the *Species at Risk Act*

Rare Vascular Plants in Canada (Argus and Pryer, 1990), Database of Vascular Plants of Canada (VASCAN; Canadensys, 2020)

Provincial SAR: NHIC Provincial Rank (SRANK) for Rare Vascular Plants (Oldham, 2009; Oldham, 2017) and for Mosses (Oldham, 1994b).

- Species listed with a provincial rank of S1 to S3
- Provincially designated SAR in Ontario

Atlas of the Rare Vascular Plants of Ontario (Oldham & Brinker, 2009; Oldham, 2017)
COSSARO Status reports

Middlesex County Rare Species: Status of the Vascular Plants for Ecoregion 7E (Oldham, 2017)

- Rare in SW Ontario

SWFLORA database for Subwatershed Life Science Inventories (Bowles *et al.*, 1994)

- Rare in Middlesex County

Species recorded that have 1-4 records (stations) in Middlesex County. Note: Plant records collected from the subwatershed studies were used to update the rare status at the county level.

Animal Species

Habitat for animal species should be interpreted to mean areas where one (1) or more rare species are resident or breeding in the area, and / or making use of the area for a key component of their life cycle (e.g. territory, nesting, critical feeding grounds or wintering concentrations). Documentation of repeated (multi-year) use of an area by a species adds to the significance of the habitat. For breeding birds, the presence of suitable habitat for territory, nesting and feeding; for butterflies, the presence of suitable habitat including the host plants upon which they feed; for mammals, the presence of signs of active use of an area (e.g. dens, bedding areas, well-used trails, scat, etc.); for herpetofauna, the presence of suitable habitat for breeding (e.g. vernal pools, downed woody debris) and hibernating (presence of hibernacula).

Federal SAR: COSEWIC Status reports

NHIC Global Ranks (GRANK) for Amphibians and Reptiles, Mammals, Birds, Insects (e.g.,

butterflies, moths, odonata, hymenoptera, etc.) and Fishes

- Species listed with a global rank of G1 to G3
- SAR listed under the *Species at Risk Act*

Provincial SAR: NHIC Provincial Rank (SRANK) for Amphibians and Reptiles, Mammals, Birds, Insects, and Fishes

- Species listed with a provincial rank of S1 to S3
- Provincially listed SAR in Ontario
- COSSARO Status reports

Middlesex County Rare Species: Southwestern Ontario regional status based on records in provincial atlases:

- mammals – e.g., Atlas of the Mammals of Ontario (Dobbyn, 1994)
- breeding birds – e.g., Avian Conservation Assessment Database (Partners in Flight, 2020), Atlas of the Breeding Birds of Ontario (OBBA) 2001-2005 (OBBA, 2007)
- insects – e.g., Ontario Butterfly and Moth Atlases (Toronto Entomologists' Association, 2020)
- herpetofauna – e.g., Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019)

Middlesex County status of rarity is based upon the most recent existing county records:

- mammals - provincial mammal atlas and records from the appropriate Provincial District office
- breeding birds - open ended lists from the provincial bird atlas (OBBA, 2007; Partners in Flight, 2020) and best available county information;
- insects - best available county information;
- herpetofauna - status of amphibians and reptiles in Middlesex County (Ontario Nature, 2019)

Comments: Other non-vascular plant (e.g. mosses) and faunal groups (e.g. Odonata) should be included where and when the information is available.

The following sections provide guidelines for the evaluation of significance and ecological function for the following natural heritage features as specifically outlined in ***The London Plan***:

- Wetlands;
- Significant Wildlife Habitat; and,
- Valleylands.

Although other natural heritage features may require evaluation and subsequent protection (e.g., fish habitat, wetlands, etc.), the guidelines for evaluating those natural heritage features are outlined in the applicable provincial, federal, or other technical documents. It is expected that all natural heritage features be evaluated in accordance with the appropriate and most up-to-date guidelines and / or policies.

3.3 Provincially Significant Wetlands, Wetlands and Unevaluated Wetlands

There are three (3) categories of wetlands within the City of London protected as per **The London Plan** (Policies 1330_ to 1336_) and the applicable Conservation Authority policies (e.g., UTRCA 2017):

- Provincially Significant Wetlands (PSWs)
- Wetlands, and
- Unevaluated Wetlands.

PSWs (on the City's Map 5 and / or in the Province's mapping data layers) may be re-evaluated by proponents in accordance with the Ontario Wetland Evaluation System (OWES) (MNRF, 2014a) as outlined in the *Natural Heritage Reference Manual*. The Province remains responsible for reviewing and approving any additions, deletions or refinements to identified PSWs.

Assessments under the OWES system must be done by a qualified professional who is certified and experienced in application of the system.

Unevaluated Wetlands mapped in the City of London (on the City's Map 5 and / or in the Province's mapping data layers) are also to be evaluated for significance using the OWES as outlined in the *Natural Heritage Reference Manual*. The evaluation is to be submitted to the Province for their review and decisioning.

Unmapped wetlands identified through the vegetation community assessment process may need to be evaluated for significance using the OWES system. These include the following ELC Community Series:

- SWAMP - deciduous swamp (SWD), mixed swamp (SWM) or coniferous swamp (SWC);
- FEN – open fen (FEO), shrub fen (FES) and treed fen (FET)
- BOG – open bog (BOO), shrub bog (BOS) and treed bog (BOT)
- MARSH – meadow marsh (MAM), shallow marsh (MAS)
- SHALLOW WATER – submerged shallow aquatic (SAS), mixed shallow aquatic (SAM) and floating-leaved shallow aquatic (SAF), and
- OPEN WATER (OAO).

Guidance for boundary delineation of wetlands is provided in **Section 4**.

Wetlands evaluated for provincial significance that do not meet the criteria for designation as a PSW (per OWES), as confirmed by the Province, will be identified as "Wetlands" within the City of London, irrespective of size or condition.

PSWs, Unevaluated Wetlands and other Wetlands will be added, removed or refined to Map 5 – Natural Heritage in **The London Plan** as new information becomes available. PSWs and Wetlands are also mapped as Green Space Place Type on Map 1, while Unevaluated Wetlands are mapped as features for Environmental Review.

All wetlands (including PSWs) and their adjacent lands are also regulated by the local Conservation Authorities and may also require consideration under the applicable Conservation Authority policies, as well as the Natural and Human-made Hazards Policies in **The London Plan**.

For more information related to the evaluation of significant wetlands using the OWES, and its application under the Provincial Policy Statement, refer to the *Natural Heritage Reference Manual* (MNRF, 2010b) as well as Ontario's Wetlands evaluation website.

3.4 Significant Wildlife Habitat (SWH)

Policies outlined in the Provincial Policy Statement and **The London Plan** (Policy 1353_) protect Significant Wildlife Habitat (SWH) by not permitting development and site alteration within or in the lands adjacent to SWH unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

The London Plan (Policies 1352 and 1354) provides key considerations for the determination of significance for wildlife habitat within the City of London. As per these policies, candidate Significant Wildlife Habitat (SWH) should be screened for and assessed utilizing the process outlined in the *Natural Heritage Reference Manual*, specifically utilizing the *Significant Wildlife Habitat Technical Guide* (MNRF, 2000), in conjunction with the criteria in the supplementary *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015a) and the criteria outlined in Policy 1354_1 through 1354_3.

With respect to Policy 1354_3, passive recreation opportunities refer to activities such as hiking, photography and eco-tourism.

Within the City of London, areas confirmed as SWH are to be designated as a natural feature/area within the Green Space Place Type and included in Map 1.

3.5 Significant Valleylands and Valleylands

Valleylands, as defined in the *Provincial Policy Statement*, refers to natural areas that occur in a valley or landform depression with standing or flowing water for a period of the year. Valleylands include features such as rivers, streams, other watercourses, and ravines. Valleylands provide many important ecological functions (e.g., wildlife habitat, water storage/transport), as well as linkages/connectivity between other natural heritage features and areas within the NHS.

Policies for the identification and protection of Significant Valleylands and Valleylands are provided in **The London Plan** (Policies 1344 to 1349) and should be considered in conjunction with the applicable Conservation Authority policies (e.g., UTRCA 2017). The policies provide considerations for the identification and determination of significance for valleylands based on the evaluation of landform-related functions and attributes, ecological features and restored ecological functions.

Table 8-1 in the *Natural Heritage Reference Manual* outlines specific standards on the evaluation of function criteria for valleylands (e.g., surfacewater functions, distinctive landforms, habitat value, etc.). These criteria should be referenced when determining the significance of valleylands in conjunction with the guidance provided in **The London Plan**.

The London Plan also includes direction (Policy 1350) for the determination of valley corridor width. Supplemental guidance related to boundary delineation for valleylands is described in **Section 4.2.2** of the EMGs.

Within the City of London, Significant Valleylands are designated as a natural feature/area within the Green Space Place Type, therefore Green Space Place Type policies outlined in **The London Plan** are also applicable. Valleylands that have been identified but not yet assessed are identified within the Environmental Review Place Type, pending evaluation. Note that air photo interpretation and / or site investigations may identify additional valleyland features.

In consultation with the applicable Conservation Authority, the City of London may consider alterations to river or stream valleys and watercourses to enhance, rehabilitate, and / or restore the system (e.g., bank stabilization, riparian plantings, and barrier removal) in accordance with Policy 1351.

4. Boundary Delineation of Natural Heritage Features and Areas

Delineation of natural features and areas requires an understanding of both technical and policy elements related to the feature and / or area being considered. Ecological boundary delineation is an important part of the planning process as it determines what will be considered for further evaluation. The City of London recognizes that it is important for the approaches taken to be as transparent and consistent as possible both to preserve the integrity of the City's Natural Heritage System (NHS) and ensure the planning process is being implemented appropriately.

Ecological boundary delineation is required before natural features and areas can be evaluated for significance, and may be reviewed when site alteration or development is proposed adjacent to natural heritage features and areas that have already been identified and confirmed. This section provides guidelines for delineating the ecological boundaries of natural heritage features and areas including currently mapped and unmapped features. It specifically includes:

- An overview of the jurisdictional responsibility and policy direction related to ecological boundary delineation for each NHS component in the City;
- General guidance for delineation of unevaluated vegetation patches in the City of London; and,
- Feature-specific boundary delineation guidance for: Wetlands, Woodlands and Significant Woodlands, Valleylands and Significant Valleylands, Significant Wildlife Habitat, Environmentally Significant Areas (ESAs) and other lands to be identified through an environmental study (such as critical Function Zones [CFZs] and linkages).

Notably, the boundaries delineated for natural heritage features do not include any setbacks, buffers, or adjacent lands. Guidance for Ecological Buffers is provided in **The London Plan** (Policies 1412_ to 1416_) and supplemented with the guidance in Section 5 of these EMGs.

In addition, these boundary guidelines are focused solely on ecological boundaries irrespective of property lines. However, it is understood that while natural heritage features and areas may cross property boundaries, that field verification of such boundaries may be limited to the subject property.

The purpose of these guidelines is:

1. To document and describe a repeatable process based strictly on ecological considerations, leading to credible mapping which can be used for planning, protection and monitoring;
2. To provide the basis for resolving variations between different scales and types of mapping; and,
3. To establish a common understanding and approach between planners, consultants, and the public regarding the ecological aspects of boundary delineation for natural features.

4.1 Policy Context and General Guidance

Some components of the City's NHS must have their boundaries confirmed by the appropriate federal or provincial agency, while the boundaries of other components are the City's responsibility to confirm, sometimes in consultation with the local Conservation Authority. An overview of the jurisdiction responsible for confirming boundaries for the various NHS components, as specified in **The London Plan**, is summarized in **Table 2-1**.

The following applies to any natural heritage feature or area, including vegetation patches, mapped or unmapped, to be considered as part of an Environmental Study through the planning process.

1. The term “vegetation patch” refers to an area that contains natural vegetation, along with associated features and functions. Vegetation patches are considered as one unit and can be comprised of multiple “natural heritage features” inside the patch (e.g., woodland, wetland, etc.). The initial feature boundary will be drawn at the interface between naturalized vegetation and the adjacent lands, generally conforming to the patch outline.
2. The ecological boundary is determined based on ecological principles, refined through the application of these guidelines, and without regard for property lines. Boundary delineation guidelines shall not be used to separate a vegetation patch into specific parts that can be treated individually as having lesser or greater significance and / or contribution to ecological function.
3. Application of these guidelines should be illustrated at a map scale of 1:10,000, using aerial photography and other tools as necessary. Further refinements will be made at a smaller scale (e.g., 1:5,000 or 1:2,000 scale), and may require field investigations. For the completion of an Environmental Study, boundaries must be geo-referenced to the best accuracy possible.
4. The diagrams and examples that form part of the conditions for boundary delineation provided below are intended to convey the intent of the guidelines. While not drawn to scale, these diagrams do depict the relative sizes and distances of the areas shown. A legend has been included to aid in the interpretation of the diagrams.
5. In the application of these guidelines, the most recent map sources, current and historical aerial photographs, and ecological background studies/documents should be used to verify the initial boundary.

4.2 Wetlands

The overarching policy framework for PSWs, Wetlands, and Unevaluated Wetlands is outlined in **The London Plan** – Policies 1330 to 1336. Wetlands of any size must be identified, delineated and screened in accordance with both City and Conservation Authority policies (e.g., UTRCA 2017).

The first step in delineating wetland features is to define the wetland types and delineate these vegetation communities approximately utilizing the ELC System (Lee *et al.*, 1998). The second step, is to confirm and, if needed, refine the delineation of internal boundaries (e.g., between different types of wetlands, boundary between wetland and upland communities), external boundaries (e.g., between wetlands and non-natural land uses), and wetland complexes (if applicable) using the Ontario Wetland Evaluation System (OWES) (MNR, 2014a). The OWES provides in-depth instructions on the delineation of internal and external boundaries and generally consists determining wetland boundaries within areas of gradual ecological change (i.e., transitional areas, eco-tones) utilizing a combination of the following information:

- Transition (i.e., a 50% split) between wetland and upland plant community (percent cover);
- Topography, such as elevation and slope; and,
- Soil substrate.

Wetland boundaries should be scaled to 1:10,000 for mapping purposes, with the width of the boundary line being scaled to cover the equivalent of 15 m in real world application (MNR, 2014a).

The wetland boundary delineation must be conducted by a qualified professional (i.e., a person certified and experienced in the application of OWES), and is typically undertaken in the field with the applicable Conservation Authority. Existing boundaries of PSWs remain as mapped unless any proposed revisions are approved in writing by the the Province.

Beyond the wetland community boundaries, the Critical Function Zone (CFZ) must also be included for constraints mapping and site planning. CFZs are non-wetland areas within which biophysical functions or attributes directly related to the wetland occur (Environment Canada, 2013). Effectively, the CFZ is a functional extension of the wetland into the upland. For example, this could include: upland grassland

nesting habitat for waterfowl (that use the wetland to raise their broods), upland foraging areas, overwintering and nesting habitat for reptiles and amphibians. Foraging areas for frogs and dragonflies, and / or nesting habitats for birds that straddle the wetland-upland ecozone could also be considered part of the CFZ.

CFZs do not replace the functions of a buffer. For more in-depth information on determining CFZs, refer to Environment Canada (2013).

4.3 Significant Woodlands and Woodlands

The overarching policy framework for the identification and evaluation of woodlands is outlined in **The London Plan** – Policies 1337 to 1343, 1383 and 1386, and includes local criteria aligned with the *Natural Heritage Reference Manual*.

The *Provincial Policy Statement* protects Significant Woodlands by not permitting development and site alteration within these features or on adjacent lands unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

Most potential Woodlands are shown as Unevaluated Vegetation Patches on Map 5 – Natural Heritage and as Environmental Review Place Type on Map 1 in **The London Plan**. However, as identified in **The London Plan** – Policy 1316, the absence of vegetation patches from the aforementioned mapping does not necessarily mean that additional unevaluated vegetation patches do not exist. Therefore, proponents must assess the subject lands in question to screen for the presence of any additional Unevaluated Vegetation Patches and / or other vegetation patches larger than 0.5 ha.

Significant Woodland and Woodland boundary delineation shall be conducted by qualified professionals with expertise in ecology, hydrology and geomorphology. All woodland boundaries are to be delineated in the field at the Drip Line of the feature.

Section 3.1 includes guidance related to the evaluation of woodlands.

4.4 Valleylands and Significant Valleylands

The overarching policy framework for the identification of Significant Valleylands is outlined in **The London Plan** – Policies 1347 to 1349, and includes local criteria aligned with the *Natural Heritage Reference Manual* guidance, but also refers to this guidance for additional criteria. Relevant guidance from the applicable Conservation Authority policies (e.g., UTRCA 2017) should also be considered.

The *Provincial Policy Statement* defines valleylands as natural areas that occur in a valley or other landform depression that have water flowing through or standing for some period of the year, and includes rivers, streams, other watercourses and ravines) (MMAH, 2020). Significant valleylands also play an essential role in the NHS, such as providing connectivity (e.g., migration and dispersal corridors) (MNRF, 2010b).

Valleylands may be clearly defined (e.g., with steep ravines sloping down towards a permanent watercourse), or may not have a well-defined corridor or permanent flows (e.g., in areas of headwaters, seeps) (MNRF, 2010a).

Specific policies for the boundary (width) delineation of Significant Valleylands are outlined in **The London Plan** Policy 1350. Significant valleyland boundary delineation shall be conducted by a qualified professionals with expertise in ecology, hydrology and geomorphology.

Section 3.5 includes guidance related to the evaluation of valleylands.

4.5 Significant Wildlife Habitat

The overarching policy framework for the protection and determination of the significance of Significant Wildlife Habitat (SWH) is outlined in **The London Plan** Policies 1352_ to 1355_. These policies point to the guidance in the SWHTG (MNRF 2000b) and the *Natural Heritage Reference Manual* (MNRF 2010b), the Province's criteria schedules for Ecoregion 7E (MNRF 2015a) for determination of the significance and delineation of SWH and municipal criteria outlined in Policy 1354_.

SWH is the most complex habitat category in the City's NHS (and in the *Provincial Policy Statement*) as it seeks to capture ecologically important and somewhat specialized habitat types for a broad cross section of species and ecological functions. In Ecoregion 7E, the ecoregion in which London is situated, there are 35 categories of SWH. SWH often occurs as a subset of or within other natural heritage features or areas (such as wetlands or woodlands), but may also extend beyond or occur outside of such features or areas.

The applicable guidance, particularly for the ecoregional criteria, largely relies on vegetation community polygons delineated at the Ecosite level using the ELC system (Lee *et al.*, 1998) to determine the extent of habitat to be considered as SWH, although a few SWH categories are delineated using the presence or absence of other habitat features not linked to one or more specific Ecosite type. Nonetheless, in most cases, the presence of one or more of the specified Ecosite types in conjunction with the presence of one or more of the defining criteria within the applicable polygons is sufficient to warrant consideration of a feature or area as candidate SWH. The current and proposed land use context should, however, also be considered in conjunction with the habitat needs and sensitivities of the species / group of species in question, and the broader context of the NHS on a City-wide scale, in determining appropriate boundaries for the SWH type.

It is the City of London's responsibility to determine whether or not the candidate SWH should be confirmed, the extent of the habitat to be protected, and the mitigative measures required, if any. Depending on the nature and location of the SWH, boundaries should also be determined in consultation with the other applicable agencies (e.g., Conservation Authority).

Further, delineation of SWH should be informed by information collected from aerial mapping and observations from site investigations, and should be confirmed in the field by a qualified professional.

Section 3 provides supplemental guidance on the evaluation of SWH.

4.6 Environmentally Significant Areas (ESAs)

The overarching policy framework for the evaluation of Environmentally Significant Areas is outlined in **The London Plan** – Policies 1367_ to 1371_, and includes local criteria unique to London. As outlined in **The London Plan**, ESAs are relatively large areas in the City that contain natural features and perform ecological functions that warrant their retention in a natural state. ESAs often capture a complex of wetlands, woodlands, SWH, and / or valleylands and are delineated based on the features that they contain.

ESAs that have been evaluated are included as Green Space Place Type on Map 1 – Place Types and are mapped on Map 5 – Natural Heritage. However, Potential ESAs patches or other vegetation patches greater than 0.5 ha (as identified through subwatershed plans or other environmental studies) should be delineated and assessed for significance (as outlined in **Section 3**). It is important to note that mapping in **The London Plan** is dynamic in nature, and not all potential vegetation patches or those identified for protection may be included in the mapping at a given time. It is the responsibility of the proponent to determine potential vegetation patches for evaluation as part of the planning process and development application.

Appropriate expertise provided by a qualified professional is required to delineate ESA elements. For vegetation communities, the ELC system for Southern Ontario (Lee *et al.*, 1998) will be the standard protocol used to differentiate natural vegetation communities within patches. The term "area" in the context of an ESA refers to patches or patch clusters (i.e., the combined area of contiguous patches), which are defined during boundary delineation and included in the feature boundary).

Section 3.2 includes guidance related to the evaluation of ESAs.

4.7 Vegetation Patches

In general, vegetation patches have been identified through subwatershed plans or other environmental studies and have been mapped in **The London Plan** on Map 1 – Place Types and Map 5 – Natural Heritage. Vegetation patches that have been evaluated for significance may become designated as an NHS component (e.g., Significant Woodland or Woodland) in whole or in part, in accordance with the guidance provided in **Section 3**.

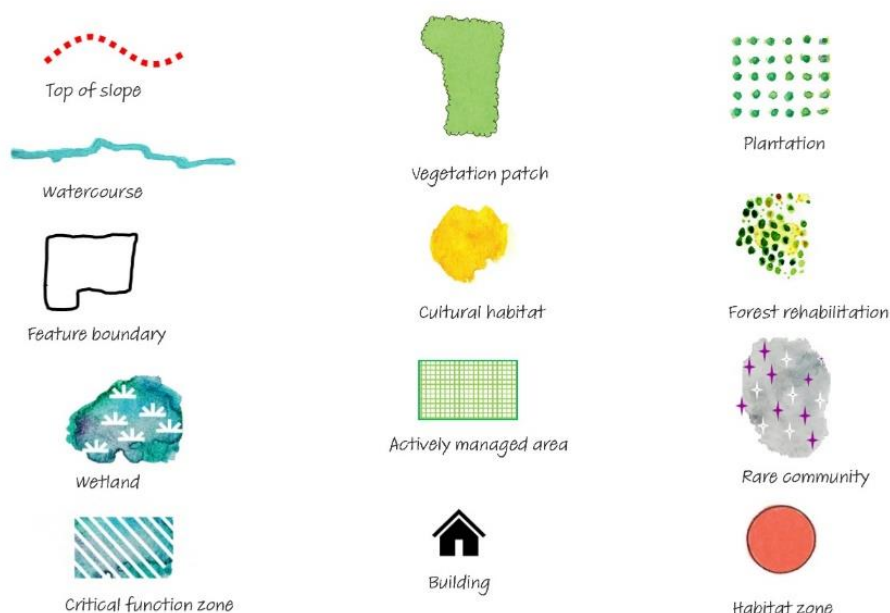
As outlined in **The London Plan**, vegetation patches that have been evaluated may be included as Green Space Place Type on Map 1 – Place Types and mapped as the corresponding natural heritage feature (e.g., as Significant Woodlands or Woodlands) on Map 5 – Natural Heritage.

Unevaluated Vegetation Patches or other vegetation patches greater than 0.5 ha (identified through subwatershed plans or other environmental studies) should be delineated and assessed for significance as outlined in **Section 3**.

It is important to note that mapping in **The London Plan** is dynamic in nature, and that not all potential vegetation patches greater than 0.5 ha may be included in the mapping at a given time. It is the responsibility of the proponent to identify and assess vegetation patches for evaluation as part of the planning process in accordance with the guidance in **The London Plan** and this document.

4.8 Boundary Delineation Guidelines

Figure 4.1: Legend for all Boundary Delineation Guideline Graphics



The following guidelines outline the process for determining natural feature boundaries.

GUIDELINE 1: Species at Risk (SAR) habitat and Significant Wildlife Habitat (SWH) **must be included within the feature boundary.**

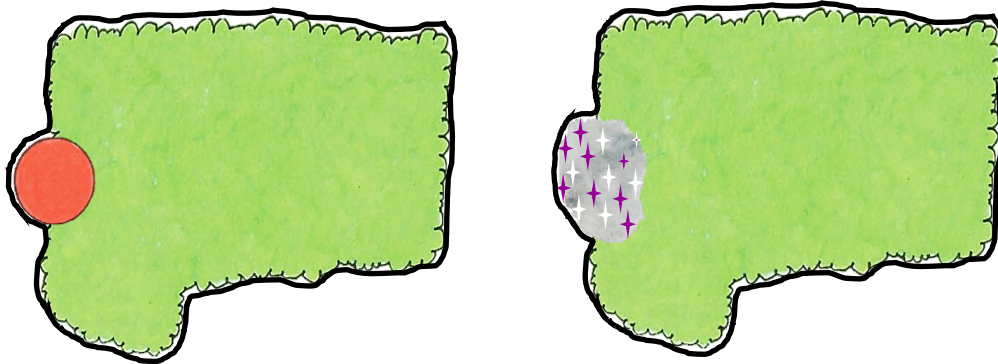


Figure 4.2: Guideline 1 Illustration

Conditions:

Confirmed SAR habitat (including associated habitat zones) is to be included within the feature boundary include habitat for Federal and Provincial SAR protected under the federal *Species at Risk Act* and provincial *Endangered Species Act*. For the City of London's policies related to SAR habitat, refer to **The London Plan – Policies 1325-1327**.

In addition to SAR habitat, all confirmed SWH is to be included as determined through ELC (Lee *et al.* 1998) and further assessed using the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF, 2015a) and the *Significant Wildlife Habitat Technical Guide* (MNRF, 2000b) and, for the City of London's policies related to SWH, refer to **The London Plan – Policies 1352-1355**.

Rationale:

SAR habitat and SWH are essential for maintaining critical life processes, biodiversity, and aiding in the protection and recovery of rare species/communities and SAR (MNRF, 2010b). Further, underrepresented or rare species and communities (i.e., SAR, SWH) are under pressure from habitat fragmentation and overall loss of habitat, therefore one important goal for ecological function when establishing/defining natural heritage features is to provide habitat to these rare species (MNRF, 2010b).

In regards to SAR habitat, a habitat zone is a feature or area used regularly for a key lifecycle requirement for a species or habitat that requires special protection. The vegetation in the habitat zone doesn't necessarily need to be of natural origins and could contain culturally influenced communities. The critical habitat of a plant species may extend to areas in the immediate vicinity of population that have similar soil, moisture, exposure, and community conditions.

Examples of habitat zones that may require special protection are:

- Old fields, hedgerows, and woodland edges that may be important habitat for American badger (*Taxidea taxus jacksoni*) maternal and other den sites, as well as migration corridors for the dispersal of young (Ontario American Badger Recovery Team, 2010); and,
- Sandy shorelines that provide critical nesting habitat for the Eastern Spiny Soft-shell Turtle (*Apalone spinifera*) often occurring along the Thames River.

GUIDELINE 2: Swamps, Marshes, Thicket Swamps, or other Untreed Wetland communities and their associated Critical Function Zones (CFZs) contiguous with a patch **must be included within the feature boundary** (inset d of **Figure 4.3**).

To be included in the patch boundary, the wetland communities must meet at least one of the following criteria:

- a) The wetland strengthens a linkage between natural areas by filling in a bay or connecting two or more patches or is contiguous with the patch;
- b) The wetland is located above the top-of-slope of stream corridor or ravine;
- c) The wetland connects a patch to a permanent, natural watercourse; or,
- d) The wetland CFZ is included within the feature boundary.

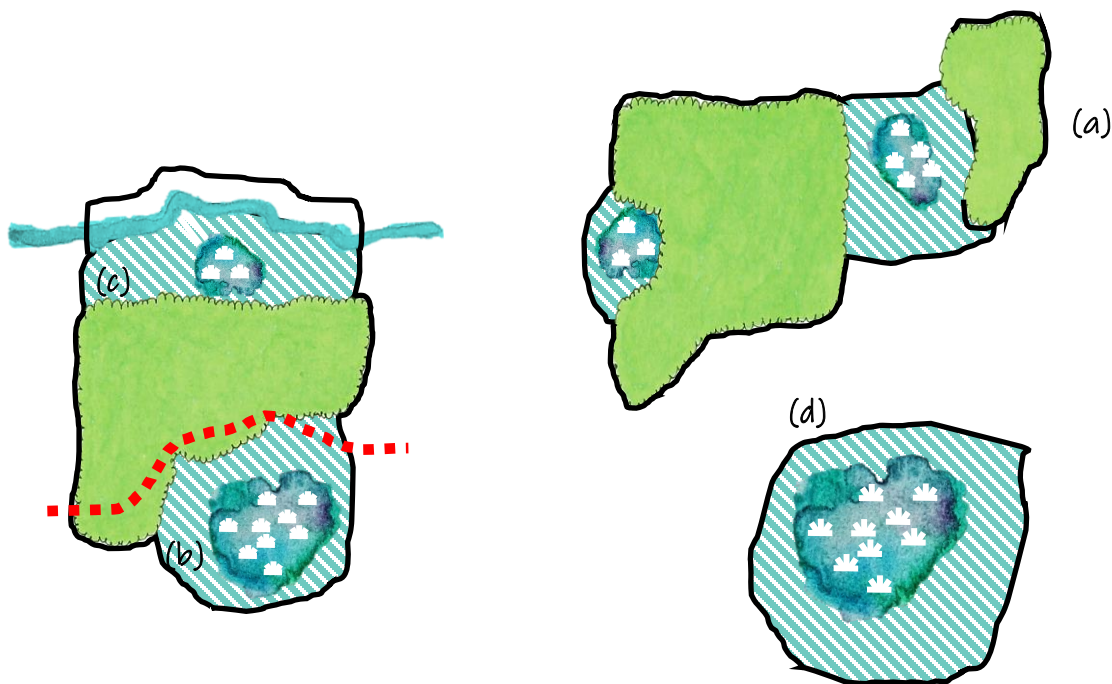


Figure 4.3: Guideline 2 Illustration

Conditions:

Although all wetlands are protected under the City of London's policies related to PSWs, Wetlands, and Unevaluated Wetlands (*The London Plan* – Policies 1330-1336), marshes, thicket swamps, and other untreed wetlands (along with their associated CFZs) that meet the criteria above must be included within the overall vegetation patch boundary. All other wetlands, including PSWs, Wetlands, and Unevaluated Wetlands and their associated CFZs that do not meet the above criteria are to be delineated as their own vegetation patch. CFZs include non-wetland areas within which biophysical functions or attributes directly related to the wetland occur (Environment Canada, 2013). Reference to Environment Canada (2013) can be made for more information on determining specific CFZs, however review of the most up-to-date documents on CFZs should be conducted.

Rationale:

Wetlands provide important habitat for plants, fish and wildlife. Wetlands also influence the quality and temperature of water flowing through them and some wetlands provide storage capacity to offset peak flows associated with storm events.

CFZs are natural areas that surround wetlands and can provide a suite of benefits to wetland function and to the species dependent on the wetland. In many cases, these natural areas, although they extend beyond the limits of the wetland, are inherently part of the wetland ecosystem and provide habitat for critical life processes to wetland species (Environment Canada, 2013).

GUIDELINE 3: Projections of naturalized vegetation **less than thirty meters (30 m) wide that extend from the main body of the patch:**

- a) **must** be included within the boundary if the projection includes a wooded ravine or valley with untreed or successional habitat below the top-of-slope; and
- b) **must** be included within the boundary if the projection provides linkage within the landscape.

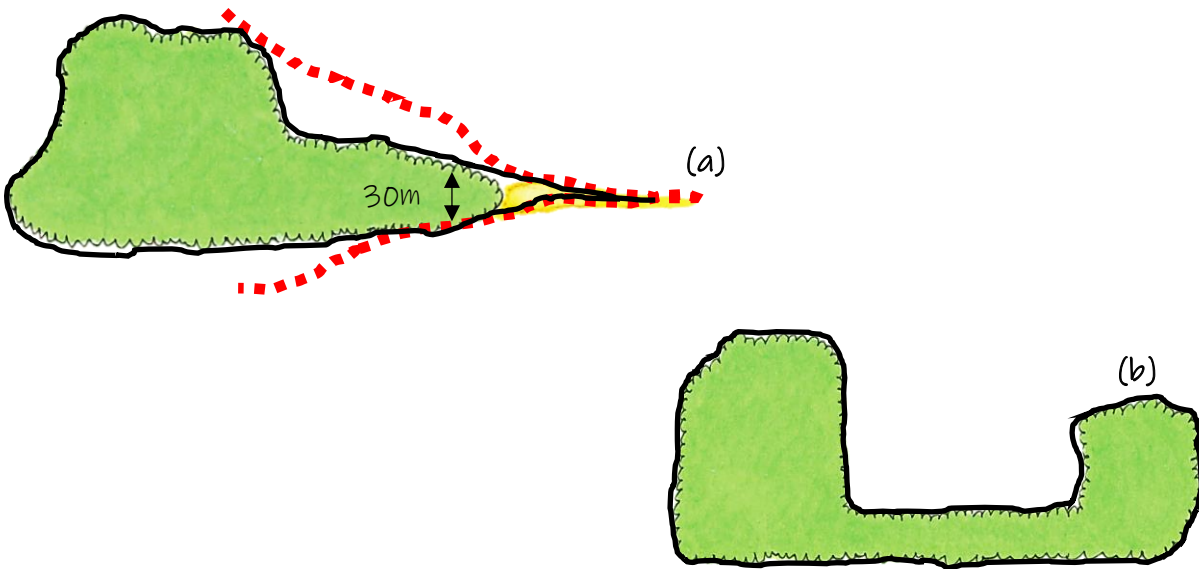


Figure 4.4: Guideline 3 Illustration

Rationale:

Ravine, valley, and upland corridors are important components of the NHS because they contain natural habitat, provide linkages, increase species richness and diversity, and facilitate movement and dispersion. Landscape connectivity (e.g., through linkages) is important in the maintenance of ecological function of patches and reduces landscape fragmentation that lead to smaller, more isolated features (MNRF, 2010b). For example, linkages can provide a dispersal route for species (i.e., connectivity) to complete different aspects of their life cycles, such as allowing reptiles and amphibians to travel between breeding and overwintering habitat (MNRF, 2010b).

GUIDELINE 4: All Watercourses **must be included within the feature boundary.**

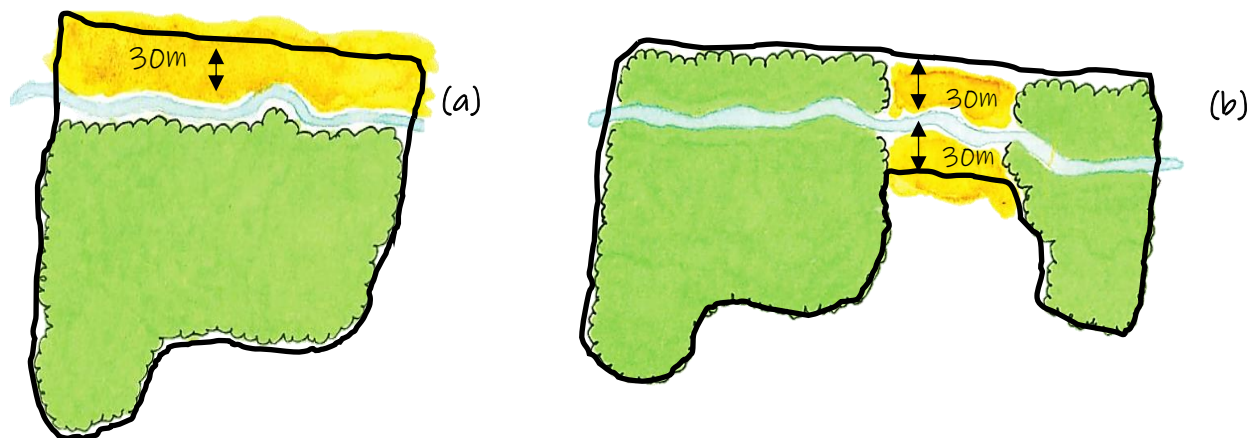


Figure 4.5: Guideline 4 Illustration

Figure 4.5 is an example of the inclusion of watercourses for defining vegetation feature boundaries, where a) depicts a watercourse at the edge of a vegetation patch and b) depicts a watercourse connecting two (2) patches.

Conditions:

The edges of the watercourse **must** be measured **from the high-water mark** and will include the following minimum corridor widths:

- 15 m on each side of small watercourses (valleylands);
- 30 m on each side of significant watercourses with a warm- or cool-water thermal regime (*The London Plan* – Policy 1350);
- 50 m on each side of watercourses with a cold-water thermal regimestreams;; or,
- 100 m on the side(s) of large rivers (Thames River, Medway Creek, Stoney Creek, Dingman Creek) where the patch occurs (City of London, 2011).

The high-water mark is defined as the average **highest** level that a watercourse or waterbody rises to and remains at long enough to alter the riparian vegetation (DFO, 2007; DFO, 2019). In flowing watercourses, this is often referred to as the “active channel” or “bank-full level”, usually reflecting the 1:2 year flood level (DFO, 2007).

Rationale:

Watercourses act as important habitat providing wildlife resources and functions as well as contributing substantially to connectivity within and between significant natural areas. Riparian areas adjacent to watercourses are important for protecting the water quality and ecological health of aquatic habitats. First order, headwater streams are recognized as indicators of hydrological processes. These hydrologic processes are important for ecological function and should be protected within NHS (MNRF, 2010b).

A watercourse is generally defined according to several federal and provincial Acts and Regulations and typically consists of a distinct (somewhat to well-defined) channel in which water naturally flows at some time of the year [i.e., permanent, intermittent, or ephemeral flow as defined by MNRF’s Stream Permanency Handbook for South-Central Ontario (MNRF 2013)]. This includes anthropogenically created / maintained / altered features as well as natural features.

GUIDELINE 5: Satellite woodlands that are less than 2 ha and are located within 100 m of another woodland patch:

- a) **must** be included within the boundary if the satellite contains Species at Risk or Significant Wildlife Habitat; and,
- b) **must** be included within the boundary if they contribute to biological diversity and ecological function of the other patch and / or act as stepping stone linkages within the greater landscape

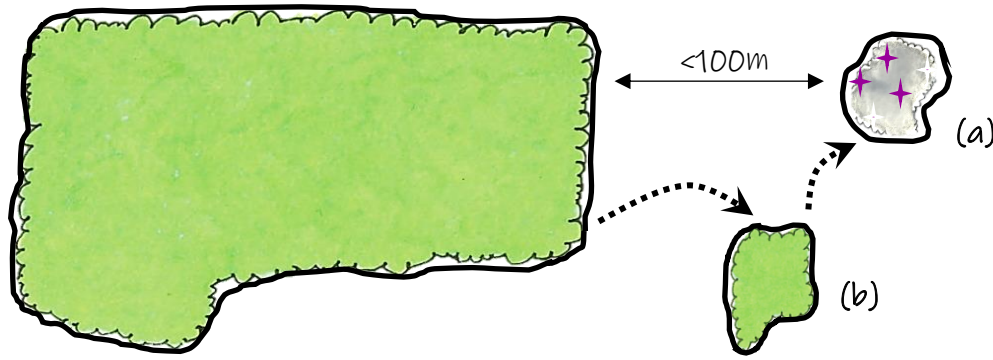


Figure 4.6: Guideline 5 Illustration

Conditions:

Contribution to biological diversity, ecological function, and connectivity may include, but is not limited to the following (MNRF 2010b):

- the satellite supports native tree cover;
- the satellite is located adjacent to or contains a wetland;
- the satellite is located between two (2) larger patches that are within 250 metres of each other, where the land between the patches is absent of permanent barrier;
- the satellite meets the habitat needs of one or more species that are not met by the larger patch;
- the satellite contains a natural vegetation community type that is not already represented in the larger patch;
- the satellite supports or is dependent upon a surface- or ground-water connection that maintains fish or aquatic habitat in either patch; and,
- the satellite provides a temporary refuge that facilitates movement between habitats.

Rationale:

There is limited evidence to support the principle that large contiguous patches contain more biodiversity than multiple small patches of the same total area (Fahrig, 2019). Woodlands ≥ 4 ha are important in Middlesex County, and have the potential to support habitat for disturbance sensitive species (UTRCA, 2014; MNRF, 2010b). Smaller woodlands have the potential to deliver multiple ecological services at higher performance levels per unit area than larger woodlands in agricultural landscapes (Valdés *et al.*, 2020). Further, multiple small, connected patches can support higher species richness, are more likely to contain wide-ranging taxa (e.g. predators), and have fewer extinctions compared to single large patches (Hammill & Clements 2020).

The presence of native conifer cover is considered important for providing wildlife shelter. Further, the importance of a woodland increases if it is located adjacent to a wetland or it contains a wetland, as

wetlands can increase vegetation diversity, provide important wildlife habitat features, and contribute to hydrological functions (Hilditch, 1993; Riley and Mohr, 1994).

Small woodlands that are in close proximity to one another or interspersed amongst larger habitat patches, may have value for area-sensitive birds and species with low mobility (Riley & Mohr 1994). Further, small woodlands located between natural heritage features or areas can act as stepping stones for movement of species, thus functioning as a linkage (MNRF, 2010b)

Clusters of patches that collectively meet several of the habitat needs of one or more species are generally more valuable than clusters of patches that meet fewer habitat needs (MNRF, 2010b). Natural areas that consist of several patches containing a diversity of native vegetation community types can sometimes provide better representation of the range of habitats than a single larger habitat patch (MNRF, 2010b; Fahrig, 2020).

GUIDELINE 6: Cultural meadows **must** be included if they meet one (1) of the following criteria:

- a) a portion of meadow habitat surrounds a feature on one or more sides, and provides improved ecological function to the patch by its inclusion;
- b) strengthen internal linkages in the patch by filling in "bays";
- c) connect a patch to a watercourse; or
- d) connect two or more patches (inset d of **Figure 4.7**); or,
- e) are below the top-of-stable-slope in a stream corridor or ravine.

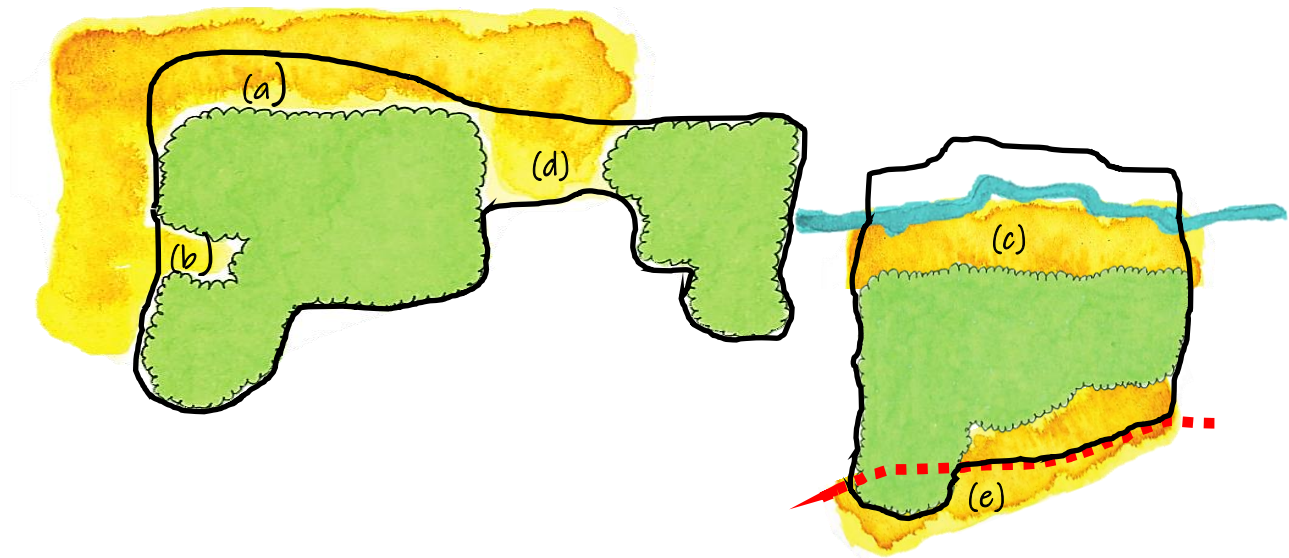


Figure 4.7: Guideline 6 Illustration

Condition:

A cultural habitat meeting any one of the above conditions is included in the vegetation patch boundary. However, it is not intended that the cultural habitat will occupy a large proportion of the total area of the patch being delineated.

Rationale:

Cultural habitats may act as significant supporting habitat to the patch, where the loss of such communities would result in loss of ecological integrity of the entire patch boundary. The inclusion of

cultural habitats may increase the biological diversity of the area if the other similar cultural habitat is not already present.

Cultural habitats may provide increased community and species diversity, important breeding and foraging wildlife habitat, landscape connections between naturalized areas, habitat for rare flora and fauna, and / or reduce negative effects from surrounding land-use. Cultural habitat adjacent to woodlands also has potential for rehabilitation and may contribute to a net environmental benefit in ecosystem health. Although cultural habitats are not pristine or unaffected by human activity, they have the potential to contribute natural values. This contribution is especially prevalent in agriculturally dominated landscapes, which are common southern Ontario (Geomatics International, 1995; Milne and Bennet, 2007).

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

GUIDELINE 7: Plantations contiguous with patches of natural vegetation **must** be included in the feature boundary if they meet one (1) of the following criteria:

- a) was originally established for the purposes of forest rehabilitation or has been managed towards a natural forest or is developing/has developed characteristics of a natural forest, such as natural regeneration of native species.
- b) strengthens internal linkages or reduces edge to area ratios by filling in bays;
- c) connects a patch to a permanent watercourse;
- d) connects two or more patches; or,
- e) is below the top-of-slope in a stream corridor or ravine.

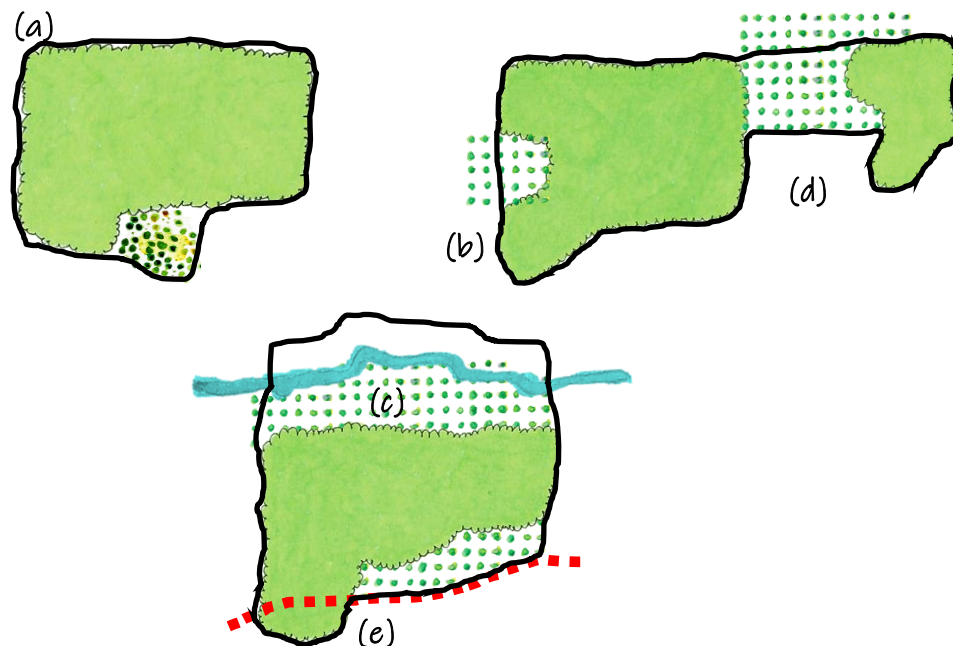


Figure 4.8: Guideline 7 Illustration

Example of the inclusion of plantations for defining feature boundaries where a) depicts a plantation providing protection for adverse effects, b) depicts a plantation filling in a 'bay', c) depicts a plantation connecting a vegetation patch to a watercourse, d) depicts a plantation connecting two (2) patches, and e) depicts a plantation below the top-of-slope of a stream corridor/ravine.

Rationale:

Cultural plantation communities may provide significant wildlife or supporting habitat for important wildlife processes (e.g., butterfly stopover areas, raptor nesting areas, etc.; MNRF, 2015a). Plantations form connections between naturalized areas, provide wildlife habitat, stabilize soils, and have the potential for regeneration to natural habitats.

GUIDELINE 8: Existing land uses within or adjacent to a patch are subject to the following boundary considerations:

- a) Existing heavily managed or manicured features that are surrounded on at least three sides by a patch are included in the feature boundary if they are less than one hectare (1 ha) in total area (**Figure 4.9**). Such features include, but are not limited to agricultural croplands, active pasture, golf courses, lawns, ornamental treed lots, gardens, nurseries, orchards, and Christmas tree plantations. Subsequent abandonment or potential for rehabilitation of patches larger than one hectare (1 ha) may qualify such areas for inclusion in the patch; and,
- b) Existing residential building envelopes and institutional building envelopes surrounded on at least three sides by a patch are not affected by the protective designation. Building envelopes and access routes of existing structures within the patch must be determined on a site-specific basis.

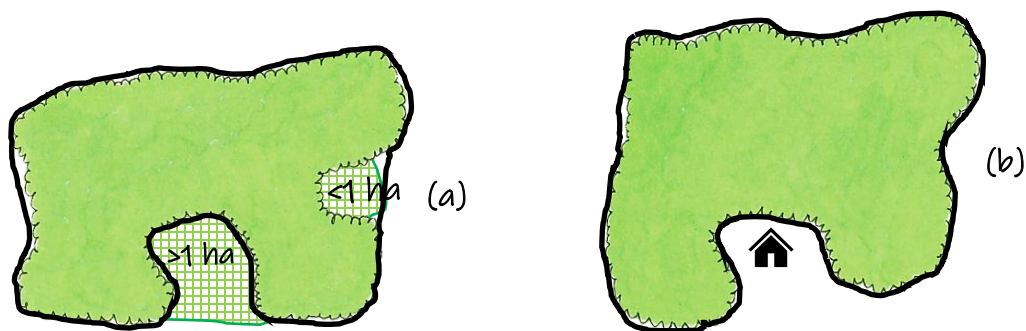


Figure 4.9: Guideline 8 Illustration

Rationale:

Existing heavily managed or manicured features (e.g., croplands, pastures, orchards, etc.) can provide a large number of ecological and environmental services. These services include providing wildlife habitat, carbon sequestration and climate change mitigation, protection from erosion, stormwater catchment, and protection from disturbance (Troy and Bagstad, 2009; FAO, 2013).

5. Determining Ecological Buffers

Ecological buffers are one of the primary planning tools that must generally be implemented to help ensure the protection of natural heritage features and their functions in accordance with *The London Plan* (see Environmental Policies 1412_to 1416_). The following section provides guidance for: i) the determination of suitable site-specific buffer widths and ii) the implementation and management of site-specific buffer restoration and / or enhancement treatments.

This section defines a buffer (**Section 5.1**), outlines the approach to be taken in the City related to buffers (**Section 5.2**), and describes the process to be followed for buffer determination (**Section 5.3**) that must be followed in order for an EIS to be accepted by the City of London.

This process is best applied by professional Ecologists who have experience with, and an understanding of, the many interrelationships of the various natural heritage features and areas, and their ecological functions, that may be present and that are potentially affected by a development proposal.

5.1 Definition of a Buffer

Buffers are strips of land kept in a vegetated state that provide a physical separation between development and a protected natural heritage feature (MNR, 2010b). The width of a buffer is to be determined based on the type of Natural Heritage Feature and its functions as well as the potential impacts resulting from the proposed adjacent development. Buffers originate at the boundary of a Natural Heritage Feature and extend outwards to the limits of development (MNR, 2010b; Carolinian Canada, 2000). In the case of wetlands, as described in **Section 4**, Critical Function Zones (CFZs) are included in the overall feature boundary. Therefore, for wetlands, the buffer is to originate at the external boundary of the CFZ. Buffers shall not be included within the limits of development, or within the boundary of the feature. Ecological buffers are not intended to contribute to feature-based compensation goals, should they be required. Buffers should not be treated as extensions of the natural feature to allow for management practices should they be required (MNR, 2010a).

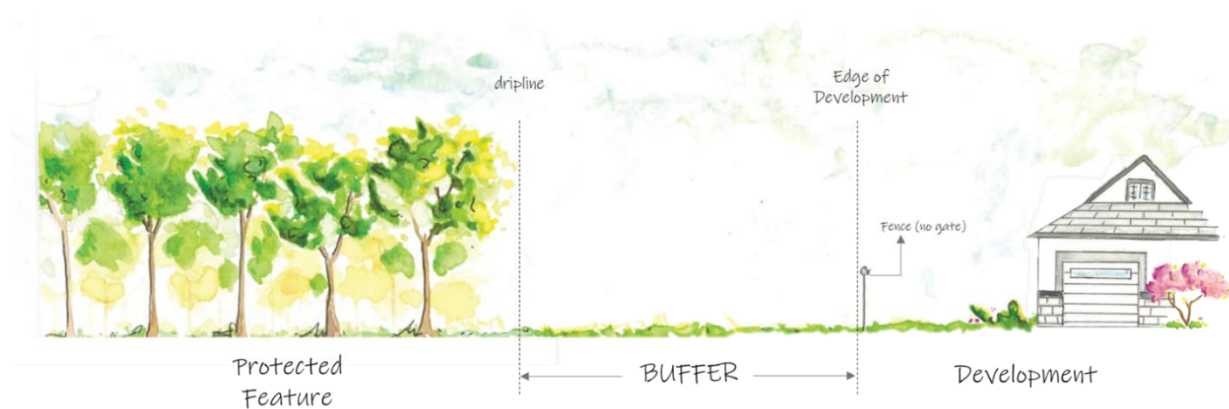


Figure 5.1: Illustration of a buffer implemented for the protection of a Natural Heritage Feature adjacent to a development.

Note that a setback is different from a buffer, although in some cases the natural feature buffer and setback may overlap in whole or in part. A natural feature setback is intended to account for physical constraints based on geotechnical assessments, identified hazards (Carolinian Canada, 2000), or other

physical constraints such as those related to flooding. For example, a property must be setback a certain distance from the stable top of slope for safety purposes and property protection. In cases where both physical setbacks and ecological buffers are required, the greater of the two will establish the development limit line.

Adjacent lands are also not synonymous with buffers, although buffers are often contained within the adjacent lands to natural heritage features and areas. As stated in the *Natural Heritage Reference Manual* (MNR 2010b), “*In contrast to adjacent lands, which are usually established before development is proposed (e.g., through official plan and or zoning by-law provisions), identified buffers should be determined once the nature of the development is known and the extent of potential impacts can be determined*”.

5.2 Approach

The process of determining a site-specific buffer width requires the consideration of information about the sensitivities and functions of the natural heritage feature and area(s) being considered and the nature and scope of the proposed adjacent land uses. The science of buffer efficacy is ever evolving. Since the science is constantly changing, the process outlined below is intended to allow for flexibility and the inclusion of new scientific information as it becomes available.

In general, the precautionary principle is to be used when it comes to the protection of features, functions, and species given that impacts may be documented decades after a development has been completed and *in situ* buffer efficacy is not yet well studied. However, in certain cases, the City and the Proponent, in consultation with any other applicable agencies, may agree to a buffer width less than that which is required as determined through the process outlined in **Section 5.3**.

Other techniques, including those outlined in **The London Plan** Policy 1415_, may be required in addition to the application of buffers to limit the impacts anticipated with proposed development.

At the City’s discretion, in consultation with any other applicable agencies, pathways or trails may be permitted within the buffer in accordance with the guidance in **Section 5.4**, and is supported by the recommendations of the approved EIS.

This approach is based on policies and guidance provided in **The London Plan** and the provincial *Natural Heritage Reference Manual* (MNR, 2010b), with consideration for the policies of the Oak Ridges Moraine Conservation Plan (MMAH, 2017b) and Greenbelt Plan (MMAH, 2017a).

5.3 Buffer Determination Process

Table 5-1 below outlines the general step-by-step process to determine a site-specific buffer width for the protection of Natural Heritage Feature(s) within the City of London. Although ultimate buffer widths can only be confirmed at the site-specific EIS stage, where possible, preliminary buffers should be identified at the broader Subwatershed Study or Secondary Plan stage to provide an early and realistic determination of lands that may be suitable for development and so that opportunities for mitigation using buffers is available during the design of draft plans (MNR, 2010b).

The following process has been developed primarily for application at the site-specific stage through an EIS, but many of the same steps and considerations could be applied at the broader Subwatershed Study or Secondary Plan stage with the understanding that refinements would need to be considered in the context of the EIS once the details of the proposed development are known.

5.3.1 Step 1 – Determine feature to be protected, delineate boundaries and determine potential impacts

5.3.1.1 *What is being protected and what are their boundaries?*

Gaining an understanding of the protected Natural Heritage Feature(s) and its function(s) is the first step in the overall process of determining a site-specific buffer width. It is the responsibility of the professional undertaking the buffer width determination to complete a comprehensive background review and the appropriate field studies such that the various habitats, and the species that occupy those habitats, are well understood.

It should be noted that multi-disciplinary investigations may be required to understand the features, their functions and the interactions with different components of the environment. These may include, but are not limited to, ecological surveys (vegetation surveys, wetland evaluations, breeding bird surveys, amphibian call surveys, reptile surveys, bat habitat surveys, SWH surveys, etc.), hydrological studies, hydrogeological studies, geotechnical investigations, etc.

Direction related to boundary delineation and evaluation of the natural heritage features and areas that are part of the City's NHS is provided in ***The London Plan*** Environmental Policies and the supporting guidance as described in **Sections 3** and **4** of these EMGs.

Table 5-1: Site-specific Buffer Width Determination Process

<p>Step 1: Determine the feature to be protected, delineate feature boundaries and determine the potential impacts</p> <p>a) Collect the necessary information from the EIS and other associated studies to gain an understanding of the Natural Heritage Feature(s) and function(s) that are to be protected,</p> <p>b) delineate feature(s) boundaries, and</p> <p>c) determine the potential impacts of the proposed site alteration or development..</p>		<p>Example: Studies determined the presence of a Significant Woodland with corresponding wetland (including Critical Function Zone) per Section 2 and 3. Boundaries defined per Section 4. Proposed development is a single family residential subdivision consisting of twenty lots located on the west side of the feature.</p>
<p>Step 2: Apply the Minimum Buffer Widths</p> <p>Apply the minimum widths for the type(s) of natural heritage features that are being protected. Identified minimum buffer widths are to start at the delineated boundary of the natural heritage feature.</p>		<p>Minimum buffer widths applied per Table 5.2.</p>
<p>Step 3: Determination of Site-specific Buffer Widths</p> <p>Determine if a greater than minimum buffer width is required for the protection of the identified Natural Heritage Feature(s) and functions. Greater than minimum buffer widths are to start at the same point as Step 2, the delineated boundary of the Natural Heritage Feature(s).</p>		<p>Wetland found to support Species at Risk habitat, buffer width increased in the wetland area per Table 5.3.</p>
<p>Step 4: Buffer Enhancement</p> <p>Site-specific enhancement within the buffer area; the objective being to enhance the functioning of the buffer and to minimize overall potential negative effects to the protected feature(s) and functions.</p>		<p>Enhancement plantings per Section 5.4 applied in area of Natural Feature that is most sensitive.</p>

5.3.1.2 *What are the potential development-derived Impacts?*

Understanding the proposed development and the elements that may affect a Natural Heritage Feature(s) and its function(s) is the responsibility of the professional undertaking the Buffer Determination Process. Buffer width(s) should be based on the functions and sensitivities of the feature(s) and the type(s) and scope of development adjacent to a Natural Heritage Feature and the potential development-derived effects that can reasonably be anticipated. For example, studies have demonstrated significant impacts to forests with adjacent residential development including those associated with off-trail use leading to compaction and erosion of soils, changes to hydrological regimes, loss and damage to vegetation, reductions in the regeneration success of trees and the spread of exotic plants and animals (McWilliams *et al.*, 2012).

When determining the potential effects of a proposed development, refer to **Section 2**.

5.3.2 **Step 2 – Apply Minimum Buffer Widths**

The ultimate width of the buffer will depend on the local conditions and sensitivities of the protected feature, the anticipated impacts associated with the change in adjacent land use, and the impacts that a buffer can, and cannot, reasonably be expected to mitigate (Beacon, 2012). As determined through a review of current policies and literature, **Table 5-2** outlines the required minimum buffer widths that are considered necessary to maintain the natural, physical and chemical characteristics of natural heritage features (MNRF, 2010b). Depending on the sensitivities of the natural heritage features(s) being considered and the type of development, these required minimum widths may not provide sufficient protection. Therefore, additional buffer width may be necessary to maintain the various biological components of natural heritage features (MNRF, 2010b), as outlined in **Section 5.3.3**.

Minimum buffers for the Habitat of Endangered and Threatened Species, as well as Significant Wildlife Habitat, will vary on a case-by-case basis as the minimum width will depend on a range of factors including the species identified and their lifecycle processes. Buffers should be determined on a case-by-case basis with consideration for the applicable provincial guidance and, in the case of Endangered and Threatened Species, in consultation with the the Province.

Table 5-2: Required Minimum Buffer Widths¹ for Protected Natural Heritage Components

Natural Heritage Component	Required Minimum Width ²
Coldwater and Cool-water Fish Habitat	30 metres ³
Warm-water Fish Habitat	15 metres ³
Provincially Significant Wetlands (PSW)	30 metres
Wetlands	30 metres ⁴
Significant Woodlands	30 metres ⁴
Woodlands	10 metres ⁴
Significant Valleylands and Valleylands	Required minimum for the component of the NHS
Environmentally Significant Areas (ESAs)	Required minimum for the component of the NHS
Upland Corridors and Meadows	5 metres

¹ The relevant science and applied technical literature used to support the identified minimums are cited throughout **Section 5**.

² Buffers are to be measured from the feature boundary, as outlined in **Section 4**.

³ Buffers are required on both sides of the watercourse.

⁴The City may accept a buffer less than the required minimums for Wetlands less than 0.5 ha, Significant Woodlands less than 2 ha, and Woodlands where it is supported through an Environmental Impact Study that is accepted by the City in consultation with the other applicable agencies where appropriate.

Why do “Woodlands” have smaller minimum buffers than “Significant Woodlands” in the City of London?

The City of London is unique from most other municipalities in that in addition to having policies that protect all natural wooded areas considered significant from a natural heritage perspective, it also has policies to support the protection and integration of other wooded areas recognizing the contributions such features can make in helping the City build resilience to climate change.

- Significant Woodlands are identified using a comprehensive suite of criteria focused on their ecological and natural heritage functions, and are protected in accordance with the policies **The London Plan** as described in Policy 1341_ and **Section 3.1** of these EMGs.
- “Woodlands”, as per **The London Plan** are described as:
 - “Smaller woodlands [that] may not meet the test for significance, but may be retained for their aesthetics and as a recreational amenity are highly connected to more dense portions of as part of a park” (Policy 418_).
 - “Woodlands that are not determined to be ecologically significant but are to be retained for public open space or park purposes, or woodlands to be retained at the property owner’s request as a private woodland” (Policy 1343_).

These Woodland policies are intended to support the protection of wooded areas that are not considered significant from a natural heritage perspective but still provide environmental and social value to the community, and therefore are protected as opportunities arise through the planning process. As a

consequence of this unique approach, Woodlands do not warrant the same level of protection with buffers as Significant Woodlands.

5.3.3 Step 3 – Determination of Site-Specific Buffer Widths

Minimum buffers as outlined in **Section 5.3.2** should generally be sufficient for the protection of identified natural heritage features and their associated functions. However, an EIS may recommend a buffer width less than the minimum in accordance with **Table 5-2** or greater than the minimums in **Table 5-2** based on the size of the feature, the sensitivity of the feature and the nature of the proposed adjacent development.

The buffers required for NHS components do not supercede or in any way supplant the need for other applicable setbacks related to natural hazards in accordance with the applicable provincial and Conservation Authority policies and regulations. In cases where buffers and natural hazard setbacks overlap, the more restrictive requirement shall apply to inform the development limit.

Some key site factors drawn from the current and applicable literature that should be considered in relation to potential increases from the required minimums are provided below, with some supplemental criteria and sources provided for consideration in **Table 5-3**.

- Site-specific drainage patterns and flows, with sheet flows towards a feature more readily intercepted / slowed by a vegetated buffer than channelled flows (e.g., Castle and Johnson 2000; Sheldon *et al.*, 2005 as cited in Beacon 2012), with this factor being closely related to slope and soil type;
- Slope, with vegetated buffer effectiveness generally being reduced with increasing slope, particularly in excess of 15% (e.g., Schueler 1987, Norman 1998 as cited in Beacon 2012); and
- Soil type and related infiltration capacity, with soils with better drainage and more organic matter providing more effective infiltration.

Other factors that can help improve buffer effectiveness and mitigate the need for potential increases from the required minimums are provided below.

- Vegetative composition of buffers, with well-vegetated buffers that mimic the composition of the feature being protected expected to be the most effective (Beacon 2012); and,
- The presence of design features – such as a continuous fence, formal trails along the feature edge with some barriers, bioswales, berms – that effectively prevent encroachments into the protected feature (e.g., McWilliam *et al.*, 2011 as cited in Beacon 2012, Beacon 2014).

As the impacts of adjacent development become better understood and more research is conducted on the ecology of various features, buffer requirements may change. Therefore, current literature may also be consulted to review the impacts relevant to the feature under consideration (MNR, 2010b). Ideal sources include studies designed to determine the impacts of an anthropogenic activity on biological systems, and comprehensive reviews or meta-analyses related to natural resource management. Such studies can be located in peer-reviewed academic journals, statements and reports from reputable experts and / or expert bodies , standard textbooks or handbooks and reference guides. City of London Ecologist Planners may recommend appropriate sources.

Table 5-3: Criteria for the Determination of Variation from Required Minimum Buffer Widths

Criteria	Rationale	Literature
Specialized Features and Functions		
Presence of Significant Wildlife Habitat	Greater than minimum buffer width may be required when Significant Wildlife Habitat in accordance with criteria schedules for Ecoregion 7e are present (MNRF, 2015a).	MNRF, 2015a; Environment Canada, 2013; MNRF, 2010b
<p>The presence of Significant Wildlife Habitat (SWH) indicates specific conditions that are enabling that type of habitat to be present and therefore, a higher degree of protection may be required. Consultation with the City of London is required.</p> <p>Buffers for the protection of SWH should be based on evidence and include reference to:</p> <ul style="list-style-type: none"> • Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNRF, 2015a) • COSEWIC Reports where applicable • COSSARO Reports where applicable • Environment Canada’s <i>How much Habitat is Enough?</i> (Environment Canada, 2013) • Significant Wildlife Habitat Mitigation Support Tool (MNRF, 2014b) • Academic journal articles, where available 		
Presence of Species at Risk	Greater than minimum buffer width may be required when species considered Endangered or Threatened per the <i>Endangered Species Act</i> are present.	Environment Canada, 2013; various COSEWIC and COSSARO reports; MNRF, 2010b
<p>The presence of an Endangered or Threatened species indicates specific conditions that are enabling that species to survive and therefore, a higher degree of protection may be required. If it is determined that a SAR is negatively affected by a proposed development, a permit under the <i>Endangered Species Act</i> may be required. In the case of any SAR, consultation with both the City of London as well as the Province is required.</p> <p>Buffers for the protection of Endangered and Threatened species must be based on evidence and include reference to:</p> <ul style="list-style-type: none"> • Ontario government’s SAR database • COSEWIC Reports • COSSARO Reports • Environment Canada’s “How much Habitat is Enough?” • Various independent academic journal articles <p>Note that any habitat or species information for Endangered and Threatened species is sensitive information and should not be identified in public documents (MNRF, 2010b).</p>		
Slope		
Slope/Overland Flow	Greater than minimum buffer width should be considered where the overall feature slope is greater than 5%, particularly when the slope is towards a protected wetland or watercourse.	Adamus 2007; Beacon 2012; Mitchell & Crook, 1996

Criteria	Rationale	Literature								
<p>Understanding the slope and direction of flow aids in predicting areas that may receive more water than others, help determine appropriate buffer plantings, as well as pre-construction conditions that need to remain the same post-construction. (Slope may be measured using a geo-referencing tool or handheld clinometer or desktop analyses using current topographical information).</p> <p>The following are recommended buffer widths starting at the edge of a natural heritage feature where slope is:</p> <table border="1"> <tr> <td>5-15%</td> <td>30 m buffer</td> </tr> <tr> <td>16-30%</td> <td>50 m buffer</td> </tr> <tr> <td>31-45%</td> <td>70 m buffer</td> </tr> <tr> <td>>45%</td> <td>90 m buffer</td> </tr> </table>			5-15%	30 m buffer	16-30%	50 m buffer	31-45%	70 m buffer	>45%	90 m buffer
5-15%	30 m buffer									
16-30%	50 m buffer									
31-45%	70 m buffer									
>45%	90 m buffer									
Development Conditions										
Development Type	Greater than minimum buffer width may be required as addressed and identified by the EIS based on specific development conditions (e.g., stressors).	McWilliam et al., 2012; Sawatzky and Fahrig, 2019; Environment Canada, 2013								
<p>Encroachment into natural features is a common impact associated with residential development. Buffers provide some area for minor encroachment without affecting actual features (MNRF, 2010a). Stressors such as human disturbance (e.g., landscaping, dumping, urban wildlife, noise) shall be considered when establishing buffer width.</p>										

5.3.4 Step 4 - Buffer Restoration and Enhancement

Once a site-specific buffer width is determined following Steps 1 through 3 as outlined in **Sections 5.3.1, 5.3.2 and 5.3.3**, the required buffer restoration and enhancement measures can be defined based on the characteristics of the adjacent natural heritage feature(s).

5.3.4.1 Buffer Enhancement Strategy

In most cases, the land set aside for the site-specific buffer will be comprised of farmed agricultural lands, mown grass or abandoned land with ruderal vegetation. In some redevelopment scenarios it may be open gravel or paved. It is the responsibility of the professional undertaking the buffer determination process to document and understand the edge conditions of an identified Natural Heritage Feature, including what is present within the adjacent lands so that appropriate enhancement strategies can be developed and implemented.

The intent of the strategy should be to reduce edge effects, improve buffer functions (e.g., through restoration or enhancement of site-appropriate native vegetation), and enhance habitat connectivity to build resilience of the Natural Heritage Feature(s) being protected.

When determining a buffer enhancement strategy, the following should be considered:

- Allocate a greater proportion of buffer enhancements in areas that reduce the total edge: area ratio of the feature (i.e., bays and projections);
- Allocate a greater proportion of buffer enhancements to areas which minimize climatic, structural or anticipated impact gradients (e.g., consider the orientation of the patch to flows in the landscape

such as prevailing winds and sources of disturbance and encroachment such as urban cats, wind-dispersed seeds, noise, light and chemical pollution); and

- Allocate a greater proportion of buffer enhancements proximal to areas that contain sensitive feature(s) and functions.

Table 5-4 outlines buffer enhancement measures that shall be implemented to reduce of negative edge effects, protect features and their ecological functions, and improve habitat quality.

Table 5-4: Potential Buffer Enhancement Measures

Buffer Enhancement Measure
<p>Native Plantings</p> <p>Plantings of native tree, shrub, seed mixes and individual herbaceous species within a site-specific buffer width increases the structural gradient and reduces exposure to light, moisture and wind conditions. Natural heritage features with a dense multi-layered edge structure are more likely to maintain interior conditions after experiencing anthropogenic disturbance (Fry and Sarlöv-Herlin, 1997; Powney et al., 2012). Further, the physical separation of development from a natural feature reduces the penetration of light and noise into the natural feature. This will be further reduced if the buffer supports dense vegetation (MNRF, 2010b).</p> <p>Increasing the structural gradient means having vegetation at various heights in various areas. This is especially important for treed natural heritage features with simple, open edges as well as features that are smaller in size with low connectivity. A multi-layered approach with respect to native plantings increases habitat suitability for resident species as well as landscape connectivity (Fry and Sarlöv-Herlin, 1997).</p> <p>Vegetated buffers slow down surface runoff and absorb nutrients and chemicals used for lawn care, agriculture and road maintenance, thus reducing impacts on natural features. If runoff is not controlled, impacts can include soil erosion/sedimentation, destruction of vegetation, and flushing of nests or eggs of amphibians and waterfowl. This is particularly important to adjacent wetlands and aquatic features where nutrients can enrich the system and lead to an abundance of nuisance weeds and / or algae (MNRF, 2010b).</p> <p>Recommended native plantings should:</p> <ul style="list-style-type: none"> • enhance diversity with consideration for species shifts resulting from warming temperatures due to climate change; • enhance diversity with consideration for existing and future pest impacts to tree/ shrub species; • add complexity to both horizontal and vertical structure; • consider mosaics of different trees and shrub species; • consider light and noise impacts by creating a physical barrier; • use native pollinator friendly seed mixes to promote the establishment of pollinator and foraging habitat; and • select species appropriate to the species composition of the natural heritage feature(s) being protected as well as the local soil composition and structure.
<p>Management of Invasive Plants</p> <p>Removal of invasive plants within the buffer area and within 10m of the edge of the identified Natural Heritage Feature will improve overall species diversity. Priority species that must be removed include: common buckthorn, glossy buckthorn, common reed (Phragmites), Japanese knotweed, dog strangling</p>

Buffer Enhancement Measure

vine, and giant hogweed (City of London, 2017). Those on the watch list should also be removed in accordance with the City of London Invasive Plant Management Strategy.

Where appropriate, targeted invasive species management and restoration extending into the feature itself should also be considered.

Other Structural Enhancements

Creation and installation of site and feature-appropriate habitat enhancements such as: addition of woody debris piles, pits and mounds, bird and bat structures, reptile nesting areas and hibernacula. Note that dead wood is important habitat and food resources for many birds, insects and lower plant species where woody biomass should be retained.

5.4 Permitted Uses within a Buffer

Buffers are to be zoned to generally be kept in a predominantly naturalized state with no permanent structures or development. However, **The London Plan** does support the inclusion of both pathways and trails in the NHS, including in buffers adjacent to NHS features and areas, as long as they support the protection of the natural features and their functions, and also broadly supports the incorporation of low impact development measures and green infrastructure.

1389_ The following uses may be permitted in the Green Space Place Type: ... 2. Recreational uses associated with the passive enjoyment of natural features including pathways and trails provided that such uses are designed, constructed and managed to protect the natural heritage features and their ecological functions.

475_ Promote innovation by encouraging green infrastructure, stormwater attenuation, re-use, and low-impact development.

In the City of London, “pathways” typically refers to paved multi-use paths intended to support community health, mobility, connectivity and the active transportation network. These pathways consist of a maximum of 3 m of paved width with 0.5 m to 1.0 m of mown grass for clearance on either side, for a maximum total width of 5 m. “Trails” in the City of London refers to a range of unpaved but still formal connections intended to support passive activities such as hiking and nature enjoyment. Trails range in widths but are typically narrower than pathways and surfaced with different materials such as crushed limestone or woodchips, and may incorporate sections of raised boardwalk or other structural works where needed to help protect sensitive ecological areas.

From a natural heritage planning perspective, formal pathways and trails in buffers to natural features can be considered to be tools to help manage access to public open spaces appropriately (e.g., It is acknowledged that pathways and trails can be vectors for negative impacts (e.g., human disturbance near the feature, increasing opportunities for encroachment into the feature, inadvertent spread of invasive species) (e.g., Thompson 2015). However, there are many gaps in the science (e.g., Ballantyne and Pickering 2015) and the applied literature from urban areas (e.g., City of Toronto, 2013; TRCA 2019; IVUMC 2019) in increasingly recognizing that having formal trails and pathways that are carefully planned and designed can go a long way to balancing access and feature protection by:

- Providing access along and outside of the feature boundaries, thereby taking some of the pressure off of potential trails within the feature, and
- Where located in the interface between rear lots and buffers to features, providing a “clean break” and some intervening public space that is manicured before the naturalized portion of the buffer

begins, thereby limiting the temptation of adjacent landowners to encroach (e.g., through dumping yard waste, extending their back yard by mowing, installing a tree fort or shed, etc.).

In addition, low-impact development measures are encouraged through several policies in ***The London Plan*** to support onsite stormwater management (e.g., water attenuation and quality control) and site drainage. Although not formalized in policy or green development standards, the City's current practice is to allow low impact development measures within buffers that do not require regular maintenance or have engineered components to them, and that contribute to maintaining the feature-based or site-specific water balance. Permitted LID measures would not require regular disruptive maintenance or include control structures (e.g., orifice controls, catchbasins). As such, vegetated swales and culverts may be accommodated within buffers.

It is with these directions in mind that the City is generally of the position that pathways, trails and "passive" low-impact development may be incorporated into ecological buffers, provided they are:

- designed, constructed and managed to support the natural heritage features and their ecological functions
- typically located in the outer half of the buffer (i.e., further away from the feature rather than closer)
- typically limited to a maximum of one third of the total buffer width (e.g., occupying no more than 5 m of a 15 m buffer) with the remaining buffer being naturalized, and
- are proposed within buffers that meet or exceed the minimums established in **Table 5-2**.

Pathways, trails and / or passive low impact development measures may only be permitted where they are demonstrated to meet all the criteria above in an environmental study at the City's discretion, and in consultation with the appropriate agencies, where their regulated areas overlap with the features and buffers in question.

Notably, buffers are not to count towards feature-based compensation measures that may be required. In addition, amenities such as gazebos and other installations that could result in disturbance to and / or permanent encroachments into the naturalized portions of the buffer are not permitted in buffers.

6. Ecological Replacement and Compensation

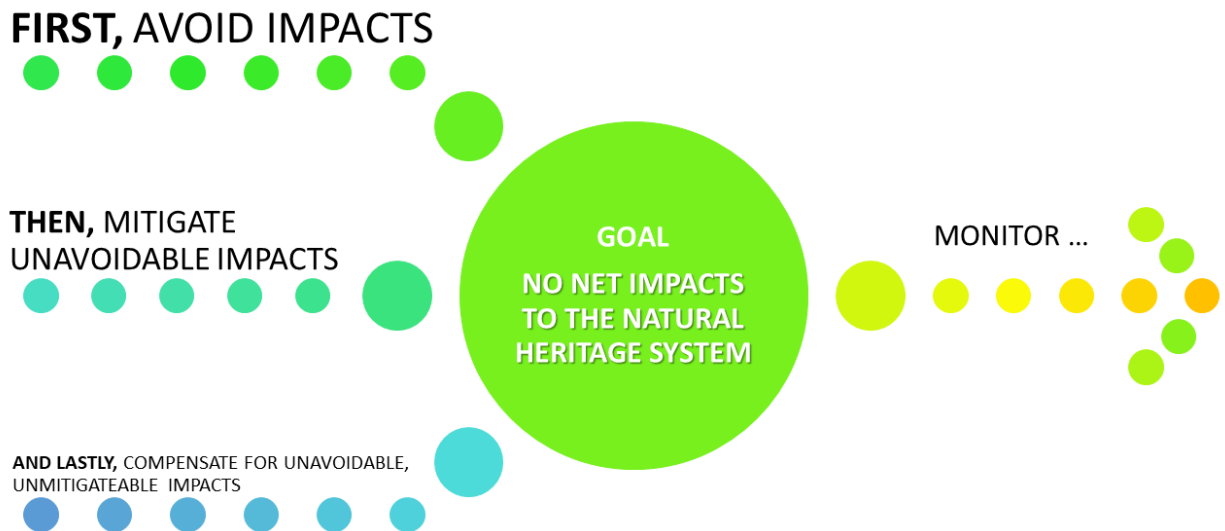
The City of London, like many urbanizing jurisdictions in southern Ontario, is expected to accommodate a certain amount of growth over the coming decades and beyond. While this presents opportunities for the City, it also means ever increasing pressures on the remaining natural heritage features and areas within its urban boundary.

The London Plan includes policies intended to help ensure what is significant and valued in London from a natural heritage perspective is sustained for the long term. The bulk of the Environmental Policies in **The London Plan** requires the outright protection of natural heritage features and areas confirmed as components of the NHS (as per **Section 3** and **Section 4**), including buffers as appropriate (as per **Section 5**) are intended to be protected in accordance with the legislative (*Planning Act*) and supporting policy (i.e., *Provincial Policy Statement* and **The London Plan**) tests. However, there are some limited cases and contexts in which removal of part, or all, of a natural heritage feature or area may be contemplated through the planning process. In these cases, replacement and / or compensation for that feature and / or area is required in the City of London with the intent of achieving no net loss or, preferably, a net environmental benefit in natural heritage area and / or ecological functions (as per **Section 2.6**). This section of the guidelines is provided to facilitate the implementation of such requirements, where applicable.

Negative impacts to natural heritage features and areas identified for protection can generally be avoided, minimized, and mitigated at the site specific scale with adequate technical knowledge, compromise and collaboration applied through the planning process. However, under some circumstances, residual damage to natural heritage features and their functions is unavoidable. After first exhausting all options for avoidance (as illustrated in **Figure 6.1**), followed by minimization and mitigation of impacts, portions of (or entire) natural heritage features may be approved for removal under the condition that ecological compensation take place to ensure that there are “no net negative impacts.”

This section has drawn on the *Guideline for Determining Ecosystem Compensation* developed by Toronto and Region Conservation Authority (TRCA, 2018), as well as other relevant and current technical and scientific sources. Although the EMGs are well established and have been applied in the City since 2007 with this version representing an update, this particular chapter is new and will be updated during the biennial update process, in response to emerging science and / or findings of monitoring applicable to the City of London.

Figure 6.1: Illustration of the required approach whereby all options for avoiding and / or mitigating impacts must be explored with the City before compensation can be considered



6.1 Context and Process

This section provides the policy context, the high-level scientific and technical context and the process for developing and implementing an Ecological Replacement and Compensation Plan in the City of London.

6.1.1 Policy Context

From a natural heritage perspective, the fundamental policy “test” used as a basis for approving – or rejecting – a development proposal in Ontario is what is referred to as the “no negative impacts” test based on the language from the Provincial Policy Statement (MMAH, 2020) which states: “Development and site alteration shall not be permitted in [insert the feature(s) in question] unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions”. This language is carried forward into **The London Plan** for the various components of the NHS (i.e., Significant Woodlands, Significant Valleylands, SWH, Wetlands and Significant ANSIs (Policy 1391_), and further defined through these guidelines (as per **Section 2.6**).

Ecological replacement and compensation will be approved on a case by case basis subject to all applicable federal, provincial and municipal policies and in consultation with the local Conservation Authorities and Province in cases where they regulate all or part of the feature in question.

Replacement and compensation of natural heritage feature(s), where permitted by the City, shall be implemented on at least a one-for-one (1:1) land-area basis (as per **The London Plan** Policies 1334, 1342B, 1401 and 1402) and, at a minimum, aim to replace any ecological functions associated with the removed feature. The only exception to these requirements is for small wetlands (i.e., less than 0.5 ha) when less than 1:1 may be considered if the proposed compensation will provide a net gain or net environmental benefit to the NHS (as per **The London Plan** Policies 1334_1 and 1334_2).

These guidelines do not supersede and are to be implemented in conjunction with other applicable restoration, rehabilitation and / or replacement compensation policies and regulations including:

- **The London Plan** Management, Restoration and Rehabilitation Priorities Policies (1417 a through j)
- **The London Plan** tree replacement Policies (399_4, a through e, 401_13) and
- Overall Benefit Permits issued under the *Endangered Species Act* and / or the *Fisheries Act*.

There may be cases where a portion of the impact to a feature or function is compensated through one mechanism while the remaining impact is compensated through a different mechanism. For example, compensation required through the *Endangered Species Act* may address impacts to one particular species but may not compensate for all of the ecological structures and functions that will be lost. In such cases, determining the additional compensation required can be accomplished through these guidelines and in consultation with the City.

Furthermore, in cases where replacement and compensation has been approved in principle by the City but cannot be fully accommodated on the subject lands, **The London Plan** Management, Restoration and Rehabilitation Priorities Policies 1418 through 1420 may help guide the identification of alternative areas for such works.

6.1.2 Scientific and Technical Context

Ecological replacement and compensation are approaches that can be adopted to achieve no net loss and net environmental benefit through the creation, restoration and / or enhancement of natural heritage features and functions to compensate for those which will be removed or disturbed elsewhere (Brown *et al.*, 2013; Morrison-Saunders and Pope, 2013). No net loss and net environmental benefit are outcomes of compensation for unavoidable losses of biodiversity and / or habitat which are considered neutral or positive, respectively (Bull and Brownlie, 2017). There has been an important shift in replacement and compensation policies away from focussing on replacement and towards focussing on net environmental benefit to improve the short and long-term outcomes of biodiversity offsetting (Bull and Brownlie, 2017; Maron *et al.*, 2018) and, also, to incorporate something of a safety net for situations where the proposed replacement takes longer than anticipated to function as planned. Thus, the goal of replacement and compensation in City of London is to obtain a net environmental benefit, wherever feasible.

Ecological features and systems are highly complex, and although some of the simpler feature types that occur in London and southern Ontario can be replicated reasonably well, it requires a good technical understanding of the feature's key requirements, applied experience implementing the habitat creation, enhancement or restoration works, and a commitment to post-installation management and monitoring (also see **Section 6.6.2**). Consequently, although most ecological replacement and compensation projects have the objective of no net loss, in reality achieving no net loss of biodiversity and ecological functions can be very challenging (Bekessy *et al.*, 2010; Gibbons *et al.*, 2015; Simmonds *et al.*, 2019). Therefore, area compensation ratios of greater than 1:1 can be necessary to help ensure full replacement of ecological structure and functions (zu Ermgassen *et al.*, 2019).

In addition, replacement and compensation projects require long-term monitoring to assess progress towards no net loss or, preferably net environmental benefit (or net positive effects, as per **Section 2.6.6.7**), and may require additional adaptive management actions to achieve the established ecological objectives.

6.2 Approval Process

Natural Heritage Features and Areas for Consideration

Through the planning and development process, certain natural features and areas confirmed for inclusion within the City's NHS that are not protected by other provincial or federal regulations may be permitted to be impacted by the planning approval authority (in this case, the City of London), but only in cases where avoidance of negative impacts is not possible and options for mitigation of negative

unavoidable impacts are limited or not feasible. In all cases, compensation is to be explored as a last resort, as illustrated in **Figure 6.1**, and will generally only be contemplated if the replacement or compensation is expected to fully replicate the extent and functions of the existing feature, or to provide an enhancement as compared to the existing feature.

As summarized in **Table 2-1**, the City is responsible for confirming the following natural heritage features and areas within its NHS, in consultation with the local Conservaiton Authority where the features are within their regulated areas:

- Wetlands (excluding Provincially Significant Wetlands)
- Environmentally Significant Areas
- Significant Woodlands and Woodlands
- Significant Valleylands and Valleylands
- Significant Wildlife Habitat (SWH)
- Environmentally Significant Areas (ESAs), and
- Upland Corridors.

The following guidance is intended to help implement ecological replacement and / or compensation, where the policies permit and where City agrees to consider it, for the above features.

Notably, these guidelines do **not** apply to or provide guidance related to replacement, compensation or rehabilitation of watercourses or Fish Habitat. Natural heritage features that are confirmed by other provincial or federal authorities (i.e., Fish Habitat, Habitat of Endangered Species and Threatened Species, Provincially Significant Wetland and Areas of Natural and Scientific Interest) may also be impacted in accordance with the applicable provincial or federal regulations, in part or in whole. In these cases, compensation or comparable activities may be permitted, with the specifics (not addressed in to be in conformance with the applicable provincial or federal regulations) and in consultation with the applicable regulatory authority.

Approval Process for Feature Replacement / Compensation

Ecological compensation may be permitted and approved as part of an EIS under the *Planning Act*, or through an EIS or comparable Environmental Study completed in support of the installation or expansion of public infrastructure through the *Environmental Assessment* process. In all cases, ecological compensation for NHS components under the City's jurisdiction will not be approved as the 'default' and will only be considered if unavoidable loss remains once the protection hierarchy has been exhausted (as illustrated in **Figure 6.1**).

Prior to the approval of an application containing proposed ecological replacement and / or compensation, the proponent shall demonstrate the following:

- Compliance with all applicable policies and legislation;
- That the proposed compensation achieves “no negative impacts” as outlined in the *Provincial Policy Statement*;
- That all efforts to avoid, minimize, and mitigate have been taken and why impacts are unavoidable;
- No negative impacts, no net loss, and / or net environmental benefit;
- That the proposed ecological compensation is within the same subwatershed in close proximity to the original feature (preferred), or in an area that will provide a net environmental benefit to the NHS to maximize connectivity and linkages; and,
- That a proposed Ecological Replacement and Compensation Plan is included within or as an Appendix to an EMP (as described in **Section 2.6, 6.3, and 7.2**).

In instances where ecosystem replacement or compensation has been approved in principle by City Staff (and the applicable Conservation Authority where the feature falls within their regulated areas), the proponent must retain a Consulting Ecologist, potentially with one or more experts from other related disciplines (e.g., Landscape Architect, Arborist, Registered Professional Forester, Engineer, Hydrogeologist, Geotechnical Consultant) to develop and oversee the implementation and monitoring of the Replacement and Compensation Plan.

It is strongly recommended that once the City agrees in principle to replacement and compensation, that the proponent develop and get in principle approval of a Concept Plan before moving forward with any detailed plans or designs.

No removals of part or all of a natural heritage feature and / or area may proceed prior to approval of the Replacement and Compensation Plan. This plan shall outline an approach and provide detailed plans that attempt to replicate, to the extent possible and without significant delay or lag time, the same ecosystem structure and associated level of ecosystem functions that are to be lost, in both the private land development process (under the *Planning Act*) and the public infrastructure process (under the *Environmental Assessment Act*) (TRCA, 2018).

Ecological Buffers and Feature Replacement / Compensation

Ecological buffers required for NHS components identified and requiring protection on the subject lands (as per **Section 5**) are not to be counted towards fulfilling any agreed-to replacement or compensation of other NHS features, or parts of features approved for removal.

In addition, replacement and compensation features will require buffers wherever the feature is to be abutting a non-natural land use (e.g. road, parking lot, residential yard, etc.). Buffer widths are to be determined based on the guidance provided in **Section 5** and in consultation with the City. Notably, buffer width determinations are to be based on the NHS component for the replacement (restored) area.

6.3 Guiding Principles for Ecological Compensation

The following are objectives of replacement and ecological compensation:

- To restore, replace, and preferably, enhance the ecological structure and function of the affected NHS by achieving no net loss of ecological features or functions, and where possible, achieve a net environmental benefit (i.e., a net gain of ecological features and / or functions);
- To implement compensation within the same subwatershed, and preferably in as close proximity to the original feature as possible;
- To locate replacement and compensation works within or adjacent to the NHS so that system connectivity is maintained and, preferably, enhanced;
- To complete compensation projects promptly so that ecosystem functions are re-established before losses occur, or as soon as possible after;
- To ensure transparency and accountability throughout the process of planning, implementing, monitoring and evaluating the effectiveness of the replacement and / or compensation; and,
- To incorporate adaptive management and climate resiliency into compensation based on the scientific literature and the results of effectiveness monitoring.,

Furthermore, ecological replacement and compensation shall be informed by current knowledge of the City ecosystems, applicable watershed studies, relevant studies by related disciplines (e.g., hydrogeological, hydrological and / or geotechnical) and any applicable Conservation Authority and be carried out in a transparent and timely manner.

6.4 Ecological Replacement and Compensation Plan

The Ecological Replacement and Compensation Plan will be reviewed by City staff and in consultation with applicable agencies where required. The Plan is to be aligned with the principles outlined in **Section 6.3** and include, but may not be limited to, the following:

- Rationale for ecological compensation (i.e., explanation of why residual impacts are unavoidable) and feasibility of the compensation;
- Description of the feature type, ecological structure and function(s) of the natural heritage feature (or portion thereof) to be removed or disturbed, including the size of area proposed for removal;
- Specific ecological objectives for the replacement and compensation, with specific targets where appropriate;
- Rationale for the proposed compensation ratio ($\geq 1:1$ land-area basis) and the area of proposed compensation;
- Description of the proposed compensation location (refer to **Section 2.6.6.8** and **6.3**);
- Construction schedule (e.g., phasing) and completion timeline;
- A Concept Plan, including the size and location of the replacement / compensation in relation to the NHS;
- Implementation plans and detailed design drawings, including any required grading plans (stamped by a Landscape Architect and / or Engineer), ESC plans to ensure protection of other NHS components, and planting plans;
- Plantings should specify native species appropriate for the site and feature type, with consideration for climate change resiliency (e.g., inclusion of a small proportion of species native to southern Ontario with ranges just south of London);
- Post-installation maintenance requirements, including provisions for supplemental invasive species removal and native plantings where appropriate, particularly for woodland features;
- A monitoring plan specific to the replacement / compensation that evaluates the extent to which the established objectives and targets are being met (refer to **Section 7.2.5.2**); and,
- Potential additional measures (e.g., adaptive management) to be undertaken by the proponent if the replacement / compensation objectives and targets are not being met.

6.5 Determining Appropriate Measures

The ability to successfully re-establish ecological structure and function is, in part, dependent on the type of natural heritage features and the specific type of vegetation community being restored. Some vegetation community types can be readily restored in a relatively short period of time (e.g., meadows), while others take longer (e.g., young woodlands) and still others are very difficult or impossible to replicate with the current knowledge and techniques (e.g., treed swamps, bogs).

For example, the functions of some vegetation community such as cultural meadows and some marshes can be established relatively quickly (e.g., within five years) as they are dominated by perennial grasses and forbs which can reach maturity over the course of a single season and with the right soils and hydrology can support habitats for a range of species within a few years (Solymar, 2005; TRCA, 2018). The functions of other features such as woodlands take much longer to re-establish due to their long developmental periods (McLachlan and Bazely, 2003; MNRF, 2017a). As such, there can be a substantial time-lag between the removal of an established wooded feature and the time required for the

compensated area to fully replace the ecological function and services provided by original feature (e.g., 20 to 50 years).

Feature compensation considerations should consider but not be limited to:

- Topography and drainage of the existing and proposed feature;
- Community type (based on ELC);
- Wildlife habitat types and structures to be replicated or added as enhancements;
- Soil type, structure and quality of the existing and proposed feature composition and processes;
- Surface water contributions and hydroperiod; and,
- Groundwater processes and interaction.

6.5.1 Wetlands

Once the replacement and compensation is approved in principle by the City, for wetlands, the quantification of the physical area of the proposed loss is to be based on the feature delineation using ELC, OWES (as described in **Section 3**) and Critical Function Zones (CFZs) and confirmed with the City and the appropriate Conservation Authority.

6.5.2 Significant Woodlands and Woodlands

Once the replacement and compensation is approved in principle by the City, for Significant Woodlands, the quantification of the physical area of the proposed loss is to be based on the feature delineation using ELC, OWES (as described in **Section 3**) and confirmed with the City and appropriate Conservaton Authority.

For Woodlands, trees approved for removal through the planning process are to be replaced in accordance with the Forest City Policies in *the London Plan*.

6.5.3 Other Features

Where approved in principle by the City, other features within the City's jurisdiction may be considered for replacement compensation on a case by case basis at a minimum of 1:1 land-area basis, or greater as required through an approved EIS.

As with Wetlands and Significant Woodlands / Woodlands, a proposed replacement and compensation concept that is aligned with the policies, principles and guidelines above should be put forward to the City before work goes into developing detailed plans and designs.

Ultimately, an approved Ecological Replacement and Compensation Plan, will guide the site preparation, construction / creation and post-construction maintenance and monitoring of the feature.

6.6 Implementating Replacement and Compensation

It is important to outline a clear implementation plan for each feature to be compensated for to maximize the likelihood of replacement or enhancement of ecological structure, function and services within the City of London's NHS.

6.6.1 Site Selection

In all cases, provision of on-site compensation is the preferred option as it will be in proximity to where the loss is proposed and avoids the logistical complexities of finding suitable lands elsewhere in the City, preferably within the same subwatershed. However, in some cases where the subject lands cannot accommodate part or all of the replacement or compensation, proponents may explore directing compensation on alternate suitable lands. The details of such an arrangement will need to be confirmed and formalized in consultation with the City, however some additional guidance is provided here.

Ecological Considerations

Appropriate site selection for ecological replacement and compensation will increase the likelihood of achieving no net loss or, where possible, a net environmental benefit (or net positive effect), specifically when considering landscape-scale conservation goals and improving ecological system connectivity (Koh *et al.*, 2014).

Potential naturalization sites have been identified by the City of London (as outlined in ***The London Plan***) which are generally good candidates for restoration, enhancement, and expansion of the NHS. Some potential naturalization sites are found on Map 5 – Natural Heritage in ***The London Plan***, however not all potential sites are mapped and thus, consultation with the City of London is recommended if other potential areas are identified. Further, not all sites are created equal and consultation with experts (e.g., Ecologists, Hydrogeologists, Engineers, etc.) is typically required to help identify appropriate locations for ecological compensation. Habitat creation and restoration is generally most successful when a project understands and works with the prevailing biophysical conditions on site (e.g., climate / exposure, topography, drainage / hydrology, soils).

The following should be considered in determining the site for ecological replacement and compensation within the City of London:

- Proposed sites must be able to support the size of the compensation, the associated buffer(s), as well as the function and services provided by the feature;
- Proposed sites for compensation of a feature should ideally be outside of the current NHS to ensure no net loss, and preferably net environmental benefit. Securing or purchasing land for compensation that is already identified as part of the NHS would result in a Net Loss to the overall area of the system.
- Compensation should be planned adjacent, or in close proximity, to the NHS to maximize connectivity and linkages. The guidelines outlined in **Section 3** and **4** can help inform site selection (e.g., bay areas, connectivity, ecological function) for compensation.
- The size, shape and structure of the proposed compensation should contribute to the City of London's goals for the NHS. In general, features that are circular or squarish will be preferred over long narrow extensions.
- Newly restored ecosystems must be buffered and should also be situated to help ensure they are protected from the effects of adjacent land uses.

Planning and Mangement Considerations

Compensation should generally be directed to lands that are already or will be transferred to a public or non-profit agency, or established as a conservation easement to ensure the long-term protection of ecological function and services being compensated.

If proposed sites for replacement, compensation or enhancement are not available within the Urban Growth Boundary, the City of London and any other applicable agencies may in exceptional cases, identify lands that are within the NHS but are in need of restoration or enhancement. However, this shall be the exception to the rule, given that this could result in a Net Loss in the amount of land within the

NHS. To ensure no net loss and long term protection of the NHS, lands secured for replacement and compensation should be appropriately zoned and mapped for the NHS component.

6.6.2 Replicating Ecosystem Structure and Functions

Ecosystems are complex and dynamic systems. Regardless of the approach to determining the level of compensation required, attempts to replace lost ecosystem structure and functions will fall short in many instances, at least in the short term. Understanding this limitation, the Guideline establishes an approach that attempts to replicate, to the extent possible and without significant delay or time-lag, the same ecosystem structure, and associated level of ecosystem functions that are to be lost.

To ensure that ecosystem structure and function is replaced, or preferably improved, consultation on the compensation plan and design must be undertaken with the City of London and any other applicable agencies. For robust examples of compensation project design and estimated costs, refer to **Guideline for Determining Ecosystem Compensation, Appendix A** (TRCA, 2018). Construction activities related to the implementation of compensation projects should refer to **Section B – Part 5 – Tree Planting and Protection Guidelines (TPP)** and **Part 6 – Parks and Open Spaces** in the City of London's **Standard Contract Documents for Municipal Construction** (City of London, 2020).

In exceptional cases, when a feature approved for removal cannot be compensated for on-site and another parcel of land cannot be identified and secured off-site, at the City's discretion, proponents may provide funds to the City in lieu of undertaking the compensation project themselves. The amount of funds will be based on the cost to restore the impacted ecosystem's structure and the cost of replacing its land base.

6.6.3 Plant Selection

Plant selection is critical in attempting to compensate for a loss of natural features. Thus, the rationale for plant selection, with consideration for the feature being replaced and the associated ecological functions and services, must be included in the Ecological Replacement and Compensation Plan.

Plant selection will require a case-by-case assessment and consultation with the City of London and other applicable agencies. Native species diversification must be considered with respect to climate change resilience, known and emerging pest impacts and overall longevity of ecological function.

CanPlant (Dougan and Associates, 2020) is a recommended resource that can be referenced to ensure plants selected meet the environmental conditions of the proposed site. Species selection considerations may include, but are not limited to: vegetation type (e.g., woody, herbaceous), species native to the Mixedwood Plains ecozone (preferably Ecoregion 7E), light and moisture requirements, soil requirements, tolerances (e.g., pH, drought, etc.), and natural habitat type.

6.7 Tracking Compensation

Ecological replacement and compensation monitoring is needed to determine whether compensation has achieved no net loss (of area and ecological functions) or net environmental benefit (i.e., enhancements as compared to original conditions) of the replicated feature and ecological function(s). For example, if a wetland has a core function of providing amphibian breeding habitat for at least two species, monitoring should assess amphibian breeding in the replicated / compensated feature to ensure no net loss (i.e., at least two species of amphibians still breeding), or net environmental benefit (more than two species of amphibians still breeding).

Further guidance related to monitoring requirements are outlined in **Section 7.2**. The results of monitoring must be provided to the City of London as outlined in **Section 7.2**, to allow for the implementation of adaptive management, and for any necessary adjustments to compensation strategies moving forward.

7. Environmental Monitoring

7.1 Policy and Context

A monitoring plan is one of the requirements of an Environmental Management Plan for any EIS developed for the City of London (as outlined in **The London Plan Policy 1436_4**) as part of the approval process for development or infrastructure projects adjacent to any components of the Natural Heritage System. The monitoring plan and subsequent implementation, is critical to tracking any loss of natural heritage features or their associated functions over time (MNRF, 2010b), and to providing a basis for adaptive management or mitigative measures in the area being monitored and / or informing forthcoming developments.

Consideration for monitoring early-on in the planning process is highly recommended to ensure appropriate resources are allocated for the completion and implementation of an approved monitoring plan. In some cases it may be appropriate to establish locations and use methods for existing conditions data collection that can be replicated and also serve as baseline data for monitoring, and potentially for during and post-construction monitoring as well.

Monitoring plans must be approved by the City of London prior to the start of construction and are determined on a case-by-case basis considering the potential impacts of development and infrastructure, as well as the natural heritage features and functions identified (and evaluated) within or adjacent to the proposed development or infrastructure site. The detailed pre-construction and construction monitoring plan is to be included in the approved Environmental Monitoring Plan (EMP) (as described in **Section 2.6.6.9**) developed from the Environmental Recommendations of an EIS.

Monitoring will enable planning authorities, through development and infrastructure agreements, to require subsequent changes to site conditions if the environmental effects are found to exceed predicted effects or targets, or if there are identifiable negative effects. Monitoring the environmental effects of development and infrastructure also provides well-documented, local examples of best management practices for particular types of development or infrastructure projects and particular types of features or functions. Monitoring may encompass a number of different measures as determined through the EIS process based on the potential impacts and mitigation measures that have been approved.

Common conditions and / or mitigation measures that may require monitoring include, but are not limited to:

- hydrogeological and hydrological processes (e.g., maintenance of pre-development groundwater levels and flows to watercourses, maintenance of water balance in wetlands)
- erosion and sediment control measures (e.g., spills and sediment releases)
- tree protection measures (e.g., machinery in identified tree protection zones)
- natural heritage feature encroachments (e.g., no grading or dumping within protected features)
- ecological functions of natural heritage features (e.g., continued presence of amphibian species and / or forest bird species documented pre-development)
- successful naturalization of buffers and,
- plant survivorship from feature-based restoration and / or compensation.

Monitoring should be tailored to the local conditions and anticipated impacts, focused on measures that can be documented consistently and include indicators or triggers for adaptive management where appropriate, and indicate if the proponent, the City or another agency will be responsible for undertaking the adaptive management if required. Measures and responsibilities will ultimately be determined in consultation with the City and any other responsible agencies.

The definition of clear goals and objectives, as well as robust information on the proposed mitigation measures and potential impacts, are critical in determining which aspects of the natural heritage features (and functions) require monitoring. This will aid in ensuring that the monitoring program will not only be effective, but efficient and streamlined (e.g., targeted monitoring).

7.2 Environmental Management Plan (EMP) Requirements

As discussed in **Section 2.6.6.9** the primary deliverable of the EIS is the Environmental Management Recommendations section. The environmental management recommendations may form an Environmental Management Plan (EMP).

The typical components of an EMP include:

Natural Heritage System Components – The NHS components present within and adjacent to the subject lands in which development is generally not permitted. This may include regulated features and hazard lands. These areas should be delineated on an EMP Figure(s) to be included in this section of the EIS. Recommendations regarding the NHS Components must require that these areas are delineated on Site Plans and contract drawings with notes that identify the areas as “no development, and no entry” areas.

Ecological Buffers – Ecological buffers must be clearly delineated on the EMP Figure(s). Recommendations regarding ecological buffers must require that these areas are delineated on Site Plans and contract drawings with notes that identify “no development, and no entry” areas. Pathways, trails or passive low impact development measures proposed and approved for inclusion in the buffer (in accordance with the criteria and process outlined in **Section 5.4**) will be clearly delineated. Additionally, any management recommendations and planting recommendations for ecological buffers should be detailed such that the recommendations can be added to landscape drawings with clear specifications for seed mixtures, shrub and tree plantings and other measures.

Restoration, Enhancement and Compensation Measures / Areas – Areas that have been identified for restoration, enhancement or compensation should also be identified on the EMP Figure(s). Similar to the ecological buffers, management recommendations and planting recommendations for restoration, enhancement and compensation areas should be detailed such that the recommendations can be added to landscape drawings with clear specifications for seed mixtures, shrub and tree plantings and other measures.

Construction Monitoring and Inspection Plan – The requirements for mitigation measures during construction must be detailed in a Construction Monitoring and Inspection Plan. This plan must provide standard construction mitigation measures and mitigation measures specific to the project and subject lands. Components that may be included in a Construction Mitigation and Monitoring Plan include:

- *Delineation and specifications for tree protection and / or ESC fencing* – protection fencing to be installed outside of the Natural Heritage System Components including ecological buffers as applicable should be identified on maps or drawing in the EMP, site plans and contract drawings.
- *Delineation and specifications for wildlife exclusionary fencing* – Wildlife exclusionary fencing designed to prevent wildlife from entering the construction areas of a site should be identified on the EMP, Site Plans and contract drawings. * *Note that this and the above noted ESC fencing may be one and the same if the specifications for both are met.*
- *Species at Risk and Wildlife Handling Protocols* – During construction, SAR and other wildlife may enter the site putting them at risk of injury or mortality from construction equipment, vehicles or construction crews working on the site. The preparation of a Species at Risk and Wildlife Handling Protocol document can prevent or mitigate injury or mortality. This protocol

document should be tailored to the project and the species present within the subject lands and the broader study area.

- *Dewatering and temporary stormwater management* – Dewatering and temporary stormwater management measures may be required for a construction site. Mitigation measures for these measures should be detailed and specified on contract drawings for the project and clearly detailed in the EMP.
- *Dust suppression measures* – Dust suppression measures may be required for the construction works on the site. If required, dust suppression measures should be detailed and included in the specifications on contract drawings.
- *Construction Monitoring* – The monitoring of the above mitigation measures should be an integral part of the plan during construction. The frequency and details of the construction monitoring should be tailored to the specific project requirements as identified in the EMP. The environmental monitoring program should be specific to the EMP and should not be considered replication or replacement for regular site inspections for other purposes.

7.2.1 Environmental Management Plan Report Requirements

- **Goals** and **objectives** of the mitigation being monitored are clearly outlined to provide a baseline;
- A **timeline** of the monitoring requirements for each of the development stages (e.g., pre-, during, and post-construction) should be clearly outlined;
- **Mitigation measures** should be clearly defined (and geo-referenced), including the inclusion of measurable **thresholds** (as approved on a case-by-case basis as approved by the City of London through the EIS process) that may trigger remedial action;
- **Data collection methods**, which should be **standardized** to ensure the long-term sustainability of the monitoring program, need to be clearly defined and applicable to the goals and objectives;
 - To assess baseline conditions, monitoring should employ sampling methods that accurately assess ecological conditions using a standardized approach that can be replicated as outlined in **Appendix C**.
- Clear **monitoring programs** that include the following three types of monitoring:
 - **Baseline** to outline the existing conditions of natural heritage features and functions in accordance with established and accepted data collection standards;
 - **Compliance** with approved EIS requirements, ESC monitoring and applicable legislation; and,
 - **Post Construction** monitoring of measures implemented to mitigate potential impacts from development.
- Processes or mechanisms for **data storage / transfer, quality assurance, and analysis of results** for initiating responses to threshold triggers;
- **Roles** and **Responsibilities**, along with the required qualifications, of those undertaking the monitoring program;
- An outline of the **reporting** structure required for the development or infrastructure as determined through an approved EIS;
 - **All monitoring data** must be shared with the City of London as a part of each **monitoring report**.

- **Contingency** measures or strategies should mitigation not be effective in achieving no net impacts as per the approved EIS; and,
- **Amendments** may be necessary as the detailed design, proposed mitigation, or construction activities change throughout the planning process (following the approval of an EIS).
- Monitoring should be undertaken intervals appropriate to the feature. Typical intervals include the 1, 3, and 5-year points after construction and or planting is complete, in order to allow for early detection and correction of any planting or construction failures.
- Monitoring and maintenance will typically be the responsibility of those undertaking the compensation project. This responsibility will be confirmed and documented as part of the agreements outlined in **Section 6.3**. Monitoring reports will be written to document project results. Where projects are not functioning as designed and approved, investigations will be undertaken to understand why and securities may be utilized to correct and / or complete restoration works. Further, modifications may be required to ensure that the project is successful; the need for these can be stipulated in an agreement and assured through securities held by the public agencies (see also **Section 6.3**). Monitoring and maintenance often constitutes a learning process that can inform future compensation decisions and implementation plans.

City of London staff, with input from local Conservation Authorities and any other relevant review agencies, will use the details contained in the approved EIS to guide the review of proposed compensation projects to facilitate appropriate and comprehensive ecological compensation. As per the usual plan review process, all comments from the TRT will be conveyed to the proponent by the City of London staff on the file.

7.2.2 Monitoring Timeline and Responsibilities

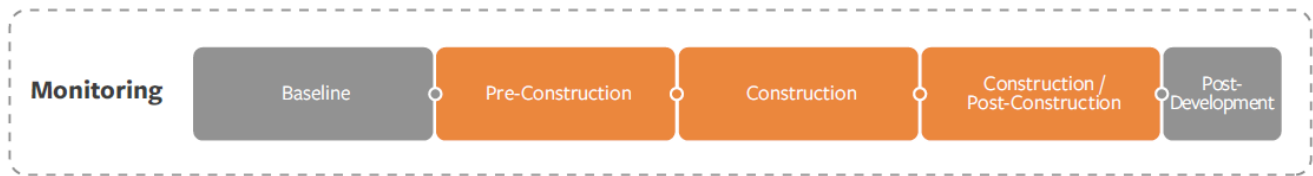
As development and infrastructure proposals, along with the subsequent implementation, can be highly dynamic, it is critical to define the roles and responsibilities of the monitoring component for the entirety of the project and into the post-development phase. It is the responsibility of the **proponent** to create a monitoring plan (to be approved through the EIS process) and to implement monitoring until the end of the Assumption Development Stage (i.e., when the developer has satisfied all parts of the development or infrastructure agreement and the assumption has been granted) or once the proponent has fulfilled the requirements outlined in the EIS.

For each project, the proponent is required to articulate timelines and responsibilities of monitoring, including that for pre-, during-, and post-construction, compensation, and up until assumption. If the feature is being transferred into City of London ownership post-assumption, long-term monitoring will be conducted by the City of London. However, if the feature is retained as private ownership, long-term monitoring will be the responsibility of the proponent.

In general, the monitoring plan should be developed with consideration for the following general phases, depicted in **Figure 7.1**, which are described in subsequent sections of these guidelines:

- **Pre-construction** – to be completed prior to the initiation of construction activities;
- **Construction** – to be conducted from initiation of construction activities until a specified build-out stage as determined in consultation with the City of London;
- **Post-construction** – to be conducted following construction monitoring until the end of the Assumption Development Stage;
 - **Post-development** – to be completed as determined in consultation with the City of London; and,
 - **Compensation** – to be initiated upon completion of compensation project and continued until requirements have been met within the Ecological Replacement and Compensation Plan (as described separately in **Section 6.4**).

Figure 7.1: Environmental Monitoring Process Stages



The City of London will require EIS monitoring reports throughout the process. The reporting timeline and structure will be otherwise determined through the approval of an EIS.

7.2.3 Pre-Construction Monitoring

Pre-construction monitoring will be approved as part of the EIS process for development and infrastructure projects. These monitoring programs and activities should align with the recommendations provided in the EIS (see **Section 2.6.6.9**) and be used to inform the EMP. Some examples of variables to be monitored pre-construction (and thus through the entirety of the project or until monitoring is handed over to the City post-development) may include, but are not limited to, the following:

- Surface and groundwater quantity, quality, and shifts in hydrologic dynamics (e.g., water balance, drainage patterns) that may be influenced by development or infrastructure activities, including grading; and,
- Encroachments to protected NHS components, buffer implementation and establishment, and effectiveness of other NHS protection measures such as fencing.

7.2.4 Construction Monitoring

Upon initiation of construction activities, construction monitoring should be initiated to assess changes to site conditions, as well as the implementation of mitigation measures (as outlined in the approved EMP). In general, the bulk of the monitoring during this phase will be focused on *compliance*. Compliance monitoring is implemented to ensure that the approved conditions of the EIS, along with those outlined in applicable legislation, are met during the construction phase. This step is critical to ensure that the natural heritage features, and their associated function(s), are protected and that impacts are mitigated as outlined in the approved EIS. Some examples of compliance monitoring include the inspection of, but are not limited to, the following mitigation measures:

- ESC;
- Tree protection;
- Boundary delineation and setbacks;
- Buffer implementation;
- Area searches for wildlife;
- Protection of water quality and quantity;
- Maintenance of hydrogeological regimes, assessed in partnership with the applicable Conservation Authority; and,
- Respect for timing windows for approved works (e.g., related to bat overwintering, breeding birds and / or fish habitat restrictions).

Should the proposed development or infrastructure project be non-compliant with the approved EIS, immediate action shall be taken to ensure the correct implementation of mitigation measures in

accordance with the EMP (refer to **Section 7.2.1**). Activities that may result in negative impacts to the NHS shall be halted as soon as the issue is identified.

7.2.5 Post-Construction Monitoring

As outlined in **Section 2.6.6.9**, the development of a post-construction monitoring plan should be initiated well before construction starts. The baseline information/data with which the post-construction monitoring information/data will be compared should be collected (ideally) in the year or two years before the start of construction.

The post-construction monitoring program should include the monitoring of the recommendations of the EMP (i.e., ecological buffers, enhancement, restoration and compensation areas specifications) as well as the monitoring of potential impacts to the NHS. Monitoring of potential impacts should be simplified and repeatable to ensure replicability and program adherence.

In general, post-construction monitoring will take place at a build-out stage or after a percentage of the construction activities have been completed. The specific timeline for the transition from construction to post-construction monitoring will be determined as part of an approved EMP in consultation with the City of London. Typical intervals include 1-, 3- or 5-years. The City will take on monitoring post assumption in intervals appropriate to the feature. Reporting of monitoring data including those for compensation sites shall be provided annually by the proponent for the duration of their responsible term.

The main focus of this phase of monitoring is to evaluate the performance and effectiveness of the mitigation implemented in the construction stage and to inform adaptive management and shifts in management and compensation strategies, if required.

Post-construction monitoring is critical to understanding if the mitigation and / or compensation measures are effective and / or if potential impacts are greater or lesser in magnitude than predicted during the impact assessment. Post-construction monitoring will also inform the need for adaptive management or amendments to the future monitoring plans based on the level of success of the mitigation measures.

Performance and effectiveness monitoring may be required based on mitigation measures for, but not limited to, the following:

- hydrogeological and hydrological processes (e.g., maintenance of pre-development groundwater levels and flows to watercourses, maintenance of water balance in wetlands)
- stormwater management measures (e.g., outlet water quality and erosion thresholds not exceeded)
- tree protection measures (e.g., protected trees remain in good health)
- natural heritage feature encroachments (e.g., no dumping or informal trail creation within protected features)
- ecological functions of natural heritage features (e.g., continued presence of amphibian species and / or forest bird species documented pre-development)
- successful naturalization of buffers, and
- successful establishment and diversification of feature-based restoration and / or compensation.

Post-construction monitoring requires the submittal of annual reports to the City of London outlining seasonal changes in the existing conditions of the NHS, as well as to show changes year-over-year. Any major issues identified during the monitoring periods (e.g., substantive die-off of plantings) must be brought to the immediate attention of the City of London and the proponent. In general, the report may include, but is not limited to, the following:

- General methodology and description (e.g., vegetation communities, taxa specific) of monitoring;
- Outline of thresholds and the associated contingencies in place should they be exceeded;
- All data collected (i.e., baseline, during construction, and up-to-date post construction);

- Analysis and comparison of data; and,
- A plan for the maintenance, and if necessary, implementation of additional mitigation measures.

Post-construction monitoring should take place until end of the Assumption Development Stage and will shift to the Post-development monitoring, as described in **Section 7.2.5.1**.

7.2.5.1 *Post-Development Monitoring*

Post-development monitoring is aimed at continuing to assess ecosystem resilience, to detect changes in the structure of natural heritage features, and to assess the long term efficacy of EIS recommendations (i.e., mitigation measures). The requirement for post-development monitoring, along with an outline of the roles and responsibilities, will be determined as part of an approved EMP (as outlined in **Section 2.6.6.9**) in consultation with the City of London. The results of post-development monitoring will be analyzed based on timelines in the EIS. The results of post-development monitoring inform if additional remedial works are necessary or if policy changes are needed.

7.2.5.2 *Compensation Monitoring*

As outlined in **Section 6.3**, ecological compensation may be permitted where it is not possible to avoid, minimize, or mitigate potential negative impacts from development or infrastructure. The aim of compensation monitoring is to determine whether the ecological compensation has achieved no net loss, or preferably a net environmental benefit, in relation to the replaced or enhanced natural heritage features and their associated function(s). The proposed compensation monitoring plan must be approved prior to the implementation of compensation measures.

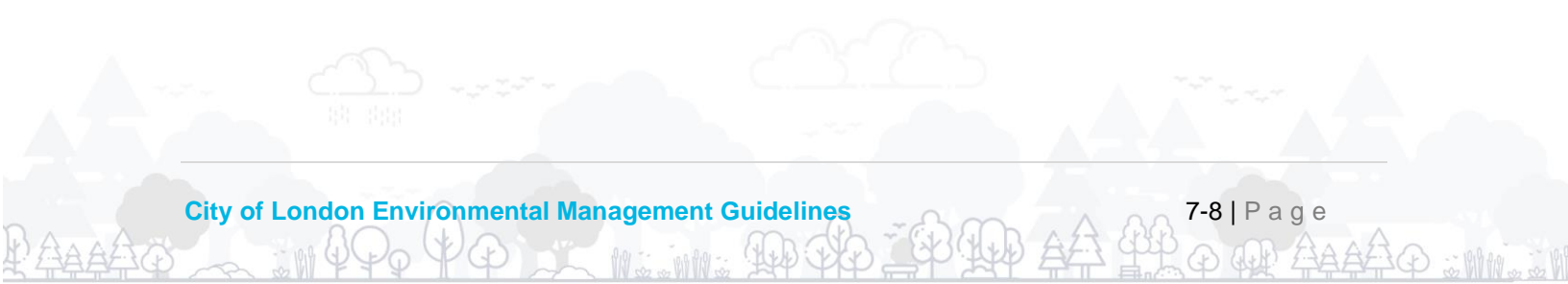
Compensation monitoring should be initiated upon completion of the compensation project (e.g., planting, restoration has been completed) to ensure that baseline data is captured. It is expected that monitoring will continue until the compensation goals have been achieved and the conditions approved through the EIS process (i.e., Ecological Replacement and Compensation Plan) have been fulfilled (5-year timelines should be expected) **or** the lands have been transferred to the City of London and an agreement has been made to shift monitoring responsibilities. This close-out process for compensation monitoring must be approved in consultation with the City of London.

Although compensation monitoring plan details will vary on a case-by-case basis, the following are some general recommendations:

- Compensation monitoring should capture the baseline conditions and re-evaluate the efficacy of the compensation project at the 1, 3, and 5-year milestones. Should the compensation project not meet the goal of no net loss or, preferably net environmental benefit (or net positive effect) at the 5-year milestone, compensation monitoring will be required at 5-year intervals until no net loss at minimum is achieved. This timeline may span pre-, during, and post-construction as it is recommended that compensation projects be initiated as early as possible to minimize lag time of replacing natural features and their function(s);
- Survivorship thresholds expectations should be set, with a 70% success rate being recommended as a baseline (NVCA, 2019);
- Monitoring data should be transferred to the City of London for storage and to inform future compensation strategies (e.g., lessons learned);
- Reporting should occur at each milestone to outline the succession and survivorship within the replaced or enhanced feature to assess the project's trajectory towards no net loss or, preferably net environmental benefit (or net positive effect). Where projects are not functioning as designed and approved (e.g. expected outcomes not observed, low survivorship of plantings), as defined through the Ecological Replacement and Compensation Plan, and with consideration for the most

up-to-date research, interventions and modifications to the project will be required to ensure that the project achieves, at minimum, no net loss; and,

The City of London will provide direction on the success of the implementation of the EIS recommendations resulting in one of three outcomes; 1) do nothing, 2) remedial works identified, or, 3) policy changes identified.



8. Glossary of Terms

Adaptive management - A planned and systematic process for continuously improving environmental management practices by learning about their outcomes. Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project (Canadian Environmental Assessment Agency, 2016).

Adjacent lands – Those lands within a set or specified distance of an individual component of the natural heritage system. Adjacent lands are defined as lands contiguous to a specific natural heritage feature or area where it is likely that development or site alteration would have a negative impact on the feature or area. The extent of the adjacent lands will be in conformity with the distances identified in Table 13 of *The London Plan* or as recommended by the Province (City of London, 2019).

Area-sensitive species - Those that require a forest to be a given size (generally a relatively extensive habitat patch) to successfully reproduce or occur in higher densities (Sandilands, 1997)

Areas of Natural and Scientific Interest (ANSI) - *Areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education* (MMAH, 2020).

Assumption Development Stage - The developer has satisfied all parts of the development or infrastructure agreement and the assumption has been granted.

Basal Area – The basal area of a stand of trees is the sum of the cross-sectional surface areas of each live tree, measured at DBH, and reported on a per unit area basis. Basal area is a measure of tree density, and widely used in forestry, wildlife, and other natural resource management professions (Bettinger *et al.*, 2016).

Baseline Conditions – Baseline conditions may also be referred to as the environmental setting, existing conditions, and other similar terms. The baseline conditions are the physical, chemical, biological, social, economic, and cultural setting in which the proposed project is to be located, and where local impacts (both positive and negative) might be expected to occur. These conditions are the standard against which are compared projected future conditions from project alternatives. Their description and characterization are necessary for decision-makers, reviewers, and others who are unfamiliar with the project site and surrounding landscape (Shepard, 2006).

Biodiversity - The variability among organisms from all sources, including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. (MNRF, 2010b).

Buffers - *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 space for 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* (MNRF, 2010b).

Carolinian Zone - The Carolinian Zone is also known as ecological site region (Ecoregion) 7E. It covers approximately 22,000 km² in extreme southern Ontario, extending northeast from the United States border to Toronto, and northwest to Grand Bend on Lake Huron. It is bounded by four major lakes (Huron, St. Clair, Erie and Ontario), and the St. Clair, Detroit and Niagara rivers. Climatically and biophysically it shares more with the “hot continental (broadleaved forests)” of the north-central United

States than with the “warm continental (mixed deciduous-coniferous forests)” division farther north. It has been described as Canada’s most endangered major ecosystem, and many of its flora and fauna are found nowhere else in the nation. This is largely because many southern species are at their northern limits here, and because most of their natural habitat has been lost to human uses over the past three centuries.” (Jalava *et al.*, 2000).

Coefficient of Conservatism (for Southern Ontario) – *A numeric value between 0 (widespread) and 10 (found only in specialized habitats) assigned to each plant species indicating the degree of faithfulness a plant displays to a specific habitat or set of environmental conditions. “Conservative” plant species, such as those that are found only in relatively pristine natural habitats like bogs or prairies, are assigned a high coefficient of conservatism; other plant species that grow in a wide variety of habitats and can tolerate high levels of cultural disturbance are assigned low values. By compiling a plant species list for a natural area and looking up the coefficients of conservatism for each species listed, one can calculate a Floristic Quality Index, which can be used to compare the quality of natural areas. The NHIC has produced a list of native plants occurring in southern Ontario, and has assigned tentative coefficients of conservatism to each (MNRF, 2010b).*

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

Compliance Monitoring – Entails monitoring of the NHS components as needed to ensure that the approved recommendations in the EIS, along with any other applicable conditions, are met during the construction phase.

Conservation Status Ranks – *Standard methods to evaluate species and plant communities and assign conservation status ranks (MNRF, 2020).*

Global Rank (GRank) - *Conservation status of a species or plant community across its entire range (MNRF, 2020).*

National Rank (NRank) - *Conservation status of a species or plant community within a particular country (MNRF, 2020).*

Subnational Rank (SRank) – *Conservation status of a species or plant community within a particular province, territory or state (MNRF, 2020).*

Critical Function Zones – *The term Critical Function Zone (CFZ) describes non-wetland areas within which biophysical functions or attributes directly related to the wetland occur. This could, for example, be adjacent upland grassland nesting habitat for waterfowl (that use the wetland to raise their broods). The CFZ could also encompass upland nesting habitat for turtles that otherwise occupy the wetland, foraging areas for frogs and dragonflies, or nesting habitat for birds that straddle the wetland-upland ecozone (e.g., Yellow Warbler). Effectively, the CFZ is a functional extension of the wetland into the upland. It is not a buffer for the wetland (Environment Canada, 2013).*

Cultural communities – Vegetation communities originating from, or maintained by, anthropogenic influences and / or culturally based disturbances (such as agricultural fields (croplands) and pastures (grazing), mowing, woodlot management or tree cutting, etc.) often containing a large proportion of introduced species (adapted from Lee *et al.* 1998), but undergoing natural succession. Cultural communities include, but are not limited to, cultural meadows, cultural thickets, cultural savannahs, cultural woodland, and cultural plantation ecosites (Lee *et al.*, 1998).

Cultural savannahs and cultural woodlands - Areas where trees have been planted, or have resulted from first generation regeneration of a site originating or maintained by anthropogenic disturbances (Lee

et al., 1998). It does not include treed areas where the main stratum is dominated by native species and tree cover is >60%. Cultural savannahs are treed areas with 11-35% scattered or clumped tree cover and dominated by graminoids and forbs. Cultural woodlands have 36-60% scattered or clumped tree cover.

Cumulative effects – *The sum of all individual effects occurring over space and time, including those that will occur in the foreseeable future (MNRF, 2010b).*

Development – *the creation of a new lot, change in land use, or the construction of buildings and structures requiring approval under the Planning Act, but does not include:*

- a) *activities that create or maintain infrastructure authorized under an environmental assessment process;*
- b) *works subject to the Drainage Act (MMAH, 2020).*

Disturbance - Any action that will cause an **effect** or **stress**; can be natural (e.g. fire, flood) or human – generated (e.g. various forms of development activity or agricultural uses).

Drip Line - *As the location on the ground beneath the theoretical line of the outer most branches of the trees at the edge of a woodland (City of London, 2018). Where an asymmetric tree canopy occurs, the drip line shall be the greatest of the drip line distances measured horizontally from the base of the trunk (City of London, 2016b).*

Ecological boundary – Is determined based on ecological principles, refined through the application of **Section 4** Boundary Delineation in these Environmental Management Guidelines, and are irrespective of property lines.

Ecological Compensation – Ecological compensation is an example of a trade-off whereby loss of natural values is remedied or offset by a corresponding compensatory action on the same site or elsewhere (Brown *et al.*, 2013). Ecological compensation is a positive conservation action that is required to counter-balance ecological values lost in the context of development or resource use and is an intentional form of trade-off (Morrison-Saunders and Pope, 2013).

Ecological function - *The natural processes, products, or services that living and non-living environments provide or perform within or between species, ecosystems and landscapes. These may include biological, physical and socio-economic interactions (MMAH, 2020).*

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 processes are intact and self-sustaining and (c) ecosystem evolution is occurring naturally. Ecological integrity includes hydrological integrity (MNRF, 2010b).*

1. The ability of a system to resist disturbance (resistance).
2. The ability of a system to recover or return to a balanced state when subject to some degree of perturbations and disturbance (resilience).
3. The ability to persist in the long-term with the minimum level of human maintenance.
4. The ability to maintain a structure of native flora and fauna.

Edge Effects – The distance from the periphery (of a given natural heritage feature) to the point where conditions (as indicated by specific criteria) do not differ from those in the interior habitat (adapted from Environmental Law Institute, 2003). *Edge effects are known to edge effects vary depending on natural feature type, position in the landscape and other factors... With respect to biological effects, 100 metres is robustly a conservative estimate of the extent of edge effects. (MNRF 2010b).*

Edge microclimate - Sun and wind are the overriding controls of the edge microclimate. They determine which plants survive and thrive as well as having a major impact on soil, insects and other animals.

- Effects from south-facing edges tend to extend further into the feature than from north-

facing edges.

- Effects from windward edges tend to extend further into the feature than from leeward edges.

ELC Community Series - Is the lowest level of classification using ELC that can be identified through maps, air-photo interpretation and other remote sensing techniques. Community series are distinguished on the type of vegetation cover (open, shrub, or treed) and / or the plant form that characterizes the community (i.e., deciduous, coniferous, mixed; Lee *et al.*, 1998).

ELC Ecosite – Part of an Ecosession having a relatively uniform parent material, soil, and hydrology, and a chronosequence of vegetation. It is a mappable, landscape unit integrating a consistent set of environmental factors and vegetation characteristics (e.g., Dry-Forest Deciduous Forest Ecosite) (Lee *et al.*, 1998).

ELC Vegetation Type - Is the finest level of resolution in the ELC, identified through site and stand level research and inventory. Vegetation types are generated by grouping similar plant communities based on plant species composition and dominance, according to relative cover. The goal is to distill the natural diversity and variability of plant communities to a small number of relatively uniform vegetation units (Lee *et al.*, 1998).

Encroachment – Encroachment(s) into protected natural heritage features and areas can occur from other land uses in the adjacent lands. Common examples of encroachment include dumping garden refuse in the natural area, creating unauthorized access (e.g., an informal trail), extending lawn management and manicuring into the natural area, and building structures (such as forts or bike jumps). Encroachment is usually more pronounced where the limit between the protected natural area and the adjacent land use is not fenced.

Enhancement – From an ecological perspective, whereby the quality of ecosystem functions are improved. Enhancement can occur within or adjacent to a feature, and is a term that can apply to a natural heritage feature or to a natural heritage system as a whole. An example of ecological enhancement within a feature is removal of invasive plant species and related replacement with suitable native species. An example of an enhancement to a natural heritage system is the naturalization of a maintained lawn between two features to provide a more natural corridor or ecological linkage.

Feature Boundary – The delineated limit of one of the natural heritage features and areas that has been or may be included as a component of the City's Natural Heritage System as per ***The London Plan*** Policies 1319 and 1320. Feature boundaries are to be determined in accordance with the applicable policies from the ***The London Plan*** and in these EMGs, **Section 4**. If not already completed, all features shall be assessed for significance accordance with the applicable policies from the ***The London Plan*** and in these EMGs, **Section 3**.

Fish Habitat – *As defined in the Fisheries Act, means spawning grounds and any other areas, including nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes (MMAH, 2020).*

Forest - *A terrestrial vegetation community with at least 60% tree cover (Lee at al., 1998) of coniferous and / or deciduous trees.*

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

Fragmentation – [T]he degree to which natural habitat, once continuous, is divided into remnant isolated patches (Ontario Road Ecology Group, 2010).

Ground water feature – *Means water-related features in the earth's subsurface, including recharge/discharge areas, water tables, aquifers and unsaturated zones that can be defined by surface and subsurface hydrogeologic investigations (MMAH, 2020).*

Discharge Areas – Discharge areas are usually located in valleys and lowlands. There the hydraulic gradients are directed upward toward the land surface. Discharging groundwater re-enters the surface-water regime as inflow to lakes or baseflow to streams, or to become evapotranspiration from wetlands (Council of Canadian Academies, 2009).

Recharge Areas – Recharge usually occurs in topographically higher areas of a groundwater basin. Water-table elevations tend to be a subdued reflection of surface topography, and the differences in watertable elevation provide the driving force that moves groundwater by gravitational flow from recharge areas toward discharge areas at lower elevations. In recharge areas, the hydraulic gradient at the water table is directed downward, and recharging waters enter the groundwater-flow system to begin their slow journey through the groundwater basin (Council of Canadian Academies, 2009).

Hibernacula – (singular = hibernaculum) Underground chamber whereby snakes are able to safely overwinter. Hibernaculum can be a built structure or naturally occurring, i.e., animal burrow or fissure in the bedrock (Long Point Basin Land Trust, 2020).

High-Water Mark - The average **highest** level that a watercourse or waterbody rises to and remains at long enough to alter the riparian vegetation (DFO, 2007; DFO, 2019).

Indicator Species – Species used which offer an indication of the biological condition in an ecosystem (MNRF 2011b).

Invasive species - an organism that is not native to the place where found and tends to grow and spread aggressively, usually to the detriment of native species and ecosystems.

Interior Habitat - With respect to woodlands, interior habitat is usually determined as habitat 100 metres or more from the outer edge of the woodland. These interior habitats provide productive habitat for sensitive species that are sheltered from external influences and disturbance (MNRF, 2010b).

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

Linkage - *Linear area intended to provide connectivity (at the regional or site level), supporting a complete range of community and ecosystem processes, enabling plants and animals to move between core areas and other larger areas of habitat over a period of generations. The terms are used interchangeably for planning purposes but may need to be distinguished for ecological or biological reasons* (MNRF, 2010b). Linkages can be naturally existing or restored linear landscape connections between two or more component of the NHS. In the City of London, from an ecological perspective, linkage functions can be supported by many components of the NHS. Also see the definition for Upland Corridors.

The functions provided by ecological linkages are informed by characteristics such as their width (i.e., appropriate to the scale of the phenomenon being addressed), length (e.g., a long corridor will generally need to be wider than a short one), quality (e.g., vegetative structure and composition), species diversity (e.g., low non-native plant indices), type of corridor use (e.g., species in which individuals pass directly between two areas in discrete events of brief duration; or species that need several days to several generations to pass through), importance within the landscape (e.g., the last remaining natural connection between two features), as well as the functions being expected of the linkage. Corridor functions may include, but are not limited to avenues along which:

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

2010b, Environment Canada, 2013).

Low Impact Development (LID) – Approach to land development that mimics the natural movement of water in order to manage stormwater (rainwater and urban runoff) close to where the rain falls. LID uses small, simple design techniques and landscape features that filter, infiltrate, store, evaporate, and detain rainwater and runoffs at the lot level. (City of Hamilton, 2020).

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

Mitigation – *The prevention, modification, or alleviation of impacts or actions on the natural environment and -.... the prevention of negative impacts. Mitigation also includes any action intended to enhance beneficial effects (MNR 2010b)..*

Native species – For the City of London, usually refers to species that occurred naturally in southwestern Ontario prior to European settlement. Where the status of a species is in question, the City will defer to the Natural Heritage Information Centre.

Natural Heritage Features and Areas - In the City of London, these are those features and areas identified in accordance with the Provincial Policy Statement and listed in **The London Plan** policies 1319 and 1320..

Natural Heritage System - *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 use (MMAH, 2020).*

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

Negative Impacts – is defined in accordance with the Provincial Policy Statement and includes policy references from that document, as follows: a) *in regard to policy 1.6.6.4 and 1.6.6.5, potential risks to human health and safety and degradation to the quality and quantity of water, sensitive surface water features and sensitive ground water features, and their related hydrologic functions, due to single, multiple or successive development. Negative impacts should be assessed through environmental studies including hydrogeological or water quality impact assessments, in accordance with provincial standards; b) in regard to policy 2.2, degradation to the quality and quantity of water, sensitive surface water features and sensitive ground water features, and their related hydrologic functions, due to single, multiple or successive development or site alteration activities; c) in regard to fish habitat, any permanent alteration to, or destruction of fish habitat, except where, in conjunction with the appropriate authorities, it has been authorized under the Fisheries Act; and d) in regard to other natural heritage features and areas, degradation that threatens the health and integrity of the natural features or ecological functions for which an area is identified due to single, multiple or successive development or site alteration activities (MMAH 2020).*

Net effects - Those impacts that remain after mitigation has been implemented.

Non-native species - Used to refer to a species that did not originate naturally in an area. Usually refers to species that have been introduced to southwestern Ontario since European settlement. Where the status of a species is in question, the City will defer to the Natural Heritage Information Centre.

Overall Benefit Permit – Issued under the *Endangered Species Act* in which “*authorizes a person, company or organization to perform the activity, as long as an overall benefit to the species is realized*” (MECP, 2020). The person, company or organization must undertake “*actions that contribute to improving the circumstances to the species*” (MECP, 2020).

Patch clusters – Are several patches that may be connected as one Area if certain criteria for connectivity and distance are met (EPPAC, 1996). As defined in these EMGs (Section 3.1), these are vegetation patches within 250 m of each other that are not separated by major roads, highways, or urban development.

Patches – Are area of naturalized vegetation generally larger than 0.5 ha. A patch may be bisected by a utility corridor or road if the right-of-way (ROW) is less than 40 m. Patches may include one or more vegetation communities within natural feature boundaries, see Section 4.0.

Place Type (*The London Plan*) - Traditionally, Planners have focused on land use when setting plans for geographic areas within a city – often referred to as a “land use designation”. *The London Plan* takes a different approach by planning for the type of place that is envisioned – what this Plan refers to as a “Place Type”. It seeks to plan highly-functional, connected, and desirable places. Most place types support a range of intensities and a mix of land uses (City of London, 2019).

Environmental Review - 779_ In some cases, lands may contain natural heritage features and areas that have not been adequately assessed to determine whether they are significant and worthy of protection as part of the City's NHS. The Environmental Review Place Type will ensure that development which may negatively impact the value of these features does not occur until such time as the required environmental studies are completed. 780_ In addition to the components of the NHS which have been evaluated and shown as Green Space on Map 1 – Place Types in conformity with the policies of this Plan, additional lands are identified on Map 5 – Natural Heritage, that may contain significant natural features and areas and important ecological functions which should be protected until environmental studies have been completed, reviewed, and accepted by the City. These potential components of the NHS, shown within the Environmental Review Place Type on Map 1, will be protected from activities that would diminish their functions pending the completion, review and acceptance of a detailed environmental study (City of London, 2019).

Green Space - 757_ The Green Space Place Type is made up of a system of public parks and recreational areas, private open spaces, and our most cherished natural areas. It encompasses a linear corridor along the Thames River, which represents the natural heritage and recreational spine of our city. It also encompasses our hazard lands, including our valleylands and ravines, and the floodplains associated with our river system. 758_ The Green Space Place Type is comprised of public and private lands; flood plain lands; lands susceptible to erosion and unstable slopes; natural heritage features and areas recognized by City Council as having city-wide, regional, or provincial significance; lands that contribute to important ecological functions; and lands containing other natural physical features which are desirable for green space use or preservation in a natural state. The components of the NHS that are included in the Green Space Place Type on Map 1 – Place Types, are identified or delineated on Map 5 - Natural Heritage. Hazard lands and natural resource lands that are included in the Green Space Place Type on Map 1 are identified or delineated on Map 6 – Hazards and Natural Resources (City of London 2019).

Plantation - A coniferous or deciduous treed community in which the majority of trees have been planted (Lee *et al.*, 1998).

Potential Naturalization Areas - Potential naturalization areas are defined as areas where the opportunity exists to enhance, restore, or where appropriate, expand the NHS. These areas may include lands suitable to create natural habitats such as wetland habitat, pollinator habitat, wildlife habitat, or to compensate for trees lost to development. (**The London Plan** Policy 1378). Potential naturalization areas are an important component of the Natural Heritage System. Potential naturalization areas can include lands adjacent to natural heritage features and areas, other natural 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. Potential naturalization areas may enhance, restore or strengthen and expand the health and viability of a natural heritage feature or area (**The London Plan** Policy 1379).

Prairie - An area of native grassland controlled by a combination of moisture deficiency and fire. Usually containing a distinctive assemblage of species. May include tallgrass prairie, tallgrass savannah or tallgrass woodland upland communities (Lee *et al.*, 1998).

Provincially Significant Wetland – Wetlands that have been “identified as provincially significant by the Ontario Ministry of Natural Resources and Forestry using evaluation procedures established by the Province, as amended from time to time” (MMAH, 2020)..

Restoration – From an ecological perspective, “is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed” (Society for Ecological Restoration website).

Savannah – A treed community with 11 to 35% cover of coniferous or deciduous trees (Lee *et al.* 1998).

Satellite Woodlands - Are small treed or forested areas located within 100 m of a larger area of significant woodland. The satellite may be part of a Patch or Patch Cluster.

Setback - A land use planning term, established through the use of zoning standards, generally providing for minimum distances from lot lines to achieve appropriate locations for buildings and structures (MNRF, 2010b; Beacon, 2012). Within the City of London “setbacks shall apply from any lands identified as an ecological buffer” (City of London, 2019).

Significant - As defined by the *Provincial Policy Statement* means:

a) in regard to wetlands, coastal wetlands and areas of natural and scientific interest, an area identified as provincially significant by the Ontario MNRF using 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 MNRF; c) in regard to other features and areas in 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 NHS; Criteria for determining significance for the resources identified in sections (c) are recommended by the Province, but municipal approaches that achieve or exceed the same objective may also be used. While some significant resources may already be identified and inventoried by official sources, the significance of others can only be determined after evaluation (MMAH, 2020).

Site Alteration – Activities, such as grading, excavation and the placement of fill that would change the landform and natural vegetative characteristics of a site (MMAH, 2020).

Successional / Seral Age - The stage in a vegetation chronosequence or succession at a given site.

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

Early successional communities - Have not undergone a series of natural thinning. Dominant plants are essentially growing as independent individuals, rather than as members of a

phytosociological community. It is floristically similar to mid-successional stands, but is juvenile in structural development (Strong *et al.*, 1990).

Mid-Aged - A seral stage of a community that has undergone natural thinning and replacement as a result of species interaction; the community often contains examples of both early successional and late successional species. Mid-successional communities have undergone natural thinning as a result of species interaction, and may show evidence of invasion by climax species, but they are still dominated by seral species. They may include stands with an over mature understorey (Strong *et al.*, 1990).

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

Older Growth Forests - relatively old and relatively undisturbed by humans. The definition of older growth considers factors other than age, including forest type, forest structure, forest development and the historical and current patterns of human disturbance. Older growth forests are self-perpetuating communities composed primarily of late seral species which show uneven stand age distribution including large old trees without open-grown characteristics (Lee *et al.*, 1998).

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

Sub-climax communities - Are successional maturing communities dominated primarily by climax species, but significant remnants of earlier seral stages may be present (Strong *et al.*, 1990).

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

Rare Plant Species – List of species that can be grouped but not limited to the following:

Provincially Rare Plants includes species with an element ranking of S1-S3 (For a complete listing of Ontario's rare plant species consult NHIC at www.mnr.gov.on.ca/MNR/nhic/nhic.html).

Regionally Rare Plants - includes species with 1 to 4 stations (records) in Middlesex County (as per the *List of the Vascular Plants of Ontario's Carolinian Zone (Ecoregion 7E)*, Oldham 2017).

Regionally Uncommon Plant - *Native in the Carolinian Zone and (a) listed as common in no more than one Carolinian Zone area; and (b) not rare or historic in more than half of the Carolinian Zone areas (≥6) in which it is native and ranked (i.e. not X (no Status))* (as per the *List of the Vascular Plants of Ontario's Carolinian Zone (Ecoregion 7E)*, Oldham 2017).

Species Richness - The number of different species within a community (Pyron, 2010).

Species-at-Risk - Used to describe species that are listed in one of the conservation categories of “endangered”, “threatened” or “vulnerable”/ “special concern”

Endangered – Any native species that on the basis of the best available scientific evidence, is at risk of extinction or extirpation throughout all or a significant portion of its (Ontario) range; a species threatened with imminent extinction or extirpation (COSEWIC).

Threatened - Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a significant portion of its (Ontario) range (COSSARO); a species likely to become endangered if the limiting factors are not reversed (COSEWIC).

Special Concern / Vulnerable - Any native species that, on the basis of the best available scientific evidence, is a species of special concern (in Ontario), but is not a threatened or endangered (COSSARO); a SAR because of low or declining numbers, small range or because of characteristics that make it particularly sensitive to human activities or to natural events (COSEWIC). COSEWIC has replaced the category of “Vulnerable” with “Special Concern”.

Stormwater Management – The plans, public works and initiatives put in place to maintain quality and quantity of stormwater runoff to pre-development levels (City of London, 2019).

Thicket Swamp - A wooded wetland area occurring on organic or mineral substrates with a water table that seasonally drops below the substrate surface; dominated by small trees and shrubs where the tree cover is <10% and the small tree or tall shrub cover (shrubs defined by Soper and Hiemburger 1982) is >25% (Lee *et al.*, 1998).

Top-of-Slope - The intersection of the physical top of a bank or valley slope with the table land. This can be different than the geotechnical or engineered stable top-of-slope. For well-defined valleys, the physical boundary is generally defined by the stable or the predicted top-of-slope while “*for a less well-defined valley or stream corridor, the physical boundary may be defined in a number of ways, including the consideration of riparian vegetation, the flooding hazard limit, the meander belt or the highest general level of seasonal inundation*” (MNR 2010b).

Tree Canopy – An almost continuous layer of foliage formed by the crowns of the larger trees. Shades the layers of vegetation below (CVC, 2011).

Treed – A community with tree cover of >10% (Lee *et al.*, 1998).

Unevaluated Wetland – Wetlands that have not undergone the OWES evaluation process.

Upland Corridors - *Vegetated areas, or potentially revegetated areas, that provide a link between natural heritage features and areas of the Natural Heritage System. Upland corridors may incorporate infrastructure (such as culverts or underpasses) to support connectivity (The London Plan Policy 1372). Upland corridors support and connect valleylands to natural heritage features and areas where the valleylands do not directly connect. Valleylands are also essential for establishing connectivity for the Natural Heritage System, and they provide corridor and linkage functions between natural heritage features and areas. Both are essential in a highly fragmented or urban landscape (The London Plan Policy 1374). Upland corridors are “to retain or create linkages between isolated natural areas” (The London Plan Policy 1417_g).*

Urban Growth Boundary - The boundary shown on Map 1 and Figure 1, beyond which urban uses will not be permitted. Generally, this map boundary separates the urban parts of our city from the rural parts of our city” (City of London, 2019).

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 (MMAH, 2020).*

Vascular Plants – Have a specialized vascular systems known as the xylem and phloem (Leslie, 2018).

Vegetation Patch – Vegetation patches are usually referred to as such in the City of London before they are assessed and screened to determine if they meet the criteria for one or more of the City’s NHS components, as listed in **The London Plan** Policy 1319. Also, see “Patches”.

Vegetation patches are considered as one unit and can be comprised of one or more “natural heritage features” inside the feature boundary (e.g., woodland, wetland, etc.).

Vernal Pool – Pool fed by either groundwater (e.g., springs), snowmelt, or surface water that may be important breeding sites for [various species], which are generally found within a woodland or in proximity to a woodland (MNRF, 2010b).

Watercourse - Is defined according to several federal and provincial Acts and Regulations and typically consists of a distinct (somewhat to well-defined) channel in which water naturally flows at some time of the year [i.e., permanent, intermittent, or ephemeral flow as defined by MNRF's Stream Permanency Handbook for South-Central Ontario (MNRF, 2013b)]. This includes anthropogenically created / maintained / altered features as well as natural features.

Watershed – *An area that is drained by a river and its tributaries* (City of London, 2019).

Subwatershed - *Area drained by a stream or group of streams within the larger watershed. A subwatershed identifies streams, wetlands, forests, groundwater recharge, and other natural areas* (GRCA, 2020).

Wetland - 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 (MMAH, 2020).

In the City of London Wetlands are those that are evaluated for significance that do not meet the criteria for designation as a PSW per OWES, as confirmed by the MNRF. Examples of wetlands include:

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

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

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

Swamp - A mineral-rich wetland community characterized by a cover of coniferous or deciduous trees (Lee *et al.*, 1998).

Wetland Plant Species – Species that are found in wetlands in Ontario. Wetland plant species range from those species that occur primarily in wetlands (“wetland indicators”) to those species that occur in both wetlands and uplands (MNRF, 2014a).

Emergent - Herbaceous plants which rise out of the water (MNRF, 2014a).

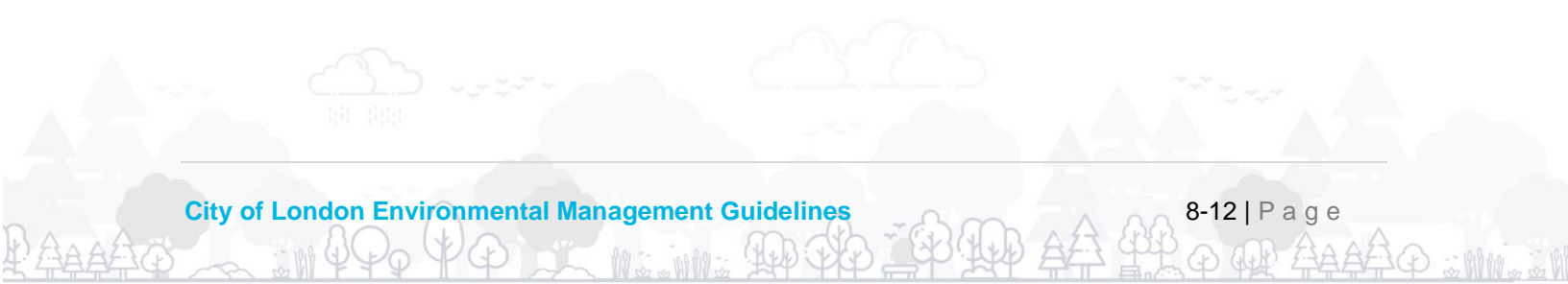
Floating - Rooted, vascular hydrophytes with leaves floating horizontally on or just above the water surface (MNRF, 2014a).

Submergent - Rooted hydrophytes with leaves entirely under the water surface (MNRF, 2014a).

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 nonmigratory species (MMAH, 2020).

Woodland – A treed community with 35 to 60% cover of coniferous or deciduous trees, (Lee *et al.*, 1998), 10% tree cover (as described in **Section 3.1.1** in these Environmental Management Guidelines) or 25% shrub cover (as described in **Section 3.1.1** in these Environmental Management Guidelines). In the *Provincial Policy Statement* woodland “means 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” (MMAH, 2020).



9. References

- Adamus, P.R. (2007). Best Available Science for Wetlands of Island County, Washington: Review of Published Literature. A Report Prepared in Response to Critical Areas Ordinance. Updating Requirements for Wetlands.
- Alani, A.M., and Lantini, L. (2020). Recent Advances in Tree Root Mapping and Assessment Using non-destructive testing methods: A focus on ground penetrating radar. *Surveys in Geophysics*: 41: 605-646
- Bakowsky, W. (1997). Southern Ontario Vegetation Communities. Natural Heritage Information Centre.
- Bakowsky, W., & Riley, J. L. (1993). A Survey of the Prairies and Savannas of Southern Ontario. Proceedings of the 13th North American Prairie Conference. Windsor.
- Ballantyne, M. and C. M. Pickering. (2015). REVIEW: The impacts of trail infrastructure on vegetation and soils: Current literature and future directions. *J Environ Manage.* 2015 Dec 1;164:53-64. Accessed at: <https://pubmed.ncbi.nlm.nih.gov/26342267/>
- Beacon Environmental. (2009). Restoration and Securement Strategy for Enhancing the Town of East Gwillimbury Natural Heritage System. 87 pp. East Gwillimbury, Ontario, Canada: Town of East Gwillimbury.
- Beacon Environmental. (2012, December). Ecological Buffer Guideline Review. Markham, Ontario, Canada: Credit Valley Conservation Authority.
- Beacon Environmental. (2014). Environmental Impact Study Compliance Monitoring. London, Ontario, Canada: City of London.
- Beak Consultants Ltd. (1995). Aquatic Resources Management Reports for Vision '96 Subwatersheds. Group 1, Groups 2/3, and Groups 4/5, London.
- Bekessy, S., Wintle, B., Lindenmayer, D., McCarthy, M., Colyvan, M., Burgman, M., & Possingham, H. (2010). The biodiversity bank cannot be a lending bank. *Conservation Letters*, 3, 151-158.
- Bergsma, B. (2004). City of London Process to Implement Policies and Develop Guidelines to Identify Ecologically Significant Woodlands. London.
- Bettinger, P., Boston, K., Siry, J.P., & Grebner, D.L.. (2016). *Forest Management and Planning*, Academic Press 2009, second edition December 2016.
- Bibby, C. J., Burgess, N. D., Hill, D. A., & Mustoe, S. H. (2000). *Bird Census Techniques (2nd Ed. ed.)*. Academic Press.
- Birds Canada. (2020). Birds Canada Webpage. Canada. Retrieved from <https://www.birdscanada.org/>
- BSC (Bird Studies Canada). (2009a). Marsh Monitoring Program Participant's Handbook for Surveying Amphibians. Bird Studies Canada in cooperation with Environment Canada and the U.S. Environmental Protection Agency.
- BSC (Bird Studies Canada). (2009b). Marsh Monitoring Program Participant's Handbook for Surveying Marsh Birds.
- Boutin, C., & Jobin, B. (1998). Intensity of agricultural practices and effects on adjacent habitats. *Ecological Applications*, 14(6), 1757-1765.
- Bowles, J. (2002). Regionally Rare Plants of Middlesex County.
- Bowles, J. M., Draper, W. B., Heagy, A., Kanter, M., & Larson, B. (1994). City of London Sub-Watershed Studies Life Science Inventories. London: City of London, Upper Thames River Conservation Authority.

- Bowles, J., & Bergsma, B. (1999). Components of the Natural Heritage System Guidelines for the Evaluation of Patches.
- Bowman, I. (1996). Species at Risk in Ontario - Report of the Rare, Threatened, and Endangered Task Force. Toronto: Ministry of Natural Resources and Forestry.
- Bricker, B., & Reader, R. (1999). The effect of woodlot size on woody species composition richness. In G. M. Allen, P. F. Eagles, & S. D. Price, *Conserving Carolinian Canada: Conservation Biology in the Deciduous Forest Region* (pp. 75-87). Waterloo, Ontario, Canada: University of Waterloo Press.
- Brosfokske, K. D., Chen, J. Q., Naiman, R. J., & Franklin, J. F. (1997). Harvesting effects on microclimatic gradients from small streams to uplands in western Washington. *Ecological Applications*, 7, 1188-1200.
- Brown, M. A., Clarkson, B. D., Barton, B. J., & Joshi, C. (2013). Ecological compensation: an evaluation of regulatory compliance in New Zealand. *Impact Assessment and Project Appraisal*, 31(1), 34-44.
- Bull, J. W., Milner-Gulland, E. J., Suttle, K. B., & Singh, N. J. (2014). Comparing biodiversity offset calculation methods with a case study in Uzbekistan. *Biological Conservation*, 178, 2-10.
- Bull, J., & Brownlie, S. (2017). The transition from No Net Loss to a Net Gain of biodiversity is far from trivial. *Oryx*, 51(1), 53-59.
- Burke, D. M., & Nol, E. (1998). Edge and fragment size effects on the vegetation of deciduous forests in Ontario, Canada. *Natural Areas Journal*, 18, 45-53.
- Butler, P., Iverson, L., Thompson III, F. R., Brandt, L., Handler, S., Janowiak, M., . . . Zegre, N. (2015). Central Appalachians forest ecosystem vulnerability assessment and synthesis: a report from the Central Appalachians Climate Change Response Framework Project. Newton Square, Pennsylvania, USA: U.S. Department of Agriculture, Forest Service, Northern Region.
- Burke, D., and E, Nol (1998). Influence of Food Abundance, Nest-Site Habitat, and Forest Fragmentation of Breeding Ovenbirds
- Cadman, M. D., Dewar, H. J., & Welsh, D. A. (1998). The Ontario Forest Bird Monitoring Program (1987-1998): Goals, methods and species trends observed. Canadian Wildlife Service.
- Canadensys. (2020). Database of Vascular Plants of Canada.
- Canadian Environmental Assessment Agency. (2016). Report on Plans and Priorities. Pp. 36
- Castelle, A. J., & Johnson, A. W. (2000). Riparian Vegetation Effectiveness. National Council for Improvement Technical Bulletin No. 799.
- Castelle, A. J., Johnson, A. W., & Conolly, C. (1994). Wetland and stream buffer size requirements - A review. *Journal of Environmental Quality*, 23, 878-882.
- Castelle, A.J., Conolly, C., Emers, M., Metz, E.E., Meyer, S., Witter, M., Mauermann, S., Erickson, T., and Cooke, S.S. (1992). Wetland Buffers: Use and Effectiveness. Adolfson Associates, Inc., Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia, Pub. No. 92-10.
- Catling, P. (2013). Using Coefficients of Conservatism and the Floristic Quality Index to Assess the Potential for Serious and Irreversible Damage to Plant Communities. *Canadian Field Naturalist*, 127(3), 285-288.
- Chapman, L. J., & Putnam, D. F. (1984). The Physiography of Southern Ontario. Special Volume 2(OGS Map P.2715), 3rd. Ontario, Canada: Ontario Geological Survey.
- City of Cambridge. (2018). Cambridge Official Plan. Pp. 363
- City of Guelph. (2018). Envision Guelph - The City of Guelph Official Plan. Guelph, Ontario, Canada.
- City of Guelph. (2020). Guidelines for the preparation of Environmental Impact Studies. Version 2. Pp. 123

- City of Hamilton. (2020). Low Impact Development (LID) – Stormwater Management. Retrieved from: <https://www.hamilton.ca/home-property-and-development/water-sewer/low-impact-development-lid-stormwater-management>
- City of Hamilton and ESAIEG. (2015). Environmental Impact Statement (EIS) Guidelines. Hamilton, Ontario, Canada.
- City of London. (1994). Guide to Plant Selection for Natural Heritage Areas and Buffers. London, Ontario, Canada: Council Approved March 22, 1994.
- City of London. (2004). Guidelines for Determining Setbacks and Ecological Buffers. London, Ontario, Canada: Council Approved April 20, 2004.
- City of London. (2007). City of London's Environmental Management Guidelines. London.
- City of London. (2014). City of London Urban Forest Strategy. London.
- City of London. (2016a). The London Plan. Official Plan, London.
- City of London. (2016b). Tree Protection By-law. London, Ontario.
- City of London. (2017). London Invasive Plant Management Strategy. 47 pp. London, Ontario, Canada.
- City of London. (2018). Tree Planting and Protection Guidelines. In Design Specifications and Requirements Manual (p. 36 pp.). London, Ontario.
- City of London. (2019). Design Specifications and Requirements Manual – 2003, Updated August 2019. London, Ontario: City of London - Environmental and Engineering Services.
- City of London. (2020). Standard Contract Documents for Municipal Construction - 2020 Edition. London, Ontario: City of London - Environmental and Engineering Services.
- City of Toronto. (2013). Natural Environment Trail Strategy. June 2013. 200 pp.
- City of Waterloo. (2020). City of Waterloo Official Plan. Pp. 444
- Couturier, A. (1999). Conservation Priorities for the Birds of Southern Ontario. Port Rowan: Bird Studies Canada.
- Crins, W. J. (1996). Life Science Gap Analysis for Site District 4E-3. Ontario Ministry of Natural Resources.
- de Foresta, H., Somarriba, E., Temu, A., Boulanger, D., Feuilly, H., & Gauthier, M. (2013). Towards the Assessment of Trees Outside Forests. Resources Assessment Working Paper 183.
- DeWalle, D.R. (2010). Modeling Stream Shade: Riparian Buffer Height and Density as important as buffer width. Journal of the American Water Resources Association. Vol 46, No. 2
- Dobbyn, J. S. (1994). Atlas of the Mammals of Ontario. Don Mills: Federation of Ontario Naturalists.
- Dobson, M. (1995). Arboriculture Research and Information Note: Tree Root Systems. Arboricultural Advisory and Information Service
- Dougan and Associates. (2020). CanPlant. Canada: Evergreen. Retrieved from <https://can-plant.ca/>
- Dreimanis, A., Vagners, U. J., McKenzie, G. D., & Etherington, J. R. (1964a). Pleistocene Geology of the St. Thomas Area (West Half). (Preliminary Geological Map No. 238). St. Thomas, Ontario: Ontario Department of Mines.
- Dreimanis, A., Vagners, U., McKenzie, G. D., & Etherington, J. R. (1964b). Pleistocene Geology of the St. Thomas Area (East Half). (Preliminary Geological Map No. P.606). St. Thomas, Ontario: Ontario Department of Mines.
- Environment and Climate Change Canada. (1994). Migratory Birds Convention Act, 1994 SC. 1994, c.22. Canada.
- Environment and Climate Change Canada. (2005). Beyond Islands of Green: A Primer for Using Conservation Science to Select and Design Community-based Nature Reserves. 80 pp. Downsview, Ontario, Canada.

- Environment and Climate Change Canada. (2017). Annex A: Environment Canada Experience with Conservation Allowances. Operation Framework for Use of Conservation Allowances. Canada.
- Environment Canada. (2002). Species at Risk Act, c. 29.
- Environment Canada. (2012). Canadian Aquatic Biomonitoring Network Field Manual for Wadeable Streams. Science and Technology Branch. 51 pp. Dartmouth, NS.
- Environment Canada. (2013). How Much Habitat is Enough? 3rd, 127 pp. Toronto.
- Fahrig, L. (2020). Why do several small patches hold more species than few large patches? *Global Ecology and Biogeography*, 29, 615-628.
- Fisheries and Oceans Canada. (1985). Fisheries Act R.S.C., 1985, c. F-14. Canada.
- Fisheries and Oceans Canada. (1994). Habitat Conservation and Protection Guidelines (First ed.).
- Fisheries and Oceans Canada. (2007). Isolated or Dry Open-Cut Stream Crossings. Fisheries and Oceans Canada Ontario Operational Statement, Version 1.0, 4 pp. . Ontario, Canada.
- Fisheries and Oceans Canada. (2019). Request for Review Form and Guidance. 11 pp. Canada.
- Fisheries and Oceans Canada. (2020). Aquatic Species at Risk Map. Canada. Retrieved from <https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html>
- Forest Breeding Bird Survey. (2008). Forest Bird Monitoring Program - Site Set-Up and Bird Survey Instructions. Guelph, Ontario: Canadian Wildlife Service.
- Forman, R. T. (1995). Land Mosaics: The Ecology of Landscapes and Regions. Island Press.
- Francis, C. M., Austen, M. J., Bowles, J. M., & Draper, W. B. (2000). Assessing Floristic Quality in Southern Ontario Woodlands. *Natural Areas Journal*, 20, 66-77.
- Freemark, K. E., & Collins, B. (1992). Landscape Ecology of Birds Breeding in Temperate Forest Fragments. In J. M. Hagan III, & D. W. Johnston, *Ecology and Management of Neotropical Landbirds* (pp. 443-454). Washington, D.C.: Manomet Bird Observatory, Smithsonian Institute Press.
- Fry, G., & Sarlov-Herlin, I. (1997). The ecological and amenity functions of woodland edges in the agricultural landscape: a basis for design and management. *Landscape and Urban Planning*, 37(1-2), 45-55.
- Geomatics International Inc. (1995). Management Options for Old-Field Sites in Southern Ontario - Guidelines and Literature Review. 17 pp. Ontario, Canada: Southern Region Science and Technology Transfer Unit.
- Gibbons, P. G., Evans, M., Maron, M., Gordon, A., Le Roux, D., von Hase, A., . . . Possingham, H. (2015). A loss-gain calculator for biodiversity offsets and the circumstances in which No Net Loss is feasible. *Conservation Letters*(Open Access), 1-11.
- Gilman, E. (2003). Branch-to-stem diameter ratio affects strength of attachment. *Journal of Arboriculture*, 29(5), 291-293.
- Government of Ontario. (2014). Tree Atlas found at: <https://www.ontario.ca/environment-and-energy/tree-atlas/>
- Grace, J. M., & Zarnoch, S. J. (2013). Influence of forest road buffer zones on sediment transport in the Southern Appalachian Region. In J. Guldin, *Proceedings of the 15th Biennial Southern Silvicultural Research Conference* (Vol. 175, pp. 387-493). Asheville, North Carolina, USA: U.S. Department of Agriculture, Forest Service, Southern Research Station.
- Grand River Conservation Authority (GRCA). (2005). Environmental Impact Study Guidelines and Submission Standards for Wetlands
- Greater Golden Horseshoe Conservation Authorities. (2006). Erosion and Sediment Control Guideline for Urban Construction.

- Gregory, R., Ohlson, D., & Arvai, J. (2006). Deconstructing adaptive management: criteria for applications to environmental management. *Ecological Applications*, 16(6), 2411-2425.
- Guzy, J. C., Halloran, K. M., Homyack, J. A., Thornton-Frost, J. E., & Willson, J. D. (2019). Differential responses of amphibian and reptile assemblages to size of riparian buffers within managed forests. *Ecological Applications*, 29(8), e01995.
- Harris, I. D., & Scheck, J. (1991). From Implications to Applications: The Dispersal Corridor Principle Applied to the Conservation of Biological Diversity. In D. A. Saunders, & R. J. Hobbs, *Nature Conservation 2: The Role of Corridors*. Surrey Beatty & Sons.
- Haspel, C., & Calhoun, R. E. (1991). Ecology and behavior of free-ranging cats in Brooklyn, New York. In L. W. Adams, & D. L. Leedy, *Wildlife Conservation in Metropolitan Environments* (pp. 27-30). Columbia, Maryland, USA: National Institute for Urban Wildlife Symposium.
- Hawkes, V. C., & Gregory, P. T. (2012). Temporal changes in the relative abundance of amphibians relative to riparian buffer width in western Washington, USA. *Forest Ecology and Management*, 274, 67-80.
- Hilditch, T. C. (1993). Use of Woodland Evaluation System in Municipal Planning. In S. Strobl (Ed.), *Significant Woodlands Workshop Proceedings* (pp. 29-34). Leslie M. Frost Natural Resources Centre.
- Hilty, J.A., Worboys, G.L., Keeley, A., Woodley, S., Lausche, B., Locke, H., Carr, M., Pulsford, I., Pittcock, J., White, J.W., Theobald, D.M., Levine, J., Reuling, Mo., Watson, J.E.M., Ament, R., & Tabor, G.M. (2020). Guidelines for Conserving Connectivity Through Ecological Networks and Corridors (Issue 30). International Union for the Conservation of Nature (IUCN). <https://portals.iucn.org/library/node/49061>
- Holmes, A. M., Hess, Q. F., Tasker, R. R., & Hanks, A. J. (1991). *The Ontario Butterfly Atlas*. (D. Friesen, Ed.) Altona.
- Houlahan, J.E., and Findlay, S.C. (2003). The effects of adjacent land use on wetland amphibian species richness and community composition. *Canadian Journal of Fisheries and Aquatic Sciences* 60: 1078-1094.
- Hounsell, S. W. (1989). *Methods for Assessing the Sensitivity of Forest Birds and their Habitats to Transmission Line Disturbances*. Toronto: Land Use and Environmental Planning Department, Ontario Hydro.
- Interagency Visitor Use Management Council (IUVMC). 2019. *Monitoring Guidebook: Evaluating the Effectiveness of Visitor Use Management*. Edition OCe, June 2019, 118 pp.
- International Union for Conservation of Nature. (2016). *Biodiversity Offsets*. Retrieved from <https://www.iucn.org/theme/business-and-biodiversity/our-work/business-approaches-and-tools/biodiversity-offsets>
- Jalava, J. V., Sorrill, P. J., Henson, J., & Brodri, K. (2000). *The Big Picture Project: Developing a Natural Heritage Vision for Canada's Southernmost Ecological Region*. Peterborough: Natural Heritage Information Centre.
- Jayasuriya, M. T. (2016). *Contrasting functional-based riparian management zones with the fixed-width buffer approach and how it relates to riparian management guidelines*. 156 pp. Syracuse, New York, USA: State University of New York, College of Environmental Science and Forestry.
- Johnson, R. G., & Temple, S. A. (1986). Assessing habitat quality for birds nesting in fragmented tallgrass prairies. In T. M. Verner, M. L. Morrison, & C. J. Rappi, *Wildlife 2000: Modelling Habitat Relationships of Terrestrial Vertebrates*. Madison, Wisconsin, USA: University of Wisconsin Press.
- Jones, C., Palmer, R. M., Motkaluk, S., & Walters, M. (2002). *Watershed Health Monitoring: Emerging Technologies*. CRC Press.
- Jones, C., Somers, K. M., Craig, B., & Reynoldson, T. B. (2007). *Ontario Benthos Biomonitoring Network Protocol*. Ontario Ministry of Environment.
- Koh, N. S., Hahn, T., & Ituarte-Lima, C. (2014). *A comparative analysis of ecological compensation programs: The effect of program design on the social and ecological outcomes*. Sweden: Uppsala University.

- Kuglerova, L., Agren, A., Jansson, R., & Laudon, H. (2014). Towards optimizing riparian buffer zones: Ecological and biogeochemical implications for forest management. *Forest Ecology and Management*, 334, 74-84.
- Lake Simcoe Region Conservation Authority. (2019). *Ecological Offsetting Policy*. 19 pp. Ontario, Canada.
- Lauenroth, W. K., & Gill, R. (2003). Turnover of root systems. *Root Ecology*, 61-89.
- Lee, H., Bakowsky, W., Riley, J., Bowles, J., Puddister, M., Uhlig, P., & McMurray, S. (1998). *Ecological Land Classification for Southern Ontario: First Approximation and Its Application*. Ministry of Natural Resources and Forestry.
- Lee, P., Smyth, C., and Boutin, S. (2004). Quantitative review of riparian buffer width guidelines from Canada and the United States. *Journal of Environmental Management*. 70: 165-180
- Lemieux, Christopher J., Aerin L. Jacob, and Paul A. Gray. 2021. *Implementing Connectivity Conservation in Canada*. Canadian Council on Ecological Areas (CCEA) Occasional Paper No. 22. Canadian Council on Ecological Areas, Wilfrid Laurier University, Waterloo, Ontario, Canada. vi + 216 pp.
- Leslie, H. (2018). Value of ecosystem-based management. *Proceedings of the National Academy of Sciences of the United States of America*. Vol 115, No. 14.
- Leuty, T. (1999). *Fact Sheet: Farm Tile Drains and Tree Roots*. Ontario, Canada: Ontario Ministry of Agriculture, Food and Rural Affairs.
- Lind, L., Hasselquist, E. M., & Laudon, H. (2019). Towards ecologically functional riparian zones: A meta-analysis to develop guidelines for protecting ecosystem functions and biodiversity in agricultural landscapes. *Journal of Environmental Management*, 249, 109391.
- Little, C., Cuevas, J. G., Lara, A., Pino, M., & Schoenholtz, S. (2015). Buffer effects of streamside native forests on water provision in watersheds dominated by exotic forest plantations. *Ecohydrology*, 8(7), 1205-1217.
- Macfarlane, D. M., Bredin, I. P., Adams, J. B., Zungu, M. M., Bate, G. C., & Dickens, C. W. (2015). *Preliminary guideline for the determination of buffer zones for rivers, wetlands, and estuaries*. Water Research Commission.
- Magee, D. (1996). *Preliminary List of the Area-Sensitive Breeding Birds*. Unpublished.
- Maron, M., Brownlie, S., Bull, J. W., Evans, M. C., von Hase, A., Quetier, F., . . . Gordon, A. (2018). The many meanings of no net loss in environmental policy. *Nature Sustainability*, 1(1), 19-27.
- Marshall Macklin Monaghan Ltd., Paragon Engineering Ltd., and Aquafor Beech Ltd. (1995). *City of London Subwatershed Studies Implementation Plan*. London.
- Matlack, G. R. (1993). Sociological edge effects: Spatial distribution of human impacts in suburban forest fragments. *Environmental Management*, 17(6), 153-164.
- McLachlan, S. M., & Bazely, D. R. (2003). Outcomes of longterm deciduous forest restoration in southwestern Ontario, Canada. *Biological Conservation*, 113(2), 159-169.
- McLaren, M. A., Konze, K., & Twiss, M. (1998). *Wildlife monitoring programs and inventory techniques for Ontario*. South Porcupine: Ontario Ministry of Natural Resources - Boreal Science Section.
- McWilliam, W., Eagles, P., Seasons, M., & Brown, R. (2012). Evaluation of planning and management approaches for limiting residential encroachment impacts within forest edges: A southern Ontario case study. *Urban Ecosystems*, 15(3), 753-772.
- Milne, R. J., & Bennett, L. P. (2007). Biodiversity and ecological value of conservation lands in agricultural landscapes of southern Ontario, Canada. *Landscape Ecology*, 22, 657-670.
- MECP (Ministry of Environment, Conservation, and Parks). (1990a). *Environmental Assessment Act, R.S.O. 1990, c. E.18*. Ontario.

MECP (Ministry of Environment, Conservation, and Parks). (1990b). Ontario Water Resources Act, R.S.O. 1990, c. Ontario.

MECP (Ministry of Environment, Conservation, and Parks). (2007). Endangered Species Act, 2007, S.O. 2007, c. Ontario.

MECP (Ministry of Environment, Conservation, and Parks). (2019). Management of Excess Soil - A Guide for Best Management Practices.

MMAH (Ministry of Municipal Affairs and Housing). (2017a). The Green Belt Plan, 2017 under the Greenbelt Act, 2005. 98 pp. Ontario, Canada: Queen's Printer for Ontario.

MMAH (Ministry of Municipal Affairs and Housing). (2017b). The Oak Ridges Moraine Conservation Plan, 2017 under the Oak Ridges Moraine Conservation Act, 2001. 88 pp. Ontario, Canada: Queen's Printer for Ontario.

MMAH (Ministry of Municipal Affairs and Housing). (2020). Provincial Policy Statement, 2020 under the Planning Act. 53 pp. Ontario, Canada: Queen's Printer for Ontario.

MNRF (Ministry of Natural Resources and Forestry). (1990). Conservation Authorities Act, R.S.O. 1990, c. Ontario.

MNRF (Ministry of Natural Resources and Forestry). (1997a). Fish and Wildlife Conservation Act, 1997, S.O. 1997, c. 41.

MNRF (Ministry of Natural Resources and Forestry). (1997b). Forest Management Guidelines for the Protection of the Physical Environment.

MNRF (Ministry of Natural Resources and Forestry). (2000a). A Silvicultural Guide to Managing Southern Ontario Forests.

MNRF (Ministry of Natural Resources and Forestry). (2000b). Significant Wildlife Habitat Technical Guide. Peterborough: Queen's Printer for Ontario.

MNRF (Ministry of Natural Resources and Forestry). (2004). Ontario Tree Marking Guide, Version 1.1. Ont. Min. Nat. Resour. Queen's Printer for Ontario. Toronto. 252 p.

MNRF (Ministry of Natural Resources and Forestry). (2006). Provincial Parks and Conservation Reserves Act, 2006, S.O. 2006, C. 12 - Bill 11. Ontario.

MNRF (Ministry of Natural Resources and Forestry). (2010a). Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales. Toronto: Queen's Printer for Ontario.

MNRF (Ministry of Natural Resources and Forestry). (2010b). Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005. Toronto: Queen's Printer for Ontario.

Ministry of Natural Resources and Forestry. (2011a). Bats and Bat Habitats: Guidelines for Wind Power Projects. Queen's Printer for Ontario.

MNRF (Ministry of Natural Resources and Forestry). (2011b). Ontario's Forest Management Guides: An Introduction. 18 pp.

MNRF (Ministry of Natural Resources and Forestry). (2012). Categorizing and Protecting Habitat under the Endangered Species Act, 2007. 8 pp. Toronto, Ontario: Species at Risk Branch, Policy Division.

MNRF (Ministry of Natural Resources and Forestry). (2013a). Species at Risk Branch – Best Practices Technical Note. 11 pp. Peterborough, Ontario

MNRF (Ministry of Natural Resources and Forestry). (2013b). The Stream Permanency Handbook for South-Central Ontario, 2nd Ed, 30 pp.

MNRF (Ministry of Natural Resources and Forestry). (2014a). Ontario Wetland Evaluation System Southern Manual Third Edition, Version 3.3. Queen's Printer for Ontario.

MNRF (Ministry of Natural Resources and Forestry). (2014b). Significant Wildlife Habitat Mitigation Support Tool.

- MNRF (Ministry of Natural Resources and Forestry). (2015a). Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E. Peterborough.
- MNRF (Ministry of Natural Resources and Forestry). (2015b). Survey Protocol for Blanding's Turtle (*Emydoidea blandingii*) in Ontario. Peterborough: Queen's Printer for Ontario.
- MNRF (Ministry of Natural Resources and Forestry). (2015c). Survey Protocol for Queensnake (*Regina septemvittata*) in Ontario. Peterborough: Species at Risk Policy Branch.
- MNRF (Ministry of Natural Resources and Forestry). (2016). Survey Protocol for Ontario's Species at Risk Snakes. Peterborough: MNRF Species Conservation Policy Branch.
- MNRF (Ministry of Natural Resources and Forestry). (2017a). A Wetland Conservation Strategy for Ontario 2017-2030. 52 pp. Toronto, Ontario, Canada: Queen's Printer for Ontario.
- MNRF (Ministry of Natural Resources and Forestry). (2017b). Ontario Stream Assessment Protocol - Version 10. (L. Stanfield, Ed.) Ontario, Canada: Fisheries Policy Section.
- MNRF (Ministry of Natural Resources and Forestry). (2017c). Survey Protocol for Species at Risk Bats within Treed Habitats, Little Brown Myotis, Northern Myotis, Tricolored Bat. Ministry of Natural Resources and Forestry, Guelph District.
- MNRF (Ministry of Natural Resources and Forestry). (2020). Natural Heritage Information Centre. Ontario, Canada. Retrieved from <https://www.ontario.ca/page/natural-heritage-information-centre>
- MNRF (Ministry of Natural Resources and Forestry). (2021). Birds and bird habitats: guidelines for windpower projects. Retrieved from <https://www.ontario.ca/page/birds-and-bird-habitats-guidelines-windpower-projects>
- Mitchell, G., & Crook, G. W. (1996). An Ontario Base Map terrain analysis toolbox for resource managers. NODA - Notes, Great Lakes Forestry Centre. Ontario, Canada.
- Moilanen, A., & Kotiaho, J. S. (2018). Fifteen operationally important decisions in the planning of biodiversity offsets. *Biological Conservation*, 227, 112-120.
- Morrison-Saunders, A., & Pope, J. (2013). Conceptualising and managing trade-offs in sustainability assessment. *Environmental Impact Assessment Review*, 38, 54-63.
- Noga, W., & Adamowicz, W. L. (2014). A Study of Conservation Offset Programs: Lessons Learned from a Review of Programs, Analysis of Stakeholder Perceptions, and Investigation of Transaction Costs. 65 pp. Ottawa, Ontario, Canada: Sustainable Prosperity.
- North-South Environmental. (2009). Inventory and Evaluation of Woodlands: City of London. London: City of London.
- Nottawasaga Valley Conservation Authority. (2019). Achieving Net Gains through Ecological Offsetting: Guidelines for Preparing a Site-Specific Ecological Offsetting Plan. Draft for Discussion, 20 pp. Ontario, Canada.
- Olden, A., Selonen, V. A., Lehtonen, E., & Kotiaho, J. S. (2019). The effect of buffer strip width and selective logging on streamside plant communities. *BMC Ecology*, 19(1), 9.
- Oldham, M. J. (1994). Natural Heritage Resources of Ontario: Mosses. 23 pp. Peterborough, Ontario: Natural Heritage Information Centre.
- Oldham, M. J. (2003). Conservation Status of Ontario Amphibians. Peterborough, ON: Natural Heritage Information Centre. Ontario Ministry of Natural Resources.
- Oldham, M. J. (2017). List of the Vascular Plants of Ontario's Carolinian Zone (Ecoregion 7E). 132 pp. Peterborough, Ontario: Carolinian Canada and Ministry of Natural Resources and Forestry.
- Oldham, M. J., & Brinker, S. R. (2009). Rare Vascular Plants of Ontario. Natural Heritage Information Centre.
- Oldham, M. J., & Weller, W. F. (2000). Ontario Herpetofaunal Atlas. Ontario, Canada: Natural Heritage Information Centre.

- Oldham, M. J., Bakowsky, W. D., & Sutherland, D. A. (1995). Floristic Quality Assessment System for Southern Ontario. Peterborough: Ministry of Natural Resources and Forestry.
- Oldham, M., Bakowsky, W., & Sutherland, D. (1995). Floristic Quality Assessment System for Southern Ontario.
- Ontario American Badger Recovery Team. (2010). Recover Strategy for the American Badger (*Taxidea taxus*) in Ontario. 27 pp. Peterborough, Ontario: Ministry of Natural Resources and Forestry.
- Ontario Breeding Bird Atlas. (2001). Ontario Breeding Bird Atlas Guide for Participants. Guelph, Ontario.
- Ontario Breeding Bird Atlas. (2002). Ontario Breeding Bird Atlas - Standardized Owl Surveys. Guelph: Bird Studies Canada, Federation of Ontario Naturalists, Canadian Wildlife Service, Ontario Field Ornithologists, and Ministry of Natural Resources and Forestry.
- Ontario Breeding Bird Atlas. (2007). The Atlas of the Breeding Birds of Ontario, 2001-2005. (M. D. Cadman, D. A. Sutherland, G. G. Beck, D. Lepage, & A. R. Couturier, Eds.) Toronto, Ontario, Canada: Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ministry of Natural Resources and Forestry, and Ontario Nature.
- Ontario Centre for Soil Resource Evaluation. (1993). Field Manual for Describing Soils in Ontario (4th ed.). Ontario, Canada: Publication No. 93-1.
- Ontario Institute of Pedology. (1985). Field Manual for Describing Soils (Third ed.). Guelph: Ontario Institute of Pedology, Guelph Agriculture Centre, and University of Guelph.
- Ontario Nature. (2019). Ontario Reptile and Amphibian Atlas. Ontario, Canada: Toronto Entomologists' Association. Retrieved from <https://www.ontarioinsects.org/herp/>
- Ontario Road Ecology Group. (2010). A Guide to Road Ecology in Ontario. 72 pp. Scarborough, Ontario
- Ontario (2009). Lake Simcoe Protection Plan
- Quin, A., Cabanettes, A., Andrieu, E., Deconchat, M., Roume, A., Vigan, M., & Larrieu, L. (2015). Comparison of tree microhabitat abundance and diversity in the edges and interior of small temperate woodlands. *Forest Ecology and Management*, 340, 31-39.
- Palone, R. S., & Todd, A. H. (1997). Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers. Radnor, Pennsylvania, USA: USDA Forest Service.
- Partners in Flight (PIF). (2020). Avian Conservation Assessment Database. Retrieved from Available at: <https://www.partnersinflight.org/wp-content/uploads/2016/07/SPECIES-OF-CONT-CONCERN-from-pif-continental-plan-final-spread-2.pdf>
- Poulton, D., & Bell, A. (2017). Navigating the Swamp: Lessons on Wetland Offsetting for Ontario. Ontario, Canada.
- Powell, J. S., & Babbitt, K. J. (2016). Buffer-mediated effects of clearcutting on in-pool amphibian productivity: Can aquatic processes compensate for terrestrial habitat disturbance? *Forests*, 8(1), 10.
- Powell, J. S., & Babbitt, K. J. (2015). An experimental test of buffer utility as a technique for pool-breeding amphibians. *PloS one*, 10(7).
- Powell, J. S., & Babbitt, K. J. (2015). Despite buffers, experimental clearcuts impact amphibian body size and biomass. *PloS one*, 10(11).
- Powney, G., Broaders, L., & Oliver, T. (2012). Towards a measure of functional connectivity: Local synchrony matches small scale movements in a woodland edge butterfly. *Landscape Ecology*, 27, 1109-1120.
- Pratt, W.A., and Fox, T.R. (2009). Streamside Management Zones Effectiveness for Protecting Water Quality after Forestland Application of Biosolids. *Journal of Environmental Quality*. 38:2106-2120
- Pyron, M. (2010). Characterizing Communities. *Nature Education Knowledge*, 3(10):39.
- Province of Ontario. (2020). *Public Lands Act*, R.S.O. 1990, c.P.43. Ontario.

- Renwick, W.H. (2009). Lakes and Reservoirs of North America in Encyclopedia of Inland Waters. 2250 pp. Millbrook, NY, USA.
- Region of Waterloo. (2016). Region of Waterloo Greenlands Network Implementation Guideline. Ontario, Canada.
- Richardson, J. S., Naiman, R. J., & Bisson, P. A. (2012). How did fixed-width buffers become standard practice for protecting freshwaters and their riparian areas from forest harvest practices? *Freshwater Science*, 31(1), 232-238.
- Riley, J. L. (1995). *Distribution and Status of the Vascular Plants of the Central Region*. Richmond Hill: Ontario Ministry of Natural Resources and Forestry.
- Riley, J. R., & Mohr, P. (1994). *The Natural Heritage of Southern Ontario's Settled Landscapes: a Review of Conservation and Restoration Ecology for Land-Use and Landscape Planning*. Aurora: Ministry of Natural Resources and Forestry.
- Sandilands, A. (1997). Memo to London ESA Committee April 9 1997 on Freemark and Collins (1992). London, Ontario.
- Sawatzky, M. E., & Fahrig, L. (2019). Wetland buffers are no substitute for landscape-scale conservation. *Ecosphere*, 10(4), e02661.
- Semlitsch, R. D., & Newbold, J. D. (2003). Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. *Conservation Biology*, 17, 1219-1228.
- Simmonds, J. S., Sonter, L. J., Watson, J. E., Bennun, L., Costa, H. M., Dutson, G., . . . Maron, M. (2019). Moving from biodiversity offsets to a target-based approach for ecological compensation. *Conservation Letters*(Open Access), 1-11.
- Smith, P. G., & Theberge, J. B. (1987). Evaluating natural areas using multiple criteria: Theory and practice. *Environmental Management*, 11, 447-460.
- Soil Classification Working Group. (1998). *The Canadian System of Soil Classification* (Third ed.). Agriculture and Agri-Food Canada.
- Solyman, B. (2005). *A Stewardship Guide to Grasslands in Southern Ontario: An Introduction for Farmers and Rural Landowners*. 34 pp. Ontario, Canada: Ontario Barn Owl Recovery Project.
- Strong, W. L., Oswald, E. T., & Downing, D. J. (1990). *The Canadian Vegetation Classification System: First Approximation* (Vol. 25). (Canada Committee on Ecological Land Classification, & National Vegetation Working Group, Eds.) Ottawa, Ontario, Canada.
- Sweeney, B. W., & Newbold, J. D. (2014). Streamside forest buffer width needed to protect stream water quality, habitat, and organisms: A literature review. *Journal of the American Water Resources Association*, 50(3), 560-584.
- Thompson, B. (2015). Recreational trails reduce the density of ground-dwelling birds in protected areas. *Environmental Management*. 2015 May; 55(5):1181-90. Accessed at: <https://pubmed.ncbi.nlm.nih.gov/25813628/>
- Teply, M., McGreer, D., & Ceder, K. (2014). Using simulation models to develop riparian buffer strip prescriptions. *Journal of Forestry*, 112(3), 302-311.
- Terra Geographical Studies Inc. (1994). *Draft Terrestrial Resource Strategy*. Ontario.
- Toronto and Region Conservation Authority. (2018). *Guideline for Determining Ecosystem Compensation*. 46 pp. Ontario, Canada.
- Toronto and Region Conservation Authority (TRCA). (2019a). *Erosion and Sediment Control Guide for Urban Construction*. 235pp. Ontario, Canada.

- Toronto and Region Conservation Authority (TRCA). (2019b). Trails Strategy for the Greater Toronto Region. September 2019, 63 pp.
- Toronto Entomologists' Association. (2018). Ontario Butterfly Atlas. Ontario, Canada. Retrieved from <https://www.ontarioinsects.org/atlas/>
- Troy, A., & Bagstad, K. (2009). Estimating Ecosystem Services in Southern Ontario. Ontario Ministry of Natural Resources and Forestry.
- UTRCA (Upper Thames River Conservation Authority). (1997). Oxford County Terrestrial Ecosystems Study: A Natural Heritage Study for Oxford County. London.
- UTRCA (Upper Thames River Conservation Authority). (2003). Middlesex County Natural Heritage Systems Study. London.
- UTRCA (Upper Thames River Conservation Authority). (2014). Middlesex Natural Heritage Systems Study: A Study to Identify Natural Heritage Systems in Middlesex County. London.
- UTRCA (Upper Thames River Conservation Authority). (2017). Environmental Planning Policy Manual for the Upper Thames River Conservation Authority.
- Valdes, A., Lenoir, J., De Frenne, P., Andrieu, E., Brunet, J., Chabrierie, O., . . . Decocq, G. (2020). High ecosystem service delivery potential of small woodlands in agricultural landscapes. *Journal of Applied Ecology*, 57(1), 4-16.
- Vanneste, T., Govaert, S., Spicher, F., Brunet, J., Cousins, S. A., Decocq, G., . . . De Frenne, P. (2020). Contrasting microclimates among hedgerows and woodlands across temperate Europe. *Agricultural and Forest Meteorology*, 281, 107818.
- Woodard, S. E., & Rock, C. A. (1995). Control of residential stormwater by natural buffer strips. *Lake and Reservoir Management*, 11(1), 37-45.
- zu Ermgassen, S. O., Baker, J., Griffiths, R. A., Strange, N., Struebig, M. J., & Bull, J. W. (2019). The ecological outcomes of biodiversity offsets under "no net loss" policies: A global review. *Conservation Letters*, 12(6), e12664.

Appendix A

EMG Process Flowchart

Appendix B

Environmental Scoping Checklist

APPENDIX B - Environmental Study Scoping Checklist

Application/Project Name: _____
Proponent: _____ Date: _____
Proposed Project Works: _____
Study Type: _____
Lead Consultant: _____
Key Contact: _____
Subconsultants: _____

Technical Review Team:
<input type="checkbox"/> Ecologist Planner: _____ <input type="checkbox"/> Province – Species at Risk: _____
<input type="checkbox"/> Planner for the File: _____ <input type="checkbox"/> Province - Other: _____
<input type="checkbox"/> Conservation Authority: _____ Contact: _____
<input type="checkbox"/> EEPAC: _____ <input type="checkbox"/> Other: _____
<input type="checkbox"/> Project Manager, Environmental Assessment: _____
<input type="checkbox"/> First Nation(s): _____

Subject Lands and Study Area:

Location/Address and Size (ha) of Subject Lands:

Study Area Size (approximate ha): _____ Map (attached): _____

Position of Site in Subwatershed: _____

Tributary Fact Sheet: _____

Is the proposed location within the vicinity of the Thames River (<120 m)? Yes No

If Yes, initiate engagement with local First Nation communities. Consultation activity to be provided at Application Review stage.

Policy:

- Study must demonstrate how it conforms to the Provincial Policy Statement
- Study must demonstrate how it conforms to *The London Plan*

Map 1 Place Types:

- Green Space
- Environmental Review

Other Place Types: _____

Map 4 Active Mobility Network:

Pathway placement and future trail accesses shall be considered as part of this study.

Map 5 Natural Heritage System:

(Subject Lands and Study Area delineated on current aerial photographs)

- | | |
|--|---|
| <input type="checkbox"/> Provincially Significant Wetland | Name: _____ |
| <input type="checkbox"/> Wetlands | <input type="checkbox"/> Unevaluated Wetlands* |
| <input type="checkbox"/> Area of Natural & Scientific Interest | Name: _____ |
| <input type="checkbox"/> Environmentally Significant Area | Name: _____ |
| <input type="checkbox"/> Potential ESAs | <input type="checkbox"/> Upland Corridors |
| <input type="checkbox"/> Significant Woodlands | <input type="checkbox"/> Woodlands |
| <input type="checkbox"/> Significant Valleylands | <input type="checkbox"/> Valleylands |
| <input type="checkbox"/> Unevaluated Vegetation Patches | <input type="checkbox"/> Potential Naturalization Areas |
- Patch No. _____

** ELC (air photo interpretation and / or previous studies) may identify potential wetlands or other potential features not captured on Map 5.*

Map 6 Hazards and Natural Resources:

Maximum Hazard Line Conservation Authority Regulation Limit (and text based regulatory limit) – Project falls under *Conservation Authority Act* Section 28

Required Field Investigations:

Aquatic:

- Aquatic Habitat Assessment: _____
- Fish Community (Collection): _____
- Spawning Surveys: _____
- Benthic Invertebrate Survey: _____
- Mussels: _____
- Other: _____

Wetlands:

- Wetland Delineation: _____
- Wetland Evaluation (OWES): _____
- Other: _____

Terrestrial (Wetland, Upland and Lowland):

- Vegetation Communities (ELC): _____
- Botanical Inventories Winter Spring Summer Fall
- Breeding Bird Surveys (type & frequency): _____
- Raptor Surveys: _____ Shoreline Birds: _____
- Crepuscular Surveys: _____ Grassland Surveys: _____
- Amphibian Surveys (type & frequency): _____
- Reptile Surveys:
 - Turtle (type & frequency): _____
 - Snake (type & frequency): _____
 - Other (type & frequency): _____
- Bat Habitat, Cavity & Acoustic Surveys: _____
- Mammal Surveys: _____
 - Winter Wildlife Surveys: _____
- Butterflies (Lepidoptera): _____
- Dragonflies / Damselflies (Odonata): _____
- Species at Risk Specific Surveys: _____
- Species of Conservation Concern Surveys: _____
- Significant Wildlife Habitat Surveys: _____
- Other field investigations: _____

Supporting Concurrent Studies/Investigations:

- Hydrogeological/Groundwater: _____
- Surface Water/Hydrology: _____
- Water Balance: _____
- Fluvial Geomorphological: _____
- Geotechnical: _____
- Tree Inventory: _____
- Other: _____

Evaluation of Significance:

Federal:

- Fish Habitat Other Federal: _____
- Species at Risk (SARA)

Provincial:

- Provincially Significant Wetlands
- Significant Woodlands
- Significant Valleylands
- Significant Wildlife Habitat Ecoregion 7E
- Areas of Natural & Scientific Interest
- Fish Habitat
- Water Resource Systems
- Species at Risk (ESA): _____

Municipal/London:

- Environmentally Significant Areas (ESAs), Potential ESAs
- Significant Woodlands, Woodlands
- Significant Valleylands, Valleylands
- Wetlands, Unevaluated Wetlands
- Significant Wildlife Habitat
- Unevaluated Vegetation Patches
- Other Vegetation Patches >0.5 ha
- Potential Naturalization Area
- Other: _____

Impact Assessment:

- Impact Assessment Required
- Net Effects Table Required

Environmental Management Recommendations:

- Environmental Management Plan: _____
- Specifications & Conditions of Approval: _____
- Other: _____

Environmental Monitoring:

- Baseline Monitoring: _____
- Construction Monitoring: _____
- Post-Construction Monitoring: _____

Additional Requirements and Notes:

Lined area for notes and requirements. The area contains 28 horizontal lines for text entry.

Appendix C

Data Collection Standards

APPENDIX C – Data Collection Standards

Understanding the features and functions of natural areas is considered central to the assessment of significance and to the evaluation of potential impacts of development and recommendations of environmental management strategies. The following sections provide insight into the methodologies and standards required for data collection for informing natural heritage studies within the City of London.

Background

The identification and evaluation of natural features and ecological functions form the basis for assessing the effects of a proposed development on an area and its adjacent lands. It is critical to obtain sufficient, accurate information on the existing conditions of natural heritage features and their functions to ensure an informed impact assessment for a proposed development or infrastructure project (MNRF, 2010a). Inventory protocols (as outlined below) provide a standard for effectively evaluating the existing abiotic and biotic elements of natural heritage features and provide strong field data to inform impact assessment, mitigation, and monitoring for proposed development or infrastructure projects. It may be necessary to use multiple assessment methodologies to capture all data (e.g., Marsh Monitoring auditory surveys and SWH visual assessment).

Further, the intention of Data Collection Standards is to ensure that all new information collected for various studies, including EIS, uses a similar approach and format so that it may be entered into regional databases and compared with existing information. The size of the study area should not affect the ability to make comparative evaluations. Watershed and sub-watershed studies establish a robust baseline of information from which comparative evaluations can be made.

For some natural heritage features and areas, the level of effort required to determine significance may be made at a landscape level (e.g., Significant Woodlands), without conducting a detailed site inventory. However, it is important to collect all levels of information required at the landscape, community, and species levels to address the potential for impacts. The specific elements required for the natural heritage inventory and analysis component of an EIS will vary depending on the size, type, location of the development, and the natural feature that may experience negative impacts. Important elements of study for any given EIS will be selected from a detailed list, however not all elements will need to be included in every EIS (refer to **Section 2.6**).

Guidelines for Data Collection

An Environmental Study must be based on data that is considered current and collected using established protocols and standards, including data collected by the proponent as it informs the analysis, recommendations, and conclusions that are provided within the EIS. Field data reflects the site conditions at the time of collection, however over time conditions on site can change due to a variety of reasons (e.g., vegetation growth, disturbances, and shifts in vegetation community composition). These changes in conditions can affect the accuracy and applicability of the field data. The “shelf life” of field data can vary depending on the type of data, the site, or the surrounding conditions.

Where relatively current data (up to 5 years) is available for the site and it meets the City of London’s Data Collection Standards (outlined in this document), it may be applied to meet some of the requirements for three- or five-season inventory (as determined through consultation with the City of London). However, a minimum of two wildlife/ecological site visits will still be required to verify and document current/existing conditions, unless otherwise specified in the ESSC. The timing of the site visits will be made to supplement information gaps, confirm significant, rare and sensitive features, delineate ecological boundaries, and to identify site specific impact, mitigation, and management requirements. Where there is older inventory information available (5 to 10 years) it must be confirmed through current inventory studies. The existing data (assuming it meets the City of London’s Data

Collection Standards) may be used to supplement current field studies and provide historical context and population, species, vegetation trends, and changes over time. The use of these data to supplement or replace the need for more current inventory will be evaluated on a case-by-case basis in consultation with the City of London.

It is recommended that reputable citizen science data sources, such as iNaturalist and the Ontario Reptile & Amphibian Atlas, be reviewed when conducting a background review to supplement data obtained by the consultant team.

Inventory Protocols

Multi-season inventories must be conducted during optimal sampling conditions and with sufficient sampling effort, such that data is of sufficient quality to assess the presence and significance of natural heritage features and functions. Optimal sampling conditions and the necessary sampling effort differ among taxa and should be determined based on species-specific protocol recommendations and / or estimates of detection probability. Sampling design will be determined during pre-consultation using the protocols included in these guidelines. Typical timeframes, in accordance with seasonal timing windows, for various, inventory types include, but are not limited to, the following:

1. Early Spring (late March/early April)

- Amphibians

2. Spring (late April – May)

- Amphibians, Reptiles, Vascular Plants, Vegetation Communities, Breeding Birds (May)

3. Early Summer (June)

- Amphibians, Breeding Birds, Mammals (including Bat acoustic surveys), Vascular Plants, Vegetation Communities, Aquatic Communities and Habitat, Butterfly and Insect Monitoring

4. Summer (early July/early August)

- Vegetation Communities, Significant Wildlife Habitat, Vascular Plants, Butterflies and Insects

5. Fall (September-October)

- Migratory Birds Vascular Plants, Vegetation Communities Reptiles, Mammals, Butterflies and Insects

6. Winter (November-February)

- Bat Leaf off surveys, Winter wildlife surveys

An outline of the comprehensive inventory protocols for species occurring in the study area and adjacent lands must be conducted by qualified professionals in the appropriate seasons as described below. When applicable, Provincial species-specific protocols should be used to document SAR. New and emerging techniques not listed below may be considered and / or required as determined in consultation with the City of London and other applicable agencies to ensure robust and accurate inventory results.

1. **Vegetation Communities** A survey of vegetation community types should be undertaken during the main growing season, preferably over three different seasons, spring, summer and fall (generally during the period late May to early September). Community description should follow the Ecological Land Classification (ELC) for southern Ontario (Lee *et al.*, 1998) to Vegetation Community Type, or contain an equivalent or greater level of structural and floristic detail. The report should present both a description of the communities and vegetation maps superimposed on an air photo or a base map of scale 1:5 000 that shows contours and water courses.

For each community type the following technical information should be included:

- A full list of vascular plant species present and an indication of their abundance.
- An assessment of soil type(s), drainage regime and moisture regime.
- An identification of the ELC Class, Series, Ecosite, Vegetation Type (Lee *et al.*, 1998).
- The element ranking for each ELC Vegetation Type (Bakowsky, 1997).
- An annotated assessment of community condition through the calculation of the Floristic Quality Index (Oldham *et al.*, 1995) or another current, equivalent community assessment method including the number of native species, number of non-native species, number of conservative species (conservatism coefficient ≥ 7), mean conservatism coefficient of native species, and sum of weediness scores.
- A summary of tree species, with age and / or size class distribution, including basal area by size class.
- Other indications of community condition including amount of decayed coarse woody debris.

2. **Vascular Plants**

- A survey of vascular plants should be carried out during April-May for spring ephemerals, June-August to capture summer flowering periods and September-October to capture fall flower periods. Surveys should have regard to weather variability in a given year.
- Locations of globally, nationally, provincially and regionally rare vascular plant species should be mapped, and the extent of habitat for each species outlined. Recommendations should be made for additional protection of rare species.
- Nationally rare species as listed in the NHIC website; species with a global rank (G-rank) for G1 to G3 (Oldham and Brinker, 2009; NHIC website), or with a COSEWIC status of Endangered, Threatened, or Special Concern.
- Provincially rare species are those listed with a sub-national rank (S-rank) of S1 to S3 (NHIC website) and MNRF SAR in Ontario (Bowman, 1996) and COSSARO.
- Regional rarity status should be assessed using Oldham and Brinker (2009), Oldham (2017), or from the best available information.

3. **Breeding birds** – Breeding and migratory bird surveys should be conducted as follows:

- Main breeding season surveys as outlined by Cadman *et al.* (1998): a minimum of two surveys, at least a ten days apart, between May 24-July 10. The first survey should take place May 24 – June 17, and the second June 15 – July 10.
 - Surveys to occur 5:00 to 10:00 a.m. for breeding bird survey (Cadman *et al.*, 1998)
 - Time of day and weather conditions consistent with the Ontario Breeding Bird Atlas participant's guide (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 survey for crepuscular species (e.g., American Woodcock, Common Nighthawk) in accordance with standardized protocols as outlined in OBBA (2001).
- Nocturnal owl surveys usually consist of two surveys in the spring and should be conducted in accordance with the OBBA Standardized Owl Survey Protocol (OBBA, 2002).
- Where suitable, marsh breeding bird surveys should be conducted in accordance with Marsh Breeding Bird Program standard survey techniques (BSC, 2009b).

- Where candidate Raptor Wintering Areas are identified, winter raptor surveys should be conducted to confirm SWH in accordance with the Bird and Bird Habitats: Guidelines for Windpower Projects (MNRF, 2015a; MNRF, 2021).
- Field data (such as breeding evidence, behaviours, SAR occurrences) should be collected and documented in accordance with standard protocols as above, included in mapping (i.e., aerial photography), and following standard terminology (e.g., codes, symbols; OBBA, 2001; Forest Breeding Bird Survey, 2008).

4. *Herpetofauna*

- Surveys for newts and mole salamanders, where required, should be conducted during seasonal migration (mid March – late April) and may include a combination of minnow traps, visual surveys (e.g., carefully flipping suitable cover, observing vernal pool egg masses), pitfall or funnel traps, or fine mesh dip nets may be required as outlined in McLaren *et al.* (1998). Consultation with local experts and the MNRF is recommended for determining the timing (as surveys are highly weather dependent to capture migration) and specific survey techniques to be used based on location, species, etc.
- Surveys to confirm presence of lungless salamanders should take place in spring or fall as outlined in the Joint EMAN / Parks Canada National Monitoring Protocol for Plethodontid Salamanders (Zorn *et al.*, 2004).
- Anuran surveys consist of documenting calls and should be conducted in accordance with the standardized Bird Studies Canada's Marsh Monitoring Program protocol for amphibians (BSC, 2009a). Surveys should be conducted as close to suitable breeding sites as possible (and preferably directly adjacent) and surveyors should record direction, distance, and call codes (BSC, 2009a).
- Observational surveys are required during the spring (between March-June) when amphibians are concentrated around suitable breeding habitat in wetlands and woodlands. (MNRF, 2000b)
- Turtle surveys may consist of nesting surveys (late May – early July) in suitable nesting habitat or along gravel shoulders of roads, as well as visual encounter surveys to detect basking turtles following Ministry of Natural Resources and Forestry protocol for Blanding's Turtle (MNRF, 2015b).
- Snake surveys may consist of the following techniques, as required:
 - Visual Encounter Surveys searches between late April and late June (Ministry of Natural Resources and Forestry Survey Protocol for Species at Risk Snakes; MNRF, 2016).
 - Hibernacula searches may be required and consist of visual encounter surveys to detect basking snakes during the first sunny, warm days in early spring.
 - Cover board surveys may be conducted where appropriate.
 - Wildlife Scientific Collector's Authorization (under the *Fish and Wildlife Conservation Act*), along with an associated Animal Care Protocol approved by the MNRF Wildlife Care Committee, and may be required for any surveys that require handling of snakes.
 - Queensnake (*Regina septemvittata*) surveys along the Thames River may be required and should be conducted in accordance with the standard Survey Protocol for Queensnake in Ontario (MNRF, 2015c).
- Resources for identification of herpetofauna egg and larval stages should be utilized (e.g., <http://www.torontozoo.com/adoptapond/resources>)

5. **Mammals**

- Bats, SAR Bats, and Bat Habitat (SWH): Criteria from the Significant Wildlife Habitat Technical Guide (2000) should be considered to determine bat related SWH. Further, the Survey Protocol for Species at Risk Bats within Treed Habitats (MNR, 2017b) and Bat and Bat Habitats: Guideline for Wind Power Projects (MNR, 2011b) documents provide additional information for surveying for bats and associated habitat.
 - Surveys may include bat cavity assessments, exit surveys to confirm presence, and bat acoustic monitoring to determine species composition, etc.
 - Correspondence with the Province and the City of London may be required to determine the design and amount of surveys required.
- Other mammals (e.g., deer, badgers, moles): Surveys may be required for other mammal-related SWH or SAR mammals with appropriate methodologies determined in consultation with the Province and / or the City of London.
- Incidental mammal observations, including scat and tracks, should be recorded and included within reports. Identification resources are useful for determining mammal species present within a study area.
 - Mammal identification and Tracking Guide: <https://www.forestsontario.ca/wp-content/uploads/2016/04/Mammal-Identification-and-Tracking-Guide.pdf>

6. **Non-target wildlife**

All species incidentally observed or detected during fieldwork (e.g., Lepidoptera, Odonata, mammals, birds, herpetofauna) should be identified, recorded and integrated into report findings. As much information about the incidental wildlife should be recorded as possible including, but not limited to, species, age, photographic evidence, location, habitat, and behaviour. Incidental observations can provide insight into the environmental conditions of the site and potential SWH.

7. **Aquatic communities and habitats survey:**

A survey of aquatic communities and habitats should be completed at the most appropriate times for sampling various species over the course of a year and should be completed to supplement data obtained during the background review, if necessary. The scope (i.e., level of detail) and need should be determined based on agency requirements and presence of current (i.e., within the last five years) data appropriate for the particular level of study. Technical data requirements will be determined in consultation with the City of London and may include, but is not limited to the following:

Fish Community Inventory

- Fish community inventories might not be necessary if current, appropriate data are available and obtained through consultation with DFO, the Province, local Conservation Authorities and / or the City of London.
- In the event that fish community inventories are required, they should be scoped with the appropriate regulatory agency (e.g., DFO, the Province, local Conservation Authorities and / or the City of London) based on project requirements
- Assuming fish community inventories are required, presence / absence surveys should be conducted using sampling gear appropriate to the water features, time of year, and (if appropriate) species / type of fish targeted (e.g., seine, minnow traps and electrofishing)
- Dependent upon project / agency requirements, detailed data and analysis might be required, and would be identified through consultation with the appropriate regulatory agency. Data gathering and analysis might consist of the following:

- Index of Biotic Integrity (IBI; Steedman, 1988)
- Ontario Stream Assessment Protocol (MNR, 2017c)

Benthic Survey

- Typically includes qualitative and quantitative sampling of benthic macroinvertebrates
- Scope and specific data analysis tools should be determined on a project specific basis with appropriate regulatory agencies
- For example: Ontario Benthos Biomonitoring Network Protocol Manual (Jones *et al.*, 2007), Canadian Aquatic Biomonitoring Network (Environment Canada, 2012).

Habitat Assessment and Stream Analysis

- Target Habitat Suitability Index (I) are habitat models developed for specific target species.
- Water chemistry (e.g., dissolved oxygen, temperature, pH, conductivity)
- Watercourse morphology (e.g., bankfull width, depth, stream order)
- Substrate composition
- Riparian (i.e., within 30 m of the bank or as per mandated project-specific protocol) and in-water cover
- Surrounding land uses (i.e., beyond the immediate riparian area)

8. Significant Wildlife Habitat (SWH):

- All candidate SWH criteria should be surveyed using current accepted methodologies;
- SWH surveys should be consistent with the current Significant Wildlife Habitat Technical Guide (MNR, 2000b), Significant Wildlife Habitat Mitigation Support Tool (MNR, 2014b), and the most current Ministry SWH Criteria Schedules for Ecoregion 7E (MNR, 2015a);
- SWH surveys should be consistent with additional considerations outlined in *The London Plan – Policy 1352 - 1355*; and,

9. Regionally Rare Species

Documentation of regionally rare species should include presence absence, population size, habitat, and any other pertinent information (e.g., nesting areas, dens, etc.) and be included in mapping as appropriate population size, condition, and the significance of the site for all regionally rare species. Regional status for Middlesex County should be assessed based on the best available information including, but not limited to:

- Mammals (Dobbyn, 1994)
- Breeding birds (OBBA, 2007; current atlas updates; Partners in Flight, 2020)
- Butterflies (Holmes *et al.*, 1991; Toronto Entomologists' Association, 2018)
- Damselflies and Dragonflies
- Herpetofauna (Oldham and Weller, 2000; Oldham, 2003; Ontario Nature, 2019)
- Vegetation (Oldham, 2017)

10. Species at Risk (SAR)

If potential suitable habitat for SAR (as listed in *O. Reg. 230/08: SPECIES AT RISK IN ONTARIO LIST*) is encountered and is not covered in the above inventory protocols, Provincial species-specific protocols (<https://www.ontario.ca/page/species-risk-guides-and-resources>) should be used in consultation with the Province

and the City of London (through scoping). Targeted surveys may be required, as determined through the scoping process in consultation with the City of London and the Province, based on the presence of suitable habitat, confirmed sightings, along with the potential impacts associated with a given development or infrastructure project.

Appendix D

Woodland Evaluation Form

Appendix D: Woodland Evaluation Criteria

The London Plan – Criterion 1341 1.

The woodland contains natural features and ecological functions that are important to the environmental quality and integrity of the NHS. These include site protection (hydrology and erosion/ slope) and landscape integrity (richness, connectivity and distribution).

The London Plan – Criterion 1341 2.

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

The London Plan – Criterion 1341 4.

The Woodland provides significant habitat for endangered or threatened species.

The London Plan – Criterion 1341 5.

The Woodland contains distinctive, unusual or high-quality natural communities or landforms.

Consistent with **The London Plan** a woodland will be considered significant if it meets either of the following evaluation scores:

- If one or more criteria meet the standard for High; or
- If five or more criteria meet the standard for Medium.

London Plan Criterion					<u>SCORE</u>
Criterion 1.1 – Site Protection	A) Presence of hydrological features within or contiguous with the patch.	HIGH – one (1) or more hydrological features (as described above) located within or contiguous with the patch.	MEDIUM – within 50 m of a hydrological feature.	LOW – no hydrological features present within 50 m of the patch.	High Medium Low
	B) Erosion and Slope Protection	HIGH – patch present on steep slopes >25% of any soil type, OR on a remnant slope associated with other features such as moraines or remnant valley slopes no longer continuous with the river system OR on moderate to steep slopes >10% - 25% with erodible soils (silty loam, sandy loam and loam, fine to coarse sands).	MEDIUM – patch present on moderate to steep slopes > 10% - 25% with less erodible soils (heavy clay and clay, silty clay)	LOW – Patch present on gentle slopes < 10% with any soil type.	High Medium Low
Score for Criterion 1.1 is based on the highest standard achieved between the two measures.					
Criterion 1.2 – Landscape Integrity (Richness, Connectivity and Distribution)	D) Landscape Richness	HIGH – > 10% local vegetation cover	MEDIUM – 10% local vegetation cover	LOW – < 7% local vegetation cover.	
	E) Landscape Connectivity (linkage and distance between patches not separated by permanent cultural barriers).	HIGH – patches directly connected by: A) waterways or riparian habitat (generally primary or secondary aquatic corridors and streams with bridges and/or underpasses: for example, Thames, Dingman, Medway, Stoney, Pottersburg, Kettle, Dodd, Sharon, Oxbow,	MEDIUM – patches indirectly connected by: i. habitat gaps < 40 m; k. areas identified as Anti-fragmentation, Terrestrial Corridor, Big Picture Corridor (https://caroliniancanada.ca/legacy/ConservationPrograms_BigPictureMaps.html) to enhance the viability of isolated woodlands by re-connection, buffering, expanding OR to infill disturbed areas or replace abandoned fields (Riley & Mohr,	LOW – patches not connected due to the presence of permanent cultural barriers: vi. major roads and highways with no culverts;	

		Kelly, Stanton, Mud, Crumlin); B) Contiguous or semi-contiguous habitat.	1994); a. abandoned rails, utility rights-of-way (hydro corridors, water/gas pipeline); b. Open space greenways and golf courses; c. Active agriculture or pasture; d. Watercourses connected by culverts; and, e. First or second order streams that exhibit channelized morphology.	vii. urban or industrial development, large parking lots; viii. infrastructure; ix. dams, buried watercourses, channelized third or greater order watercourses; and, x. active recreational land-uses (campground, parks with major facilities – community centres, arenas).	
	F) Patch Distribution (isolation & arrangement of patches / patch clusters).	HIGH – patch clusters with total area > 40 ha OR identified as a Big Picture Meta Core (Carolinian Canada, 2000).	MEDIUM – patch clusters with total area 20 – 40 ha.	LOW – patch clusters with total area < 20 ha.	
Score Criterion 1.2 based on the highest standard achieved for any one of the three standards.					
Criterion 2.1 – Age and Site Quality	C) Community Successional Stage / Seral Age	HIGH – patch contains one (1) or more mature or older growth communities	MEDIUM – patch contains one (1) or more mid-aged communities	LOW – patch contains only pioneer to young communities	
	D) Mean Coefficient of Conservatism (MCC) of communities or whole patch	HIGH – one (1) or more vegetation community with an MCC ≥ 4.6; OR MCC of patch > 4.5	MEDIUM – one (1) or more vegetation community with an MCC 4.2 – 4.5; OR MCC of patch ≥ 4.0 – 4.5	LOW – all vegetation communities with an MCC < 4.2; OR MCC of patch < 4.0.	
Score Criterion 2.1 based on the highest standard achieved between the two measures.					
Criterion 2.2 – Size and Shape	D) Patch Size	HIGH Patch > 9.0 ha in size OR patch contains a woodland >4 ha.	MEDIUM Patch 2.0 – 9.0 ha in size OR patch contains a woodland 2-4 ha.	LOW Patch < 2.0 ha in size.	
	E) Patch Shape and Presence of Interior	HIGH Patch contains interior habitat that is more than 100 m from the edge OR has a Perimeter: Area ratio <1.5 m/m ² .	MEDIUM Patch contains no interior habitat but has a Perimeter:Area ratio 1.5 – 3.0 m/m ² .	LOW Patch contains no interior and has a Perimeter:Area ratio > 3.0 m/m ²	
	F) Bird Species	HIGH Patch provides breeding habitat for any three (3) or more bird species of conservation concern, including provincially rare bird species (MNRF, 2015a) or species of regional concern (Partners in Flight, 2020).	MEDIUM Patch provides breeding habitat for one (1) or two (2) bird species of conservation concern, including provincially rare bird species (MNRF, 2015a) or species of regional concern (Partners in Flight, 2020).	LOW Patch does not provide breeding habitat any bird species of conservation concern, including provincially rare bird species (MNRF, 2015a) or species of regional concern (Partners in Flight, 2020).	
Score Criterion 2.2 based on the highest standard achieved for any one of the three standards.					
Criterion 2.3 Diversity of	A) ELC Community Diversity	HIGH – Patch contains 6 or more ELC Community Series	MEDIUM – Patch contains 3-5 ELC Community Series	LOW – Patch contains 1-2 ELC Community Series	

Communities, Landforms and Associated Species	B) Community and Topographic Diversity (variation and heterogeneity)	HIGH – Patch contains three (3) or more Ecosites in one (1) Community Series OR four (4) or more Vegetation Types OR three (3) or more topographic features (e.g. tableland, rolling upland, valley slope, terrace, bottomland).	MEDIUM – Patch contains two (2) or more Ecosites in one Community Series OR by three (3) Vegetation Types OR two (2) topographic features, or one (1) Vegetation Type with inclusions or complexes.	LOW – Patch relatively homogenous; one (1) Ecosite OR one (1) to two (2) Vegetation Types on one (1) topographic feature.	
	C) Diversity (species and individuals) and Critical Habitat Components for Amphibians	HIGH – three (3) or more species of amphibians present in the patch, OR one (1) species of amphibian that is abundant in one (1) or more communities; OR two (2) or more critical habitat components present in the patch.	MEDIUM – 1-2 species of amphibians present in the patch; OR one (1) species of amphibian that is occasional* in one (1) or more communities; OR one (1) critical habitat components present in the patch.	LOW – No species of amphibian present in the patch, OR no critical habitat components present in the patch.	
	D) Presence of Conifer Cover	HIGH – Patch contains one or more conifer communities that are > 4.0 ha in size.	MEDIUM – Patch contains one or more conifer communities that are between 2.0 and 4.0 ha in size.	LOW – Patch contains conifer communities < 2.0 ha in size.	
	E) Fish Habitat Quality	HIGH – Dissolved oxygen > 8.0 mg/L OR abundant instream woody debris and rocks and watercourse with a natural channel located within or contiguous with the patch.	MEDIUM – Dissolved oxygen 5.0 – 8.0 mg/L OR moderate amount of instream woody debris and rocks and portions of channelized watercourses within or contiguous with the patch.	LOW – Dissolved oxygen < 5.0 mg/L OR no instream woody debris and sparse structure and entire watercourse channelized within or contiguous with the patch.	
	Score for Criterion 2.3 based on the highest standard achieved for any one of the five standards.				
Criterion 4.1 – Significant habitat for endangered or threatened species.	A) Species At Risk Habitat	SAR habitat present or previously identified: YES or NO			
	The presence of SAR habitat will add one HIGH score to the overall assessment				
Criterion 5.1 – Distinctive, unusual or high-quality communities.	F) ELC Community SRANK	HIGH – One (1) or more communities with an SRANK of S3 or lower.	MEDIUM – No communities with an SRANK lower than S4.	LOW – No communities with an SRANK lower than S5.	
	G) Significant Wildlife Habitat	SWH habitat present or previously identified: YES or NO			
	The presence of SWH habitat will add one HIGH score to the overall assessment				
	H) Rare Plant Species Presence / Absence	HIGH – 1 Rare Plant (S1-S3) or 4 Regionally Rare plants	MEDIUM – 1-3 Regionally Rare plants	LOW – 1 Regionally Uncommon Plant	
	I) Size and distribution of trees	HIGH – trees > 50 cm dbh abundant in one or more communities within the patch.	MEDIUM – trees > 50 cm dbh rare or occasional in one or more communities within the patch.	LOW – trees > 50 cm dbh not present in any communities within the patch.	
J) Basal Area	HIGH – Average basal area of trees for any community in the patch $\geq 16\text{ m}^2/\text{ha}$ for trees >25 cm DBH; OR $> 24\text{ m}^2/\text{ha}$ for trees > 10 cm DBH; OR all diameter class sizes are represented in the stand (saplings < 10 cm; polewood 10-24 cm; small	MEDIUM – Average basal area for any community in the patch $12 - 24\text{ m}^2/\text{ha}$ of trees >10 cm DBH; OR missing one of polewood, small, medium, or large size classes.	LOW – Average basal area for all communities in the patch $< 12\text{ m}^2/\text{ha}$ for trees > 10 cm DBH; OR missing two or more of polewood, small, medium, or large size		

		sawlog 26-36; medium sawlog 38-48 cm; large sawlogs 50-60 cm; x-large or veteran trees > 62 cm.		classes.	
Score for Criterion 5.1 based on the highest standard achieved for any one of the five standards					
Criterion 5.2 – Distinctive, Unusual or High-Quality Landforms	B) Distinctive landform types	HIGH – Patch located on an Earth Science ANSI OR on the Beach Ridge or Sand Plain physiographic landform units.	MEDIUM – Patch located on the Till Plain or Till Moraine physiographic landform unit.	LOW – Patch is located on the Spillway physiographic landform unit.	
		Score for Criterion 5.2 based on the highest standard achieved.			
Woodland Evaluation Score					
Significant Woodland					Yes/No

Appendix E

Net Effects Table Template

APPENDIX E - Net Effects Table Template

Through the EIS, all anticipated negative impacts should be addressed through a combination of avoidance, mitigation and compensation measures as appropriate so that the net effects are either neutral (i.e., No Net Effect = no measurable impact to the NHS is anticipated) or positive (i.e., Positive Net Effect = there is a gain in the areal extent and / or improvement to the quality of one or more NHS feature / area identified for inclusion within the NHS).

Examples of direct and indirect impacts are italicized. These are only examples and do not provide the full extent of potential impacts. Each project will require consideration of project and site-specific potential impacts.

SOURCE OF IMPACT	POTENTIAL AREAS AFFECTED & POTENTIAL EFFECTS	AVOIDANCE, MITIGATION, COMPENSATION	NET EFFECTS & RATIONALE
1.0 Existing Impacts (where opportunities for net positive effects have been identified):			
<i>1.1 Loss of gravel from the roadway shoulder</i>	<i>Cultural meadow (CUM) – Increased surface water runoff to the cultural meadow causing flooding, thus, reducing the viability of the habitat for various species using the habitat.</i>	<i>Regrade the roadway shoulder replace gravel and enhance with hydroseeding of a native seed mix to stabilize edge and encourage infiltration.</i>	<u><i>(+) NET POSITIVE EFFECT</i></u> <i>Regrading the roadway shoulder will reduce surface runoff and promote infiltration and minimize flooding into the cultural meadow.</i>

SOURCE OF IMPACT	POTENTIAL AREAS AFFECTED & POTENTIAL EFFECTS	AVOIDANCE, MITIGATION, COMPENSATION	NET EFFECTS & RATIONALE
1.2 Invasive weed (buckthorn) growth in forest understorey –	Deciduous forest (FOD) - Reduced plant species diversity due to competition from invasive weeds	Prepare and implement an Invasive Weed Management Plan to selectively remove buckthorn	<u>(+) NET POSITIVE EFFECT</u> Removal of invasive plants allows for native plants to colonize and increase diversity
1.3 ...			
2.0 Direct Impacts:			
Planning & Engineering Design			
2.1 Housing development lots encroaching on forest community	Deciduous forest (FOD) - Removal of native vegetation within a small portion of deciduous forest along edge of the study area resulting in loss of habitat for forest birds and other wildlife.	<ol style="list-style-type: none"> 1) Re-design development plan to avoid loss of forest; and establish a buffer with native plantings 2) Compensate for loss of forest habitat by filling in bays and other areas adjacent to the forest, increasing core habitat; and establish a buffer with native plantings. 3) Proposed rear lot fencing to include no gates. 	<ol style="list-style-type: none"> 1) <u>(+) NET POSITIVE EFFECT</u> The planting of native plant species within the buffer will provide additional wildlife habitat 2) <u>NO NET EFFECT, OR (+) NET POSITIVE EFFECT</u> Compensation may only provide equal habitat or it may provide a net environmental benefit.
2.2 Widening of an existing roadway (additional lanes & services)	Cultural meadow (CUM) – Loss of breeding and foraging habitat for Bobolink	Consult with the Province to determine permitting requirements. Identify and secure additional lands to provide for compensation of habitat loss. Plant compensation areas with native meadow seed mix. Develop plan for long-term management.	<u>(+) NET POSITIVE EFFECT</u> The planting of native plant species within the buffer will provide additional wildlife habitat

SOURCE OF IMPACT	POTENTIAL AREAS AFFECTED & POTENTIAL EFFECTS	AVOIDANCE, MITIGATION, COMPENSATION	NET EFFECTS & RATIONALE
2.3 ...			
Construction			
2.4 Construction vehicle traffic	Wildlife from adjacent wetland, meadow marsh (MAM) and open aquatic (OAO) habitat – Injury or mortality to wildlife	Avoid injury and mortality by preparing and implementing a Wildlife Handling Protocol, providing wildlife posters for construction trailer, and training construction crews.	<u>NO NET EFFECT</u> Potential impacts to wildlife can be avoided with appropriate protocols and training.
2.5 ...			
3.0 Indirect Impacts:			
Planning & Engineering Design			
3.1 Development plan increase in impervious surfaces; Stormwater management system	Moist deciduous forest (FOD) and skunk cabbage population – Reduction in groundwater discharge due to loss of infiltration. Die-back and reduction of groundwater dependent skunk cabbage population.	Re-design development plan to reduce impervious surfaces. Provide greater infiltration through use of best management practises, infiltration trenches, etc.	<u>NO NET EFFECT</u> Potential impacts to groundwater dependent plant populations (i.e. skunk cabbage) can be mitigated through the use of appropriate stormwater management measures.
3.2 ...			
Construction			
3.3 Construction related runoff	Adjacent watercourse and swamp thicket (SWT) – Sedimentation in watercourse covering spawning habitat and	Installation of sediment control fencing. Regular monitoring of fencing and other protection measures.	<u>NO NET EFFECT</u> Proper installation of sediment control fencing can prevent deposition of fill and

SOURCE OF IMPACT	POTENTIAL AREAS AFFECTED & POTENTIAL EFFECTS	AVOIDANCE, MITIGATION, COMPENSATION	NET EFFECTS & RATIONALE
	<i>or fish eggs. Habitat loss and / or reduction of fish population.</i>		<i>sedimentation. No changes to site drainage.</i>
3.4 ...			

"Inspiring a Healthy Environment"

November 23, 2021

City of London - Long Range Planning & Sustainability
206 Dundas Street
London, Ontario N6A 1G7

Attention: Emily Williamson (sent via email)

Dear Ms. Williamson:

**Re: City of London Environmental Management Guidelines [2021] Phase 2 Draft –
UTRCA Comments**

The Upper Thames River Conservation Authority [UTRCA] appreciates the opportunity to participate in the process for developing the City's new Environmental Management Guidelines. Our recent meeting with City staff on November 19, 2021 was productive and allowed for good discussion. We have completed our review of the **City of London Environmental Management Guidelines [2021] Phase 2 Draft for Review** dated June, 2021 prepared by AECOM and offer the following comments for consideration. We are cognizant of the timelines for the EMG project and that the guideline document will continue to evolve over time.

Section 2. – Preparation of Environmental Studies

2.1 – Appendix A – indicate that an EIS may be required for other types of Planning Act approvals such as OPA & ZBA. Only Subdivision process is noted.

2.1 - Please reference what process is to be followed for cases where the proponent is the City of London.

2.2 – Determination of the "type" [is that the same as "scope"] of EIS that will be required. It is indicated that this may occur at the pre-consultation meeting [IPR?] but will there be enough information about the site and the project at that time?

2.2 - Please indicate the process which is to be followed for EA Scoping.

2.6.2 - Please clarify the "minimum buffer" requirements for the waiving of an EIS. The UTRCA recommends that all unevaluated features be considered significant with buffers of 30 metres to all streams/watercourses, wetlands and woodlands if an EIS is being waived.

2.6.2 - It is indicated that "*Ultimately the waiver of the EIS requirement will be at the discretion of the City of London*". As was discussed on November 19th, *this* determination will be made in collaboration with other agencies. Thank you.

2.6.3 – Focussed EIS is to be provided at the focussed design studies stage. The CA was concerned that the timing was too late in the approval process. At our meeting, it was clarified that the nomenclature

“focussed” replaces “scoped” and that the necessary ecological information would be required prior to Planning Act approvals being finalized. Thank you.

2.6.4 (#7) - Please indicate/clarify that the EIS Report Submission is to include species lists by ELC community in WORD or EXCEL formats, with all newly created supportive figures as SHAPE FILES and that the submission includes permission for the City and the UTRCA to incorporate this information into their databases.

2.6.6.3 - Please ensure that pre and post development catchment boundaries and flow paths are included when discussing and mapping surface and drainage water features.

2.6.6.4 - Consider the term “system” instead of “disciplines”.

2.6.6.4 – Is the Table on page 2-10 the “sub-disciplines”? Please consider the term “biological components” and recommend that these sub-disciplines/components be provided for each ELC community, not just for the 4 disciplines / systems.

2.6.6.5 - Refers to “City of London and local Conservation Authorities” yet no CA policies or definitions are provided. The UTRCA recommends that our polices and definitions [UTRCA’s Environmental Planning Policy Manual (2006)] for wetlands, watercourses, valley lands, source water, etc. be included/referenced in the appropriate Sections of the EMGs (e.g. Sections 3.3, 3.5.4.2, 4.4, 6.2, 6.5.1).

2.6.6.7 Impact and Net Effects Assessment – determines whether a project can meet the test of ‘no negative impact’ **or** ‘net environmental benefit’. As was discussed, this language is consistent with The London Plan. In the long term, as the EMGs evolve, we recommend that “or” be replaced with “and”.

2.6.6.8 - “Avoidance... should always be considered to be the preferred option *where feasible*”. How/by whom is feasibility determined?

2.6.6.10 – Conclusion Statement – the term “positive net effect” is used. Consider consistent terminology – net environmental benefit.

Section 3. – Evaluation of Significance and Ecological Function

3.1.2 A) Hydrological Features – the UTRCA regulates and protects all wetlands that meet the definition pursuant to Section 28 (25) of the Conservation Authorities Act -

“wetland means land that,

- a) *is seasonally or permanently covered by shallow water or has a water table close to or at its surface;*
- b) *directly contributes to the hydrological function of a watershed through connection with a surface watercourse;*
- c) *has hydric soils, the formation of which has been caused by the presence of abundant water; and,*
- d) *has vegetation dominated by hydrophytic plants or water tolerant plants, the dominance of which has been favoured by the presence of abundant water, but does not include periodically soaked or
wet land that is used for agricultural purposes and no longer exhibits a wetland characteristic*

referred to in clause (c) or (d)."

3.2.1B) Erosion and Slope Protection – references the 1996 Slope Stability Mapping. The Conservation Authority having jurisdiction should be contacted to obtain the most current information in regards to natural hazards including “slope” riverine erosion hazards.

Section 5. - Determining Ecological Buffers

5.2 Approach – This Section discusses a precautionary principle which is to be used to protect features and functions, yet only reasons for when a reduction in buffer size from the minimum required is provided, which is contradictory to a “precautionary principle”. Please balance this discussion to include when an increase in buffer size from the minimum should be considered, such as a proposed paved pathway/ trail alignment, or as part of the identification of preliminary buffers in broader Subwatershed or Secondary Plan stages.

“At the City’s discretion, in consultation with any other applicable agencies, pathways may be permitted within the buffer provided that the buffer is of sufficient size [i.e. meeting the minimum requirements]”.

As was discussed at the November 19th meeting, there are matters where the City and the UTRCA have agreed to disagree. In our opinion, a paved pathway constitutes development – excavation, filling and paving with a hard surface. The City is of the opinion that a paved pathway may be permitted within a buffer intended to protect the natural heritage system; The UTRCA respectively disagrees; pathway should not be permitted in buffers. If this is to be the City’s policy, more details are required as to when a pathway could be considered/permitted and the minimum required buffer size [e.g. minimum of 30 metres] and the width and configuration of the pathway [e.g. 3 metres wide, no/limited meandering] should be reduced to minimize the footprint/encroachment of this infrastructure.

The UTRCA does not agree with the statement that buffers that meet the minimum requirements should be considered of “sufficient size” to permit a pathway within them and this is a minimum size requirement and that this statement appears to contradict Section 5.4. Instead, pathways should only be placed in locations outside of the minimum buffer width unless a study has demonstrated that the location of the pathway closer to the feature will not have a negative impact.

Table 5-2 –buffers should not be ***less than*** 10 metres.

Table 5-2 – Fish Habitat – clarify that the minimum buffer is required on each/both sides of the watercourse.

Table 5-2 - The lack of a minimum buffer for woodlands that are deemed to be “not significant” has the potential to result in the complete degradation of these features that are left in situ and / or their complete removal without compensation. The criteria used to determine significance is not all-encompassing in terms of biological features and functions (e.g. climate change mitigation, carbon storage, water storage) nor in terms of features and functions not related to biological features (e.g. spirituality, recreation, aesthetics). This is especially concerning given the City has declared a climate emergency where the retention of woodlands would be a mitigation and also reduce the development pressures that a housing shortage is creating on these natural features.

The UTRCA recommends that any woodland > 0.5 ha that does not meet the significance criteria developed by the city of London be protected with a minimum buffer of at least 3 times the height of the trees along the edge of the woodland feature.

We acknowledge that the City has the staff expertise to determine the alignment of a pathway adjacent to natural features. The UTRCA also has that expertise and we have data showing the number of hazard trees that have been removed within ESAs, even large ESAs such as Westminster Ponds, because the pathways have been located too close to these features.

In order to avoid potential hazard trees impacting pathways, the UTRCA recommends that a minimum distance of three times the height of the trees be maintained between the dripline of the trees and the edge of a proposed pathway and that this setback be planted with shrubs and herbaceous vegetation (such as those mentioned in Section 6.6.3) and managed to reduce tree species that are fast growing (e.g. Poplars, Willows, Aspen, Birch), subject to infestation (e.g. Ash, Elm) or have limbs prone to failure (Norway Maple, Silver Maple, Siberian Elm).

P. 5-11 – top of page – At “the City’s discretion..... a pathway may be incorporated”. As was discussed City staff, in cases where the natural hazard/natural heritage feature is regulated by the Conservation Authority, the decision would be a collaborative process. Thank you.

Section 6 Ecological Replacement and Compensation

6-1 - When relocation/removal/compensation of a natural feature is being considered, the UTRCA is of the opinion that a net environmental benefit should be achieved.

The City’s goal – “*with the intent of achieving no net loss or, preferably a net environmental benefit*”.

Section 6.1.2 provides scientific and technical context that speaks to the importance of net environmental benefit to improve short and long term biodiversity outcomes and provide some form of security for unexpected situations, and yet the compensation plan is based on a “no net negative impact” as its goal instead of a net environmental benefit. Based on our discussion with City staff, the UTRCA understands that this wording is tied to The London Plan. As the EMGs continue to evolve over time, we recommend this matter be revisited to ensure that both a no net loss and a net environmental benefit is achieved when compensation is being proposed/considered. It is important that the economics reflect that compensation is not a preferred option.

We understand that the consultants considered the compensation policies prepared by the Lake Simcoe Region Conservation Authority which require a 3:1 replacement ratio for wetlands and a 2:1 replacement ratio for woodlands plus a buffer. As was indicated at the November 19th meeting, the UTRCA is in the process of developing a compensation policy and will share it with the City when it is available.

In order to evaluate the success of the new EMGs, in particular Section 6.8 – Tracking Compensation, some additional metrics that are not specific to the ecological features and functions being removed could include:

- a) Total number of hectares lost to compensation and the total number gained (boundaries of compensated areas should be GPS’d every 5 years to determine if the features are increasing / decreasing in size as a result of encroachment from humans, non-natives).
- b) Total number of hazard trees (and locations GPS’d) removed for safety reasons near development and infrastructure, including trails.
- c) True cost of compensation (resources in recreating, monitoring and mitigating the features and functions)

The UTRCA would encourage a partnership with the City of London to:

- a) Develop a natural heritage strategy that would identify areas within the City and the broader watershed that would provide ecological goods and services if they were to be protected and / or naturalized. This strategy could be used in identifying compensation areas, areas to address climate change issues, etc. and help meet the planning and management considerations of Section 6.6.1.
- b) Develop a data mining project to map locations of significant features and functions identified in EIS, SLSR, EAs, subwatershed studies, secondary plans, etc.

Thank you again for including the UTRCA in this important process. Please contact the undersigned if there are any questions pertaining to the comments.

Yours truly,
UPPER THAMES RIVER CONSERVATION AUTHORITY



Christine Creighton
Land Use Planner
TT/CC/cc



CHIPPEWAS OF THE THAMES FIRST NATION

November 19, 2021

VIA EMAIL

Emily Williamson
Ecologist / Planner
Long Range Planning, Research & Ecology
Planning & Development
City of London

RE: Environmental Management Guidelines Phase 2 – Updated Draft

Dear: Emily,

We have reviewed the Environmental Management Guidelines (EMG) Updated Draft. The Proposed EMG's has the potential to provide guidance on land use planning within the London Township Treaty to which Chippewas of the Thames First Nation (COTTFN) is a signatory. As well as the Big Bear Creek Additions to Reserve Land Selection Area and Traditional Territory.

After reviewing the information that you have presented to us at this time, we have identified a low level of inclusion of climate change incorporated into the EMG's. We would like the City of London to take into consideration the following recommendations:

1. A greater inclusion of climate change mitigation, adaption, and co-benefit approaches to ensure natural resiliency and conservation in land use planning and management incorporated into the EMG's.
2. More inclusion of natural assets and ecosystem service valuation in the context of climate change considerations in terms of mitigation services and adaptation services provided by the City of London natural areas, as well as biodiversity services, is warranted to ensure best management practices are implemented through the EMG's
3. The City of London needs to consider incorporating the Climate Change Emergency Action Plan and Climate Change Lens for Screening of City Projects into the EMG's as these planning tools provide key processing means for monitoring the transparency and accountability of environmental conservation efforts and land use management planning objectives.



CHIPPEWAS OF THE THAMES FIRST NATION

We look forward to continuing this open line of communication as well as your follow up to the recommendations that have provided on behalf of Chippewas of the Thames First Nation. We are more than happy to schedule a time to discuss with you, to schedule a meeting please contact me at consultation@cottfn.com.

As per 'Appendix D' of the Wiindmaagewin attached is invoice 0191. Please do not hesitate to contact me if you need further clarification of this letter.

Sincerely,

Fallon Burch
Consultation Coordinator
Chippewa of the Thames First Nation
consultation@cottfn.com

November 15, 2021

To Emily Williamson and Kevin Edwards,

The City of London Environmental and Ecological Planning Advisory Committee (EEPAC) is pleased to submit comments on the most recent 2021 draft version of the Environmental Management Guidelines (EMG or Guidelines). Please find more detailed comments attached to this letter as an Appendix. The objectives of our review of the Environmental Management Guidelines were 1) to ensure language in the Guidelines is clear and can be interpreted consistently in accordance with intended protections of the Natural Heritage System; 2) to ensure terminology, protocols and procedures outlined in the Guidelines reflect current science.

We commend City of London staff and the consultant for their work on updating this extensive, integral document. The Guidelines are essential to the City's ability to manage and maintain the Natural Heritage System. We recognize areas where the current draft provides significant improvements from its 2007 predecessor, such as the inclusion of Critical Function Zone, improvements to the Environmental Management Plan (EMP) requirements, the requirement of a Net Impacts Table as part of an Environmental Impact Study (EIS), and Buffer Restoration and Enhancement. However, the EEPAC working group also identified several sections where further changes are needed to ensure the Guidelines can be interpreted consistently and are effective for mitigating negative impacts to the Natural Heritage System (NHS).

In summary, EEPAC's priority concerns about the current draft EMG pertain to the following sections:

1. **Buffers** - The current 2021 draft reflects a dramatic departure from the previous 2020 draft. Our comments pertain to a variety of concerns about buffers, particularly the lack of clearly stated minimums for buffer widths for some parts of the NHS which, as currently written, could be interpreted to allow zero buffers. We are also concerned about the allowance of paths inside buffers, which contradicts current science. We recommend that the minimum buffers be restored to the previous 2020 draft unless suitable justification for these changes can be provided. If possible, long-term management of buffers would be made simpler if buffers could remain under City ownership, rather than held by developers or private landowners.
2. **Appendix C Data Collection Standards** - While this section is included as an Appendix, its contents are fundamentally important to the implementation of the rest of the Guidelines. We have provided more detailed comments on specific language in this section so that it may be updated to provide clarity and consistency, fill gaps and reflect current science. We are pleased that community/citizen science data sources have been included. We provided recommendations to clarify how this type of data should be used in practice.
3. **Monitoring** - EEPAC recommends that language in this section should be made more explicit and specific about monitoring being required, especially monitoring of water resources. EEPAC recommends establishing minimums for pre- and post-construction monitoring, with during-construction monitoring decided on an as-needed basis. Monitoring must include measures/indicators of performance of ecological functions. EEPAC would like to see an explicit requirement for Water Quality Monitoring Program (WQMP) stated in this section of the EMG.

In addition to comments and recommendations, we have included a list of questions about the draft. EEPAC would appreciate if staff could address these questions in writing ahead of the meeting on Nov 22, 2021.

The completed EMG will be used to protect London's Natural Heritage System and water resources for years into the future. As climate change, biodiversity loss and rapid development across the City pose long-term threats to the resiliency of the Natural Heritage System, it is imperative that the Guidelines reflect best practices informed by current science, and expressed in clear language so that procedures will be applied consistently and requirements as stated in the Guidelines will be met. EEPAC looks forward to reviewing the finalized version of the updated EMG and appreciates being included in this important process.

Members of the Environmental Management Guidelines EEPAC Working Group

Appendix A

List of Comments on the 2021 Draft Environmental Management Guidelines

Formatting note: **Comments** and **recommendations** are grouped by **EMG section or theme**. **Questions** are highlighted in blue in-text and are also listed at the end of the Appendix. EEPAC would appreciate if staff could respond to these questions in writing and indicate areas of agreement with our recommendations before the upcoming meeting with EEPAC on November 22, so that our discussion may focus on matters that are subject to further decisions before the EMG draft is finalized.

1. Minimums for buffers

Comment 1.1: We are not clear what existing policy or policy change or existing research has driven the change from the 2020 EMG draft, in particular, regarding buffers. London Plan Policies 1334, 1342B and 1343 are not about buffers, they relate to the removal of natural heritage features which relate to the Replacement and Compensation section. Staff's response to Comment 6 on the previous draft from the London Development Institute (page 197) says, "*the buffer section has been revised... there is now flexibility to buffer more as necessary but not less than 15 meters*". Why is this minimum of 15 m not reflected in the current draft?

Recommendation 1.1: minimum buffers need to be explicit and specified as greater than zero, ideally a minimum of 15 m, consistent with the prior 2020 EMG draft.

2. Table 5.2 - Buffers

Comment 2.1: The buffer section of the previous version of the EMG (2020 draft) better protects and preserves existing conditions and minimizes adverse impacts on functions and features of significant areas than the current draft. There is nothing in the London Plan out of the LPAT settlement specific to buffer sizes. Policy 1414 references the EMG (see below). The changes to Table 5.2 of the EMG mean the minimum buffer can be zero. It is unclear what research subsequent to Beacon's 2012 work drove the changes that will in some cases, if implemented, lead to what Beacon 2012 called "*a high risk of not achieving the buffer function.*"

London Plan Policy 1414: "*The location, width, composition and use of ecological buffers necessary to protect natural heritage areas from the impacts of development on adjacent lands will be specified through application of the City Council approved Guidelines for Determining Setbacks and Ecological Buffers as part of an approved secondary plan and/or an environmental impact study. The City may also consider technical and/ or scientific documents that reflect improvements in scientific knowledge regarding natural features.*"

The following changes to the current draft EMG from the 2020 draft are of concern to EEPAC:

- A. **Comment 2.2:** Some features in Table 5.2 are no longer listed.

Recommendation 2.1: In Table 5.2, features included in the 2020 EMG draft, but not in the current draft, should be restored to the table.

- B. **Comment 2.3:** Current language in Table 5.2 suggests that some of the natural heritage components can have zero buffers. e.g., for woodlands, the required minimum is "*less than 10 m.*" This can be read to mean that a buffer of 0 m is allowed, as 0 m is less than 10 m.

Recommendation 2.2: The 2020 EMG draft had minimums that were explicitly above zero. We recommend using the language in the previous draft EMG. Beacon (2014) wrote the following about buffers in its report to the City on EIS Effectiveness (p. 71) in supporting a minimum buffer greater than zero (highlighting is ours): "***The findings in this study support the current guidelines of an absolute***

minimum of 5 m (and would support a buffer of up to 10 m), not so much to allow for variability along ecological edges, but to mitigate for the encroachments anticipated when residential lots abut protected natural areas. However, there are a number of additional considerations in determining appropriate buffer width (e.g., need to protect water quality of a wetland) that may result in a recommendation for a wider buffer. Conversely, there may be cases where the site design or structure of the buffer may justify a slightly narrower buffer. For these reasons, even if it may be more expedient from a planning process perspective to identify and enforce simplified and standardized buffers, from a scientific perspective it remains more defensible to incorporate some flexibility in buffer width determination.”

- C. **Comment 2.4:** The 2020 draft of the EMG provided supporting research to justify the buffer minimums. References are not provided in the current draft’s table of recommended buffers.

Recommendation 2.3: Provide references with supporting research alongside recommended buffers, for clarity and to ensure minimum buffers are reflected by the best available current science.

- D. **Comment 2.5:** Table 5-4 (Potential Buffer Enhancement Measures) includes “Removal of invasive plants within the buffer area and within 10 m of the edge of the identified Natural Heritage Feature will improve overall species diversity.”

Question 1: How will the City implement the above recommendation if there is no buffer?

Recommendation 2.4: It is better if the buffers remain under City ownership, rather than held by developers or private landowners. This is a much more appropriate condition for long-term management. This requirement should be made clear in the Guideline.

3. Buffer widths - Section 5.3.3

Comment 3.1: The 2020 draft EMG quoted Beacon (2012): “As buffer widths increase, their effectiveness also tends to increase.” This text has been removed. Reducing the minimum buffers contradicts Beacon’s research.

Question 2: Which research has supplanted findings from Beacon (2012) to justify minimum buffer widths?

Comment 3.2: This section’s first paragraph includes this: “However, an EIS may recommend a buffer width different from the minimum based on the sensitivity of the feature and the nature of the proposed adjacent development.” The rest of the paragraph speaks to increases from the minimum.

Recommendation 3.1: If the intention is that an EIS may recommend a buffer width larger than the minimum, then this possible outcome should be explicitly stated in section 5.3.3.

4. Table 5-3 – Variation to Minimum Buffer

Comment 4.1: It is unclear to us why the minimum buffer “may” only be increased for Significant Wildlife Habitat (SWH) and Species at Risk (SAR) rather than the minimum “must” be increased.

Recommendation 4.1: Change language from “may” to “must” (be increased for SWH and SAR) in Table 5.3 to ensure minimum buffers are consistently increased for SWH and SAR. Include recommendations for the extent of the increase in buffer size.

Comment 4.2: A number of items have been deleted from Table 5.3 in the 2020 draft EMG, including tree height, spilt texture and edge vegetation.

Recommendation 4.2: Restore tree height, soil texture, edge vegetation and other items removed from Table 5.3 in the 2020 draft EMG. If these items are to be excluded, please provide justification and supporting research. Including tree height would provide a buffer width that is clear and less ambiguous. Given that most forests are a mixture of species, the expected outcome of this policy is a buffer width of the tallest trees at maturity along the edge.

Comment 4.3: The following paragraph preceded Table 5.2 in 2020 draft EMG. Although it references maximums, the principles underlying it also apply to a larger-than-minimum buffer. Why was this paragraph removed?

“If studies determine that development anywhere within the adjacent lands will have a negative impact on natural feature(s) and their function(s), buffers identified to mitigate these impacts could include the entire adjacent lands (MNR, 2010a). Accordingly, the ~~fixed maximum~~ buffer widths in these guidelines are determined by the extent of the adjacent lands for natural heritage features (Table 5.2). In some cases, the adjacent lands may need to be expanded (MNR, 2010a). This would be a unique circumstance where a) significant evidence (e.g. Recovery strategy, SWH Mitigation Support Tool) exists to support the use of wider buffers wider than the maximum, and b) there is room for a wider buffer within the development proposal. Should there not be the space to implement a wider buffer width, alternative mitigation would be required to achieve no negative impacts. “

Recommendation 4.3: Restore the paragraph above from the 2020 EMG draft with the highlighted suggested edits incorporated.

5. Table 5-3 - Slopes

Comment 5.1: There will be a range of slopes around any natural heritage feature. It may be difficult to operationalize the slope/ buffer table in cases with a variety of terrains, slopes and features. There does not seem to be mention of the top of slope here, only on page 5-2.

Question 3: Does it make a difference if the slope goes down from the development compared to up?

6. Table 5-3 - Connected to the Landscape

Comment 6.1: One of the issues is that there are some negative impacts of connectivity, such as the movement of *Phragmites* populations from one natural heritage feature to another. Connectivity is needed for the movement of amphibian populations, such as salamanders, but can be dangerous because of the movement of invasive, introduced species such as *Phragmites*. Is it clear that the invasion of a wetland by *Phragmites* has a major and negative impact on many of the ecological functions of wetlands. So in some cases connectivity should not be encouraged.

7. Impact of Buffer Change on EIS Requirements

Comment 7.1: Pages 2-5 of the current EMG draft include the following text:

Opportunities to Minimize EIS Requirements

*“It is possible that an EIS may not be a development application requirement for lands that contain NHS components and / or Adjacent Lands. The conditions under which a full EIS (including, but not limited to, seasonal surveys and details site assessments) is waived, requires the implementation of an ecological buffer to a Natural Heritage Feature **that meets or exceeds** the City’s **minimum buffer requirements** as shown in Table 5.2*

of these EMGs and any additional mitigation requirements as stipulated by the City (e.g. fencing without gates). A focused EIS that describes the site, outlines the limits of the feature(s) and function(s) and discusses restoration and enhancements and their implementation will continue to be a requirement of approval. Ultimately, the waiver of the EIS requirement will be at the discretion of the City of London.”

Given the revisions to Table 5.2, a development with no buffer adjacent to a woodland of any size could be permitted without an EIS because zero would be the minimum buffer requirement. Under the current language, if development is proposed adjacent to any woodland where the minimum buffer is “less than 10 m”, then no EIS may be required if the proponent has a buffer of 0 m.

Comment 7.2: P. 5-2 contains text that is inconsistent with City policy: *“In cases where both physical setbacks and ecological buffers are required, the greater of the two will establish the development limit line.”* This is contrary to London Plan Policy 1415_7 which states: *“Setbacks shall apply from any lands identified as an ecological buffer.”*

Recommendation 7.1: Please revise the text above to be consistent with the London Plan.

8. Pathways in buffers

Comment 8.1: Beacon, on page 68 of its 2014 report to the City on EIS Implementation stated:

“Encroachments (e.g., mowing, dumping of yard waste, placement of structures, informal trail creation) between the rear lot lines and the first 30 m of the adjacent protected natural areas (and their buffers where applicable) occurred in all sites, but were largely restricted to the first 10 m from the rear lot lines and appeared to be less frequent where rear lots were fenced and gated. In addition, very limited data suggested the presence of formal trails between rear lot lines and protected natural areas may reduce the incidence of some types of encroachments (i.e., mowing, structures, landscaping) but not others (e.g., informal trail creation).”

Recommendation 8.1: pedestrian pathways **should not** be allowed a priori to be included inside of buffers.

Where pathways are intended to be included inside buffers, these plans should require approval from the City on an individual basis in order to minimize negative impacts to the Natural Heritage System (e.g., encroachment).

Comment 8.2: EEPAC members did a site visit to two of the locations (Applegate and Warbler Woods Walk) viewed by Beacon in 2014. Appendix B includes a photo from and map of Warbler Woods Walk. It highlights uncertainty about where a pathway would be located under the proposed buffer policies which we would like to discuss. We found the following and have photos if required:

- At Applegate. There is no evidence of informal trails from the path either paved or level one. This is more likely a function of the topography (you go down a steep slope into Dingman Creek), than of the path or trail. There are homeowners who have installed gates as well as planted trees outside the fence line in the buffer.
- At Warbler Woods Walk, significant amounts of development have taken place since Beacon's 2014 report. The pathway appears not to be in the buffer. There were a number of locations where mowing and planting including trees, have taken place adjacent to the pathway on the house side of the path. We also walked the internal trails in Warbler Woods to arrive at the entrance at the end of Chestnut Court to see if there are any signs of informal trails adjacent to the ESA from the much older subdivision where there is no pathway. The only obvious example was from a house with no fence.
- In summary, fencing with no gates is clearly more important than a pathway or trail in preventing informal trails.

Comment 8.3: Section 5.2 Approach (p. 5-2) - “At the City’s discretion, in consultation with any other applicable agencies, pathways may be permitted within the buffer provided that the buffer is of sufficient size (i.e., meeting the minimum requirements), remains naturalized outside of the pathway, and is supported by the recommendations of the approved EIS.” A paved path is at least 5 m wide (3 m for the path and 1 m mowed strip on each side for safety of pedestrians / bike interactions. However, the minimum buffer for a Woodland can be zero.

Recommendation 8.2: The City should adopt an alternate approach by establishing a pathway easement, close to the fence line, and outside the buffer and have it constructed early in the development process adjacent to the feature. This could be accomplished through Section 51.1 of the Planning Act.

Recommendation 8.3: If there is intent to create a trail system in the feature, the trail system should be included in the scoping of the EIS so that it can be established early in the life of the adjacent development rather than later in order to avoid the creation of “desire line” trails within the feature.

9. Section 5.4 Prohibited and Permitted Uses in a Buffer (p. 5-10 and 5-11)

The following text is included in section 5.4: *“Buffers are generally to be kept in a predominantly naturalized state and no permanent structure or part of a development is to occur within a buffer. The following exceptions that may be approved where **buffers greater than the minimums** have been recommended at the City’s discretion, and in consultation with the appropriate agencies, where needed: **Pedestrian pathways in the outer half of the buffer with the remaining buffer to be restored and naturalized**; and low impact development measures (such as bioswales, infiltration trenches) that are compatible with the buffer function and the protection of the feature(s). At the City’s discretion, and subject to the completion of an EIS wherein a site-specific buffer equal to, or greater than the minimum buffer (as described in Table 5.2) has been recommended, a pathway may be incorporated within the buffer provided the buffer remains, or is naturalized.”*

Question 4: Does this mean where no buffer is permitted (equal to the minimum for a Woodland), a 3 m pathway with 1 m mowed on each side is permitted? In such a case, where is the outer half?

Recommendation 9.1: The bolded text in section 5.4 copied above is unclear about whether the outer half is closest to the development or the feature. Recommend updating language to be more specific.

10. Section 5.3.4 Buffer Enhancement (p. 5-9)

The following text is included in section 5.3.4: *“The intent of the strategy should be to reduce edge effects, improve buffer functions (e.g., through restoration or enhancement of site-appropriate native vegetation), and enhance habitat connectivity to build resilience of the Natural Heritage Feature(s) being protected.”*

Comment 10.1: EEPAC believes that permitting pathways in the buffer runs counter to this objective. We anticipate that these enhancements will become a major point of contention, since the policy is so open ended. There are several ambiguous sections in the proposed policies, especially the buffer enhancement section, that provide for complicated and difficult negotiations.

11. Data Collection Standards for Ecological Inventory

Comment 11.1: The language prescribing winter raptor surveys should be kept consistent throughout this section. Currently, these surveys are lumped in with ‘3. Breeding Birds’, but only apply ”Where candidate

Raptor Wintering Areas are identified are not included under the list of inventory protocols at the beginning of the section”.

Recommendation 11.1: Winter Raptor Surveys should be explicitly included under the inventory protocol list at the beginning of this section under list item 6 Winter (November - February).

Comment 11.2: Paragraphs 2 and 3 of the Background section in Appendix C are worded unclearly. Specifically, this passage should be clarified:

- “*The size of the study area should not affect the ability to make comparative evaluations*”. Does this mean that a study area size needs to be sufficiently large to ensure repeatability, or does it mean that comparative evaluations will not take the size of the study area into account, or something else?

Comment 11.3: The following text is included under the section Guidelines for Data Collection: “*It is recommended that reputable citizen science data sources, such as iNaturalist and the Ontario Reptile & Amphibian Atlas, be reviewed when conducting a background review to supplement data obtained by the consultant team.*” EEPAC is of the opinion that community/citizen science provides invaluable tools for expanding the scope of data collection capacity in terms of human resources and across time, including historical records obtained outside the prescribed monitoring period. However, the EMG must be clear how community/citizen science data is to be used in order to ensure consistency in the interpretation of data and how data will inform study design, mitigation applicable to SAR or SWH, etc.

Recommendation 11.2: “*citizen science*” should be corrected to “*community science*” to be more representative. Data may be contributed to these sources by members of the public who are not citizens, such as international visitors to the region.

Recommendation 11.3: Replace the current draft text included in the previous comment with the following: “*It is recommended that reputable citizen science / community science data sources, including but not limited to iNaturalist, eBird, and the Ontario Reptile & Amphibian Atlas, **must be** checked when conducting a background review **prior to** the commencement of data collection for a study. Where records are obtained from community science data sources, they should be evaluated for verifiability, such as by reviewing photos included with observations and by checking species identification provided by online users of those data sources. If community science data sources yield verifiable historical records of SAR individuals and/or rare species, observed within the past 15 years, within a study area or on land adjacent to the study area, inventory protocols targeting those species **are required** to be included in the study design, regardless of other trigger requirements for those protocols being met. Historical records of SAR and/or rare species on the subject land obtained from community science data sources **must be** included in study reports to supplement data obtained using ecological inventory protocols by the consultant team.*”

Comment 11.4: Information provided about sampling design for a study must be detailed enough to assess the accuracy and completeness of the data.

Recommendation 11.4: Add language under the Inventory Protocols section to indicate that descriptions of sampling design delivered in study reports should specify details of the sampling site locations and the timing of sampling that was carried out.

Comment 11.5: EEPAC is concerned that aquatic inventory protocols as listed on Page 2 of Appendix C are inadequate. There are no research references to support the recommended frequency of aquatic surveys being exclusively in Early Summer (June). Seasonal variation in aquatic systems necessitates that sampling be stratified throughout the year, as surveys carried out during Early Summer may miss species that are present at the site but not observable during that period.

Recommendation 11.5: Aquatic communities and habitat should be subject to surveys in spring, summer and fall. Aquatic communities and habitat should be included elsewhere in the Inventory Protocols list, specifically in 1. Early Spring (late March/early April) and 2. (late April - May) as well as in 5. Fall (September-October).

Recommendation 11.6: Under 7. Aquatic communities and habitats survey (page 5, Appendix C), please include a reference to the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry's [Aquatic habitat inventory survey manual](#)

Recommendation 11.7: Under Habitat Assessment and Stream Analysis, rather than listing examples, “*e.g., dissolved oxygen, temperature, pH, conductivity*”) please instead list all of the intended components that are required to be included in water chemistry analyses, or categories thereof. EEPAC reviews many studies that include very little water chemistry analysis and would like to see more explicit requirements in the EMG.

Recommendation 11.8: Provide recommendations for the timing and frequency of water chemistry analyses along with supporting references. The language in the current draft suggests water chemistry analyses need only be carried out in Early Summer (June). EEPAC believes this timeframe is inadequate to capture seasonal variation in water chemistry, especially in monitoring impacts post-development. More frequent water chemistry sampling should be encouraged.

Recommendation 11.9: Nocturnal owl surveys should be carried out in Fall as well as in Spring. The current draft lists only Spring surveys for owls under Breeding birds (Appendix C, page 3). Overwintering owls establish territory in London in the Fall, and their vocalizations can be captured by surveys. It is not clear if owls are included under migratory bird surveys in fall.

Recommendation 11.10: Under Benthic Survey, Appendix C page 6, it says: “*Often a component of detailed water quality assessments associated with specific project types such as assimilative capacity studies*”. This language makes it seem like benthic surveys are only needed for specific projects, but in actuality benthic surveys are an important component of aquatic monitoring in general. Recommend revising or removing this line of text.

Question 5: If raptor overwintering habitat has not been previously identified onsite, does this mean surveys are not required?

Question 6: Under 1. Vegetation Communities (Appendix C, page 3), the second-last bullet point says: “A summary of tree species, with age and/or size class distribution, including basal area by size class.” Should this summary also include the spatial distribution / locations of trees?

Question 7: Why does Appendix C not include information to support Migratory Bird surveys in Fall and Winter wildlife surveys? There are no inventory protocols for these provided. What species constitute “winter wildlife”?

Are non-raptor migratory birds that overwinter in London (e.g. Dark-Eyed Juncos, Brown Creepers, waterfowl) included as winter wildlife?

Question 8: Why does the list under 9. Regionally Rare Species (Appendix C page 6) not include fish or mussels?

12. Section 7 - Monitoring

Comment 12.1: Monitoring can be expensive, requiring time, expertise and money. The scope of required monitoring will vary across different projects. It might be worthwhile if the EMG explicitly identifies who is responsible for providing resources for meeting monitoring commitments (i.e., whether resources required for types of monitoring are to be provided by developers, the City or by consultants). Clarifying this aspect of monitoring could facilitate smoother implementation of the monitoring requirements of the EMG.

Comment 12.2: The EMG will be used to protect London's Natural Heritage System and water resources, as well as ecological/environmental health of these systems for years into the future. Therefore, some of the most critical components of this section include baseline monitoring of existing conditions, monitoring of efforts to preserve, protect and enhance existing conditions, as well as ensuring that existing features and functions will not be compromised and/or be negatively impacted by new development under post-construction conditions.

Recommendation 12.1: Language in the EMG should reflect that post-construction monitoring "must" be a requirement. References to post-construction monitoring should replace use of the word "should" with "must" or "shall" or "is required."

Recommendation 12.2: Indicators of measures of performance should be explicitly provided to inform the design and interpretation of post-construction monitoring. Including examples of criteria for measuring success or failure of ecological functions in post-construction monitoring will be helpful to users of the EMG.

Recommendation 12.3: Monitoring requirements as described in the EMG draft should be modified to provide clearer and more comprehensive directions. We recommend that the following text be included in the Monitoring section:

"Monitoring plans must be approved by the City of London prior to finalizing the project (land development) design and not prior to commencing of the site construction. If the results of pre-construction (baseline) monitoring for the site(s) identify features or functions that require modifications be made to the design to mitigate potential negative impacts of proposed development and infrastructure to existing conditions, including water resources, natural heritage features and major functions identified (and evaluated) within or adjacent to the site(s), then these modifications must be incorporated and reflected in the proposed project design to be approved by the City of London."

Recommendation 12.4: Water Quality Monitoring Program (WQMP) must be required to measure, document and report on existing environmental/ecological conditions of the Natural Heritage System and/or water resources systems, of infrastructure and of adjacent lands during pre-construction (baseline), post-construction and in some cases during construction activities. WQMPs aim to ensure no negative impacts will be caused by proposed development and infrastructure to existing water resources systems, natural heritage features and major functions identified (and evaluated) within or adjacent to the proposed development or infrastructure site(s). The post-construction WQMP requirements for projects should be established and recommended by EIS-Environmental Impact Study(s). Specifically, requirements will apply to any land development sites (projects) that are located immediately adjacent and/or in close proximity to all parts of the NHS, open watercourses and infrastructure outlets.

Recommendation 12.5: In general, **pre-construction** (baseline) WQMP should be required for the large majority of proposed land developments and infrastructure projects unless an exemption is sought. Pre-construction monitoring is to be commenced at the early project design stage. WQMP samples must be collected during both weather seasons (wet and dry) over a minimum of six months in order to characterize seasonal variation in water quality.

Recommendation 12.6: A requirement for **during-construction** WQMP needs to be determined on a case-by-case basis to ensure that no negative impacts occur as a result of proceeding with the construction activities of the approved project(s) and to identify and mitigate sources of negative impacts as quickly as possible.

Recommendation 12.7: The **post-construction** WQMP must be carried out for a minimum of 3 years post-construction on a semi-annual basis and include measures/indicators of ecological functions.

Recommendation 12.8: The pre- and post-construction WQMP shall include two major analysis components: 1) basic chemistry with parameters identified by MECP's Provincial Water Quality Objective (PWQO) under Ontario Water Resources Act; 2) biological/ecological aquatic monitoring, such as macroinvertebrate sampling and subsequent analysis. The City of London used this WQMP analysis for all 13 Subwatershed Studies as well as their updates, and for monitoring other water resources systems (creeks, water ways, river, majority SWM facilities, 6 Wastewater Treatment Plans and some wastewater pumping station discharges) using BioMAP Protocol for biological monitoring .

Question 9: Why is there nothing included in the Monitoring section about situations where the compensation fails to be completed within the "appropriate" time? There is no information about holdbacks, which is only mentioned in relation to remedial works on page 7-8.

13. Net Impacts

Comment 13.1: Appendix E, Net Impacts Table does not include any examples of medium or high negative effects.

Recommendation 13.1: Include specific examples that would be helpful to the proponent so that they understand what will concern the city. It is also not clear if a Net Impacts Table is actually required, as wording on page 2-12 (2.6.6.7) says "should" although on the same page it says this Table is critical. Recommend clarifying whether a Net Impacts Table is required and updating text accordingly.

P. 2-6 says: "*The net effects of the project should then be assessed based on the anticipated net impacts after avoidance, mitigation and or compensation measures are implemented as recommended. If the project is assessed to result in a **significant net negative effect**, then the proponent should include additional mitigation and/or compensation measures, or re-work the proposed project plan and / or design to minimize or avoid such effects.*"

Question 10: The Net Impact Table does not include the term "significant net negative effect" nor does it appear anywhere else in the document. Does this mean medium or high as per the Net Impact Table in the Appendix? This should be clarified somewhere in the EMG to qualify what constitutes a "significant net negative effect".

14. The use of "should" - optional or not?

Comment 14.1: In numerous places in the draft EMG, "should" is used where it appears "shall," "must" or "will include" are intended. Unless of course, many of the "requirements" are optional. If something is important

enough that not including it would, for example, make the EIS incomplete, the EMG should use “shall” or “must” or “will include” to provide consistency.

Recommendation 14.1: Review the document to ensure the intent is correct.

15. Missing and Unclear Material

Comment 15.1: Based on EEPAC’s review of the current EMG draft, the following items are either missing or unclear:

- A. Appendix D – Woodland evaluation. This section needs renumbering; it jumps from Criterion 2 to Criterion 4. p. 3-11 to 3-12 and also skips 3, but the wording is intact.
- B. On page 4.2, something is cut off, a yellow highlighted section that was in the 2020 draft.
- C. Also on page 4.2 it reads “5. *In the application of these guidelines, the most recent map sources, current and historical aerial photographs, and ecological background studies/documents should be used to verify and update background information.*”

Question 11: How far back in time is considered recent, especially in reference to air photos and previous field work?

Recommendation 15.1: Please specify an allowable time frame.

- D. A table that appeared on p. 5-8 of the 2020 EMG draft has been removed. That table followed this text: “*The following has been adapted from Environment Canada’s Recommended Buffer table in How Much Habitat is Enough.*”

Question 12: Was the table on p 5-8 of the 2020 EMG draft intentionally deleted, and if so, why?

16. Homeowner Education

Recommendation 16.1: The EMG document, as part of the EMP requirements, should include explicit examples of homeowner education requirements that would be included in a subdivision agreement. EEPAC remains of the opinion that the current approach of distributing materials to owners of newly-built homes on a one-time basis is inadequate for homeowner education to serve its critical functions for protecting impacts to the NHS and that permanent signage at trailheads and along trails are more effective.

List of Questions (duplicated from list above):

Question 1: How will the City enforce this if there is no buffer, especially if the feature is not part of the management contract with the UTRCA?

Question 2: Which research has supplanted findings from Beacon (2012) to justify minimum buffer widths?

Question 3: Does it make a difference if the slope goes down from the development compared to up?

Question 4: Does this mean where no buffer is permitted (equal to the minimum for a Woodland), a 3 m pathway with 1 m mowed on each side is permitted? In such a case, where is the outer half?

Question 5: If raptor overwintering habitat has not been previously identified onsite, does this mean surveys are not required?

Question 6: Under 1. Vegetation Communities (Appendix C, page 3), the second-last bullet point says: “A summary of tree species, with age and/or size class distribution, including basal area by size class.” Should this summary also include the spatial distribution / locations of trees?

Question 7: Why does Appendix C not include information to support Migratory Bird surveys in Fall and Winter wildlife surveys? There are no inventory protocols for these provided. What species constitute “winter wildlife”? Are non-raptor migratory birds that overwinter in London (e.g., Dark-Eyed Juncos, Brown Creepers, waterfowl) included as winter wildlife?

Question 8: Why does the list under 9. Regionally Rare Species (Appendix C page 6) not include fish or mussels?

Question 9: Why is there nothing included in the Monitoring section about situations where the compensation fails to be completed within the "appropriate" time? There is no information about holdbacks, which is only mentioned in relation to remedial works on page 7-8

Question 10: The Net Impact Table does not include the term “significant net negative effect” nor does it appear anywhere else in the document. Does this mean medium or high as per the Net Impact Table in the Appendix? This should be clarified somewhere in the EMG to qualify what constitutes a “significant net negative effect”.

Question 11: How far back in time is considered recent, especially in reference to air photos and previous field work?

Question 12: Was the table on p 5-8 of the 2020 EMG draft intentionally deleted, and if so, why?

Appendix B

Figures



Figure 1 - Photo taken in Warbler Woods demonstrating the ambiguity regarding buffers and trails/pathways. Is the trail in the feature or the buffer?

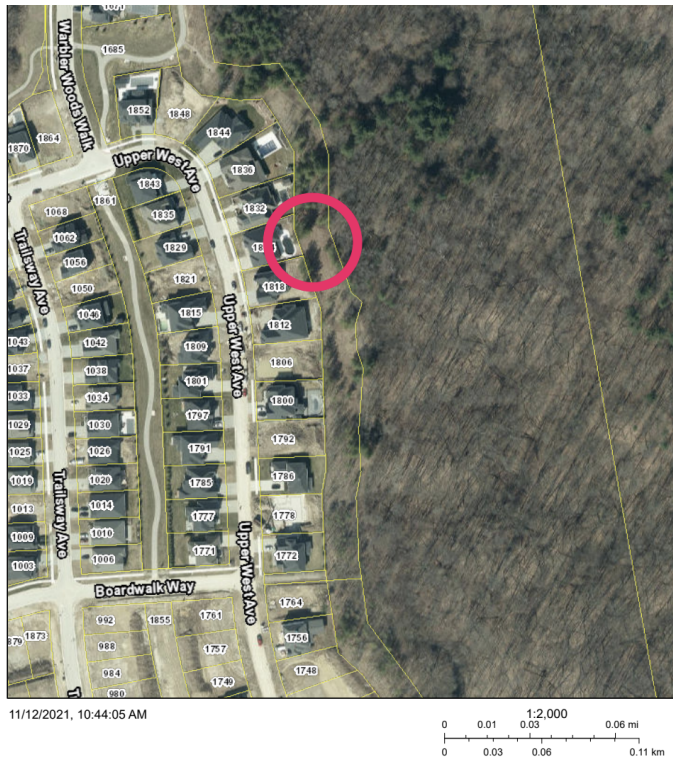


Figure 2 - Approximate location of the photo in Figure 1.

Appendix B:
London Development Institute and London Home Builders Association Comments on October 18 EMG
Submission 1/3

	Section Name	Page	Para.	Sen.	Draft Language	Suggested Revision	Justification
1	Introduction	1-1	3	new	<i>Although these guidelines... ensure the most up-to-date information is used throughout the process.</i>	ADD "These guidelines should not be considered as new policy or regulation."	This is a guideline document
1.1	The London Plan	1-1	1	5	FORMATTING	Correct formatting of Policy 1424 quote	
1.1	The London Plan	1-1	2	1	<i>These EMGs also identiy related requirements from other policies and legislation (e.g., Provincial Policy Statement, Endangered Species Act, etc.) that must be considered,...</i>	<i>These EMGs also identiy related requirements from other policies and legislation (e.g., Provincial Policy Statement, Endangered Species Act, etc.) that should be considered,...</i>	More flexible, in line with this being a Guideline.
1.2	First Nation Engagement & Consultation	1-2	2	1	<i>Early engagement and consultation with local First Nation communities within the vicinty of the Thames River...</i>	Early engagement and consultation with local First Nation communities within 120m of the Thames River... OR In instances when development is within 120 M of the Thames river , First Nations consultation is required.	Consistent with Scoping Checklist
2.2.3	ESSC Approval	2-2			<i>Discussion Item</i>	Request that staff add an appendix document (or something available on the City's website) that indicates the window of the City/UTRCA entertaining site visits, and associated "submission/request by" dates - similar to the IPR schedule	Improves communcation and process planning between the City and Proponents
2.2.3	ESSC Approval	2-2	1	2	<i>The City of London will then send written (e-mail or letter) approval and finalized copy of the ESSC to the proponent and the scoping meeting attendees.</i>	Within ten (10) business days , the City of London will send written (e-mail or letter) approval and finalized copy of the ESSC to the proponent and the scoping meeting attendees.	Assigning a timeline
2.4	Subject Lands Status Reports (SLSR)	2-3	1	1	<i>Consistent with the London Plan policies 1425 to 1428, a SLSR shall provide an assessment of natural features and areas on the subject lands...</i>	Consistent with the London Plan policies 1425 to 1428, a SLSR, if required by the City, may be required to provide an assessment of natural features and areas on the subject lands...	SLSR is not (shoud not) be required for every application. 1425 "may require".
2.4	Subject Lands Status Reports (SLSR)	2-3	2	1	<i>The objective is to inventory, evaluate, assess the significance of, delineate boudaries of, and make recommendations for appropriate land use designation of the natural heritage features and functions in question.</i>	The general objective is to inventory, evaluate and assess the significance of, delineate boudaries of, and/or make recommendations for appropriate land use designation of the natural heritage features and functions OR Dependent on the official plan maps and prior planning, the objective of an SLSR is to inventory or to inventory, evaluate and assess the significance of the natural heritage features and functions in question.	1st option -More consistent with the language of the London Plan (1425 to 1428) 2nd option provides justification for a SLRS
2.4	Subject Lands Status Reports (SLSR)	2-3	4	2	<i>In these cases, a Draft EIS that addresses these items is to be submitted for review and confirmed by the City, in consultation with relevant agencies, prior to completing the balance of the EIS.</i>	In these cases, a Draft EIS that addresses these items is to be submitted for review and confirmed by the City, in consultation with relevant agencies, prior to completing the balance of the EIS. A response should be provided by the City and agencies within 4 weeks.	There needs to be a reasonable time frame for the City to provide comments.
2.5	Environmental Assessment for Infrastructure Projects	2-3	1	1		Add space between "but" and "new"	

Appendix B:
London Development Institute and London Home Builders Association Comments on October 18 EMG
Submission 1/3

2.6.1	The Purpose of an EIS	2-4	2	1	An EIS must be completed to the City's satisfaction in accordance with The London Plan policies..	An EIS must be completed to the City's satisfaction in accordance with The London Plan policies..	Leaves too much discretion to Staff. Should rely on policy.
2.6.2	Table 2.1 Area Requiring ES	2-5	1	bullet 7	"Upland Corridors" in Table	Remove "Upland Corridors" from 120m as not in London Plan. Should consider replacing with London Plan table.	Consistent with London Plan policies
2.6.2	When is an EIS Required?	2-4	1	1	EISs are typically required for development and infrastructure projects that are proposed wholly or partially within or adjacent to the NHS.	add at the end of the current sentence: and to be confirmed during the preconsultation process.	The IPR is best place to determine additional features
2.6.2	Opportunities to Minimize EIS Requirements	2-5	1	3	A focused EIS that describes the site, outlines the limits of the feature(s) and function(s) and discusses restoration and enhancements...	A focused EIS that describes the site, outlines the limits of the feature(s) and function(s) and discusses potential requirements for restoration and enhancements...	If a buffer of the minimum or greater size is provided, there may be no need for any restoration or enhancements.
2.6.4	#5 Impact & Net Effects Assessment -last two sentences	2-6	1	4	For any proposed development or works adjacent to a Natural Heritage Feature, ecological buffers (see Section 5) shall be applied where as required...	For any proposed development or works adjacent to a Natural Heritage Feature, ecological buffers (see Section 5) shall be applied where as required...	grammatical correction
2.6.3	Focused EIS	2-5	1	3	...Ecological buffers to any natural heritage features must meet or exceed the City's minimum buffer requirements as shown in Table 5.2 for the most sensitive natural heritage features (i.e. 30 m) and include any additional mitigation requirements as stipulated by the City (e.g. fencing without gates). The focused EIS submission will describe the site, outline the limits of the feature(s) and function(s) and provide discussion on the restoration and enhancements and their implementation. Mapping	For Discussion	There is a lot of repetition with the preceding paragraph..
2.6.4	#5 Impact & Net Effects Assessment	2-6	1	New	Add a final sentence	Additional mitigation and/or compensation measures, or re-work of the project plan and/or design may be reflected as a condition of approval, and implemented at the design stage.	Provides flexibility to avoid changes to the Draft Plan (and associated documents) when it would be more appropriate to reflect the changes at design stage.
2.6.4	#6 Environmental Management Recommendations	2-7		2	Recommendations... measures identified in the impact assessment and net effects assessment.	Recommendations... measures identified in the Impact assessment & Net Effects Assessment.	Consistent with the formatting of step 5 that it is referencing
2.6.4	#8 EIS Report Review & Approval (Return the EIS for revisions)	2-7	1	bullet 2	The City may return the EIS report for revisions, or with minor comments received from the TRT	ADD - The City may return the EIS report for revisions, or with minor comments received from the TRT, based on the requirements of the EMG or London Plan policies. Also an Additional Bullet: Require an EIS addendum based on recommendations of the original EIS and/or red line changes to the draft plan submission	Comments need to be tied to requirements not opinion. The additional bullet allows for the iterative design process that takes place with most draft plans submissions and is required prior to final approvals .
2.6.4	#8 EIS Report Review & Approval (Reject the EIS)	2-7	1	bullet 3	The City may reject the EIS based on non-conformance with The London Plan policies, or based on the inadequacies of the EIS report itself.	The City may reject the EIS based on non-conformance with The London Plan policies, or based on the inadequacies of the EIS report itself.	There is nothing indicating what qualifies as "inadequacies". It is already tied to conformance with the London Plan policies which should be sufficient.
2.6.6.3	Physical Environment	2-9		End	New Sentence	For Discussion	Sentence would indicate supporting documents (e.g. hydrog report) do not need to be appended to the EIS but be referenced. This could help resolve AODA issues when including excerpts from other reports
2.6.6.7	Impact and Net Effects Assessment	2-13	2		Existing Impacts...	For Discussion	Does this need to be quantified (i.e. data) or is qualified reporting sufficient. Add clarification. Need to standardize pre-dev impact assessment. Add to data collection standards

Appendix B:
London Development Institute and London Home Builders Association Comments on October 18 EMG
Submission 1/3

2.6.6.8	Avoidance, Mitigation & Compensation	2-14	4	1	One of the most important mitigation measures that will apply to all NHFs is the implementation of ecological buffers	One of the most common important mitigation measures that can be will applied to all NHFs is the implementation of ecological buffers	Beacon et al suggest buffer effectiveness is not well documented or proven
2.6.6.9	Environmental Management Recommendations	2-16			New Section to describe file management process	reference a new section 2.6.6.12 which outlines file mgr process and eis updates, addendums or stand alone design studies docs. See attached for sample of potential addition.	follow file mgr process and eliminate the need for eis revisions as process moves through various design updates prior to final servicing drawing approvals
2.6.6.11	References, Appendices, and Figures	2-15		bullet 2	Resumes (two page) of the study's authors, reviewers, and field staff	Clarification required	Clarification - two page total? Or two pages each?
2.6.6.12 NEW	Process For Updates Through File Manager	2-16			New Clause	For Discussion	Once the EIS has been submitted for review for Draft Plan approval any subsequent review process will be guided by the File Manager steps as outlined in the Appendices. The same file management process will be followed any Impact Assessment.
3	Evaluation of Significance and Ecological Function	3-1	New bullet	4th	New 4th bullet	Should add another bullet after third: • Features not identified on Map 1 that have been assessed to support significant components which may be retained, adjusted or altered with a relocated compensation area as agreed to by the City...	Consistent with mapping and treatment of features not on map 1
3	Evaluation of Significance and Ecological Function	3-1	within the bullet s		For Discussion	(EA process is guided by other documents), there are a number of subsequent	There needs to be some 'checks-and-balances' put in place to ensure "locally developed criteria" isn't just being created.
3	Evaluation of Significance and Ecological Function	3-2	12	1	... any that may be adopted following the approval of these EMGs.	For Discussion	Can we add a dispute mechanism? Review/update process similar to the DSRM (updated yearly, changes in table format circulated to stakeholders for comment, stakeholders have the opportunity to request AND/OR This is particularly important when an SL Sr is requested by the city But the site is designated and zoned for the proposed use changes/additions etc.)
3.1.1	Policy and Context	3-3	7	1	According to the ELC for southern Ontario a treed area is any community with tree cover >10%.	According to the ELC for southern Ontario a treed area is any community with tree cover > 25%.	Less than 25% is not considered treed unless specialized wetland (fen or bog).needs to be more than 35% to be woodland. Natural savannahs in between these ranges but should not include homestead trees (cultural savannah) See Lee et al 1998
3.1.1	Policy and Context	3-3	9	2	In the ELC system shrub and thicket...	spelling correction... thicket	
3.1.1	Policy and Context	3-3	12	1	Based on the information above... tree cover is greater than 10% or shrub cover is greater than 25%.	Based on the information above... tree cover is greater than 25% or shrub cover is greater than 25%.	10% cover is allowed to be considered "treed" only in fens or bogs, which are not woodlands. Lee et al (1998)

Appendix B:
London Development Institute and London Home Builders Association Comments on October 18 EMG
Submission 1/3

3.1.1	Policy and Context	3-2	3	1-2	Furthermore, the Provincial Policy Statement, considers woodlands significant when an area "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 MNRF, with the most current guidance provided in the Natural Heritage Reference Manual (MNRF 2010b).	For Discussion	
3.1.1	Significant Woodlands and Woodlands	3-2	1	2	This section describes the required methods for evaluating the ecological significance of all Unevaluated Vegetation Patches, woodlands and vegetation patches greater than 0.5 ha (as per The London Plan Policies 1337_ through 1343_ and 1383_ through 1386_).	This section describes the required methods for evaluating the ecological significance of all Unevaluated Vegetation Patches on Map1, and flags significant components for, woodlands and vegetation patches greater than 0.5 ha (as per The London Plan Policies 1337_ through 1343_ and 1383_ through 1386_).	Allows for treatment of features not on map 1 differently and consistent with pps as described in next paragraph of EMG.
3.1.1	Policy and Context	3-3	7	2-8	As such, the following ELC Community Classes and Series are potential components of woodland patches: • FOREST - deciduous forest (FOD), mixed forest (FOM) or coniferous forest (FOC); • SWAMP - deciduous swamp (SWD), mixed swamp (SWM) or coniferous swamp (SWC); • BLUFF - treed bluff (BLT); • TALLGRASS - savannah (TPS), woodland (TPW); • CULTURAL - cultural woodland (CUW), cultural savanna (CUS) or cultural plantation (CUP).; and • SHRUB / THICKET - shrub bluff (BLS), cultural thicket (CUT), and swamp thicket (SWT).	As such, the following ELC Community Classes and Series which have been on the landscape more than 5 years, are potential components of woodland patches:	Need a definition that considers length of time the feature has been present. Grass not mowed for a few years should not be here. Manmade ponds and drainage swales for infrastructure should not be here. Hedgerows should not be here. street trees should not be here
3.1.1	Policy and Context	3-3	11	1	Based on the above information, a vegetation patch is considered to have a woodland component within the City of London if tree cover is greater than 10% or shrub cover is greater than 25%.	Based on the above information, a vegetation patch is considered to have a woodland component within the City of London if tree cover is greater than 25% for native savannahs, 35% for woodland or shrub cover is greater than 25%.	>25% tree cover for woodland. Less is a shrub not woodland. 35% for woodland. 25% for savannahs. See Lee et al (1998)
3.1.1	Policy and Context	3-4	13	1	Consistent with The London Plan a woodland will be considered significant if it meets either of the following evaluation scores: • If one or more criteria meet the standard for High; or • If five or more criteria meet the standard for Medium.	A woodland on Map 5 but not on Map 1 will be considered significant if 3 or more criteria meet the standard for High in areas previously designated for urban use. A woodland on Map 5 not meeting the above standards, and any vegetation patches greater than 0.5 ha will be evaluated using the criterion to highlight the features or functions that score high, which need to be considered for protection, preservation, restoration or compensation.	Breaks out into natural heritage (map 1) potential natural heritage (only on map 5 in previously planned areas) or potential part of long term natural system
3.1.2	Criterion under Presence of hydrological features number b)	3-4	1	3	b) "It is recommended that measures be taken to protect water features, wetlands and other areas of significant hydrological importance (e.g., headwaters, recharge areas, discharge areas) within natural heritage systems" (MNRF 2010b).	b) "It is recommended that measures be taken to protect significant water features, wetlands and other areas of significant hydrological importance (e.g., headwaters, recharge areas, discharge areas) within natural heritage systems" (MNRF 2010b).	newly added. Remove or better Define what is meant by "water feature". See pg 152 of Natural Heritage Reference Manual

Appendix B:
London Development Institute and London Home Builders Association Comments on October 18 EMG
Submission 1/3

3.1.2	Criterion under Presence of hydrological features number c)	3-4	2	4	c) the important hydrological functions of wetlands that complement and enhance those provided by woodlands.	c) the important hydrological functions of wetlands that complement and enhance those provided by woodlands (MNR, 2010b).	See MNR 2010B re: naturalness (pg 152). FQI suggested as way to assess naturalness. Purpose of existence, impacts. See water features discussion and a former dug pond does not meet this need, nor do ephemeral flow paths.
3.1.2	Criterion 1st bullet point under hydrological features	3-4	3	2	Groundwater discharge and recharge areas or evidence of groundwater dependent species	Groundwater discharge and recharge areas or evidence of a concentration of groundwater dependent species	Plural (several plants of a species or several species).
3.1.2	Criterion 2nd bullet point under hydrological features	3-4	3	3	Headwaters and watercourses: o Flood plain (as regulated by the local Conservation Authority) o River, stream, and ravine corridors (Valleylands) outside of flood plain regulated lands, and	Headwaters and watercourses o Flood plain (as regulated by the local Conservation Authority) o River, stream, and ravine corridors (Valleylands) outside of flood plain regulated lands assessed as important (MNR, 2010b); and	Need a definition here. Topographic draw should not count. See NHRM. Flowing water is implied in criterion.
3.1.2	Criterion 3rd bullet point under hydrological features	3-4	4	1	Wetlands (evaluated and un evaluated)	Wetlands: Greater than 0.5 ha (evaluated and un evaluated)	Clarity with OWES to guide this evaluation rather than London Plan which aims to protect all wetlands
3.1.2	Criterion Ranking under hydrological features	3-4	4	1	Criterion Ranking: • HIGH – One (1) or more hydrological features (as described above) located within or contiguous with the patch. • MEDIUM – Within 50 m of a hydrological feature. • LOW – No hydrological features present within 50 m of the patch.	For Discussion	There is no wetland size requirement any more. Wetlands <2 ha used to be a Medium rank and based on OWES which stops at 0.5 ha. A Medium rank is now given to patches within 50 m of any hydrological feature, not just a watercourse.
3.1.2	Criterion 1.1 B) under Erosion and Slope Protection	3-5	1	2	As slopes increase, the erosion risk also...	Add "natural" in front of "slopes" within the Section.	
3.1.2	Criterion 1.1 B) under Erosion and Slope Protection	3-5	2	1	This measure relates to the need "to protect runoff processes, ground stability, and aquatic habitat (erosion potential) for slopes > 10%" (MNR, 2010a).	For Discussion	This reference is for forest management. What if a wooded patch is not there but there is cultural meadow on the edge of a slope next to farmland? Or farmland has trees on a slope from lane
3.1.2	Criterion 1.1 B) Criterion Ranking under Erosion and Slope Protection	3-5	5	1	Criterion Ranking: o HIGH – Patch present on steep slopes >25% of any soil type, OR on a remnant slope associated with other features such as moraines or remnant valley slopes no longer continuous with the river system OR on moderate to steep slopes >10% - 25% with erodible soils (silty loam, sandy loam and loam, fine to coarse sands).	For Discussion	
3.1.2	Criterion Landscape Richness	3-5	2	2	Thresholds reflect cumulative frequency distribution of patches within London (Bergsma, 2004).	For Discussion	
3.1.2	Criterion Ranking under Landscape Richness	3-5	3	1	Criterion Ranking: o HIGH > 10% local vegetation cover o MEDIUM 7 – 10% local vegetation cover o LOW < 7% local vegetation cover.	For Discussion	UFORE suggest City is at 25% cover so these filters are incorrect and were originally based on Upland woods only.

Appendix B:
 London Development Institute and London Home Builders Association Comments on October 18 EMG
 Submission 1/3

3.1.2	Criterion Ranking under Landscape Connectivity	3-6	3	1	<p>Criterion Ranking:</p> <ul style="list-style-type: none"> o HIGH – patch clusters with total area > 40 ha OR identified as a Big Picture Meta Core (Carolinian Canada, 2000). o MEDIUM – patch clusters with total area 20 – 40 ha. o LOW – patch clusters with total area < 20 ha. 	<p>Criterion Ranking:</p> <ul style="list-style-type: none"> o HIGH – patch clusters with total area > 40 ha o MEDIUM – patch clusters with total area 20 – 40 ha. o LOW – patch clusters with total area < 20 ha. 	Big Picture Meta Corridors were removed from the London Plan.
3.1.2	Criterion Ranking under Community Successional Stage	3-7	3	1	<p>Criterion Ranking:</p> <ul style="list-style-type: none"> o HIGH – patch contains one (1) or more mature or older growth communities o MEDIUM – patch contains one (1) or more mid-aged communities o LOW – patch contains only pioneer to young communities 	Discussion - example of how patches not on map can become significant	A 250 m street lined with trees with combined canopy of 20m diameter equals 0.5 ha. The trees are mature so this street lined ROW of trees is a significant woodland.
3.1.2	Criterion Ranking under Mean Coefficient of Conservatism	3-8	3	1	<p>Criterion Ranking:</p> <ul style="list-style-type: none"> o HIGH – one (1) or more vegetation community with an MCC ≥ 4.6; OR MCC of patch > 4.5 o MEDIUM – one (1) or more vegetation community with an MCC 4.2 – 4.5; OR MCC of patch ≥ 4.0 – 4.5 o LOW – all vegetation communities with an MCC < 4.2; OR MCC of patch < 4.0. <p>Score for Criterion 2.1 based on the highest standard achieved for any one of the two standards.</p>	Discussion - Remove from Natural Heritage System if not natural	Remove from Natural Heritage System if not natural.
3.1.2	Criterion Ranking under Patch Size	3-8	4	1	<p>Criterion Ranking:</p> <ul style="list-style-type: none"> o HIGH Patch > 9.0 ha in size OR patch contains a woodland >4 ha. o MEDIUM Patch 2.0 – 9.0 ha in size OR patch contains a woodland 2-4 ha. o LOW Patch < 2.0 ha in size. 	Discussion -This should be a filter to decide if a feature gets evaluated as a significant woodland	
3.1.2	Criterion Ranking under Bird Species	3-9	3	1	<p>Birds can be indicators of habitat quality and the degree of forest fragmentation. The following criteria rankings have been developed based on the guidance from the: Significant Wildlife Habitat Ecoregion 7E Criteria Schedules (MNR, 2015a) for "Habitat of Species of Conservation Concern, Special Concern and Rare Species" and the Avian Conservation Assessment Database (Partners in Flight, 2020) for "Regional Concern" species for the Lower Great Lakes/St. Lawrence Plain Bird Conservation Region.</p> <p>Criterion Ranking:</p> <ul style="list-style-type: none"> o HIGH Patch provides breeding habitat for any three (3) or more bird species of conservation concern, including provincially rare bird species (MNR, 2015a) or species of regional concern (Partners in Flight, 2020) . o MEDIUM Patch provides breeding habitat for one (1) or two (2) bird species of conservation concern, including provincially rare bird species (MNR, 2015a) or species of regional concern (Partners in Flight, 2020). o LOW Patch does not provide breeding habitat any bird species of conservation concern, including provincially rare bird species (MNR, 2015a) or species of regional concern (Partners in Flight, 2020) . 	<p>"Species of regional concern" no longer evaluated based on Southern Ontario Conservation Priorities Scores for Middlesex County (Couturier, 1999).</p> <p>Remove "and the Avian Conservation Assessment Database (Partners in Flight, 2020) for "Regional Concern" species for the Lower Great Lakes/St. Lawrence Plain Bird Conservation Region." and all references to " species of regional concern (Partners in Flight)</p>	The list includes very common species in the area (ie Rose breasted grosbeak, flicker)
3.1.2	Criterion Ranking - Diversity (species...)	3-10 3-11	4	1	<ul style="list-style-type: none"> o HIGH – three (3) or more species of amphibians present in the patch, OR one (1) species of amphibian that is abundant* in one (1) or more communities; OR two (2) or more critical habitat components present in the patch. 	Discussion - Remove this as it should be dealt with under SWH	What does this even mean if there are no amphibians present?

Appendix B:
London Development Institute and London Home Builders Association Comments on October 18 EMG
Submission 1/3

3.1.2	Criterion Ranking under Species At Risk Habitat	3-12	2	2	Federally endangered or threatened species, as outlined in the Species at Risk Act, that are not covered under provincial legislation should be considered.	Discussion - delete this	not applicable or necessary
3.1.2	Criterion Ranking under Species At Risk Habitat	3-12	4	1	The presence of SAR habitat will add one HIGH score to the overall assessment	The presence of protected SAR habitat based on Endangered Species Act review by province , will add one HIGH score to the overall assessment	modernize to acknowledge permits
3.1.2	Criterion Ranking under Significant Wildlife Habitat	3-13	1	1	Significant Wildlife Habitat (SWH; including habitat for species of conservation concern and rare species) occurrences within the patch as determined through the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNR, 2015a). This criteria applies to any SWH that is not evaluated through any other criteria within these guidelines (e.g., Criteria 2.2c).	Delete	SwH dealt with under separate policies
3.2.3	London Plan 1371 - Criterion 1	3-20	7	1	Regional level: Regionally significant Earth Science ANSIs and vegetation communities identified as rare to uncommon based on an analysis of the London Subwatershed Studies Life Science Inventories (Bowles et al., 1994) or the best available data.	Discussion	Requesting clarification on what a Regionally Significant Earth Science ANSI is and provide map.
3.2.3	London Plan 1371 - Criterion 2	3-21	9	1	Regional level: All wetlands within the City of London are protected in accordance with The London Plan.	Delete	Local wetlands should not score for ESA.
3.2.3	London Plan 1371 - Criterion 2	3-21	10	1	Presence of regionally significant ANSIs identified in LIO.	revise to reference Hanna. Since Hanna 1984, MNR has added Regional ANSI when a feature is ESA as decided by municipality.	This is a do loop since MNR now updates original Reg ANSIs when municipality assigns an area with ESA status.
3.2.3	London Plan 1371 - Criterion 3	3-22	7	1	2. The area either a) contains some interior forest habitat which is at least 100 m from all forest edges and is not interrupted by gaps wider than 20 m, OR b) there is confirmed presence of one or more breeding birds which are either forest-interior species or area-sensitive species.	2. The area either a) contains some interior forest habitat which is at least 100 m from all forest edges and is not interrupted by gaps wider than 20 m, OR b) there is confirmed presence of one or more breeding birds which are either forest-interior species or area-sensitive species.	no new reference offered yet distance reduced
3.2.3	London Plan 1371 - Criterion 7	3-24	2	1-2	The focus of this criterion is to identify populations of rare, threatened or endangered species for protection. This criterion is focused on SAR and rare species not covered under significant wildlife habitat under Criterion 6 (e.g., species of conservation concern).	revise to reflect permits that can be obtained under Act	SAR Permits?
3.2.3	London Plan 1371 - Criterion 7	3-25	6	1-3	Federal SAR: COSEWIC Status reports NHIC Global Ranks (GRANK) for Rare Vascular Plants (Oldham, 1994a) and Mosses (Oldham, 1994b). • Species listed with a global rank of G1 to G3	Delete as not necessary If remains add bullet: • SAR listed under the Species at Risk Act	This same statement is in the Animal Species Federal SAR section as well. What about species (ex: Midland Painted Turtle) that are on the SARA list, but not the SARO list?
3.2.3	London Plan 1371 - Criterion 7	3-26	16	1-4	Provincial SAR: NHIC Provincial Rank (SRANK) for Amphibians and Reptiles, Mammals, Birds, Insects, and Fishes • Species listed with a provincial rank of S1 to S3 • COSSARO Status reports	revise re permits; MECP SAR in Ontario should be revised to reflect threatened and endangered. Add following bullet: • MECP SAR in Ontario	SAR Permits?
3.2.3	London Plan 1371 - Criterion 7	3-26	18	3	• breeding birds - open ended lists from the provincial bird atlas (OBBA, 2007); Partners in Flight, 2020) and best available county information;	Remove Partners in Flight, 2020	Partners in Flight is not about rarity
4.7	Boundary Delineation Guidelines: Guideline 1	4-7	1	1	Species at Risk (SAR) habitat and Significant Wildlife Habitat (SWH) must be included within the feature boundary.	Protected Species at Risk (SAR) habitat and confirmed Significant Wildlife Habitat (SWH) must be included within the feature boundary.	Recognizes permit allowance in ESA Act and SWH impacts in PPS.

Appendix B:
London Development Institute and London Home Builders Association Comments on October 18 EMG
Submission 1/3

4.7	Boundary Delineation Guidelines: Guideline 3	4-9	1	2&3	a) and b) "must be included..."	change references of "must" to "should"	Provides flexibility
4.7	Boundary Delineation Guidelines: Guideline 4-Rationale	4-10	2	2	...This includes anthropogenically created / maintained / altered features as well as natural features.	For Discussion	COMMENT - This paragraph/sentence should be clarified in some way, as the way it is worded, it would even include a front yard or rear yard swale
4.7	Boundary Delineation Guidelines: Guideline 5	4-11	1	1	a) must be included within the boundary if the satellite contains Species at Risk or Significant Wildlife Habitat	a) should be included within the boundary if the satellite contains protected Species at Risk or confirmed Significant Wildlife Habitat	Provides flexibility and recognizes permit allowance in ESA Act and SWH impacts in PPS.
4.7	Boundary Delineation Guidelines: Guideline 6 & 7	4-12	1	1	First line in both Guidelines	change references of "must" to "should"	Provides flexibility
4.7	Boundary Delineation Guidelines: Guideline 8	4-14	1	1	a) Existing heavily managed or manicured features that are surrounded on at least three sides by a patch are included in the feature boundary...	a) Existing heavily managed or manicured features that are surrounded on at least three sides by a patch may be included in the feature boundary...	Depending on configuration could accommodate a cul-de-sac and aren't necessarily part of the feature
4.7	Boundary Delineation Guidelines: Guideline 8	4-14	1	2	b) Existing residential building envelopes...	b) Existing or former residential building envelopes...	Should include residences that were demolished
4.7	Boundary Delineation Guidelines: add Guideline 9				New Guideline	Non native or invasive portions of the patch will not be included for boundary delineation purposes. Removal and naturalization of these areas can contribute toward CFZ creation and/or buffers.	Allows for discussions on compensation added to these emg's
5	Determining Ecological Buffers	5-1	1	1	Ecological buffers are one of the primary planning tools that must generally be implemented...	Ecological buffers are one of the primary planning tools that should must generally be implemented...	implemented to considered?
5.1	Definition of a Buffer	5-1	1	1	Buffers are strips of land kept in a vegetated state...	Buffers are strips of land kept in a primarily vegetated state...	Allows for walkways
5.1	Definition of a Buffer	5-1	1	2		"its' " is this correct	
5.1	Definition of a Buffer	5-1	1	6	Buffers shall not be included within the limits of development...	Buffers should not be included within the limits of development...	Flexibility for block development where appropriate buffer setback can be built into the zoning, rather than implemented through the block limit.
5.3	Buffer Determination Process	5-2	2	1		...secondary plan stage with the understanding...	missing the "t"
5.3.2	Step 2 - Apply Minimum Buffer Widths	5-4	2	1	Change to title of Step 2	Change "required" minimum buffer to "suggested" minimum buffer (x2) Table 5.2 outlines the required minimum buffer widths that are considered appropriate ...	Allows for flexibility
5.3.2	Table 5.1 Step 4	5-4	4	1	Site Specific enhancement....	ADD "where appropriate, reduced buffers could be considered"	Allows for quality over quantity

Appendix B:
London Development Institute and London Home Builders Association Comments on October 18 EMG
Submission 1/3

5.3.2	Table 5.2 Required Minimum Buffers Widths for Protected Natural Heritage Components	5-5	1	Table	Table Title " Required Minimum Buffer Widths... and Column title	Remove "Required" and change to "Recommended" for the label	There are allowances for deviation and would be consistent with prior EMG
5.3.2	Table 5.2 Required Minimum Buffers Widths for Protected Natural Heritage Components	5-5	1	Table	Significant Woodlands 30 meters	Change Significant Woodlands to required minium to 10m	There are allowances for deviation and would be consistent with prior EMG
5.3.3	Step 3 - Determination of Site Specific Buffer widths	5-6	2	1	Other factors that can help improve buffer effectiveness and mitigate the need for potential increases from the required minimums are provided below.	Other factors that can help improve buffer effectiveness and mitigate the need for potential increases from the recommended minimums are provided below.	Should allow for flexibility.
5.3.3	Determination of Site Specific Buffer widths	5-6			Need for an additional bullet point	For Discussion: Consideration of supporting hydrogeological studies, water balance calculations and stormwater management .	add a bullet to reflect progression in tech studies previously not considered in prior EMG
5.3.4	Table 5.4 descriptive text	5-9	1	1	outlines buffer enhancement measures that shall be implemented to reduce of negative edege effects...	outlines buffer enhancement measures that should be implemented to reduce of negative edege effects...	Stormwater management, LID, water balance, erosion control, development phasing all can help reduce minimum buffers and reduce negative edge effect
6	Ecological Replacement and Compensation	6-1	2	3	However, there are some limited cases and contexts in which removal...	However, there are some limited cases and contexts in which removal...	"Limited" not needed
6	Ecological Replacement and Compensation	6-1	3	2	However, under some circumstances, residual damage to natural heritage features and their functions is unavoidable.	For Discussion	Need to add language to support removal/compensation/relocation to support efficient development patterns for low quality features. Whatever we land on should be carried through the whole section. Small feature remove as well(also discuss Figure 6.1)
6.1.2	Scientific and Technical Context	6-3	1	3		x2 spelled "focussing"; remove the extra "s"	
6.1.2	Scientific and Technical Context	6-3	2	2	Consequently, a lthough...	remove the space "although"	
7.1	Policy and Context	7-1				For Discussion - Need some contemplation of how it will be addressed if there is a measured negative impact after infrastructure is already in the ground	
7.2.1	EMP Report Requirements	7-3				For Discussion - Security deposit return timing	
7.2.2	Monitoring Timeline and Responsibilities	7-4	1	2	It is the responsibility of the proponent to create a monitoring plan (to be approved through the EIS proces).	It is the responsibility of the proponent to create a monitoring plan; monitoring is to be contemplated through the EIS proces. The final monitoring plan would be approved through detailed design and engineering review.	You won't have all the information you need at the EIS stage (which is submitted as part of a complete application). Shows up at the end of the section as well.
7.2.2	Monitoring Timeline and Responsibilities	7-4			Bullets at the bottom of 7-4 page	Correct the formatting	signoff by city process?
7.2.3	Pre-Construction Monitoring	7-5		bullet 2		For Discussion - Need more reference of what is considered an encroachment at the pre-construction stage and post construction	degree of impact and distance into feature. Trails?no trails allowed
7.2.5	Post-Construction Monitoring	7-6		bullet 4		Fo Discussion	Natural Heritage encroachments - City policy creating informal trails/dumping vs the recommendations of the consultant of formal trail through feature.

No.	Section Name	Appex C	P	S	Draft Language	Suggested Revision	Justification
	Appendix C - Data Collection Standards						
		Data Collection Standards	1	2	<i>The following sections provide insight into the methodologies and standards required for data</i>	The following sections provide insight into the methodologies and standards required for data collection for informing Natural	"Environmental" includes soil, water, air, noise, etc.
	Guidelines for Data Collection	Guidelines for Data Collection	2	1	<i>Where relatively current data (up to 5 years) is available for the site and it meets the City of London’s Data Collection Standards (outlined in this document), it may be applied to meet some of the requirements for three- or five-season inventory (as determined through consultation with the City of London).</i>	<i>Where relatively current data (up to 5 years) is available for the site and it meets the City of London’s Data Collection Standards (outlined in this document), it may be applied to meet some of the requirements for one to four-season inventory (as determined through consultation with the City of London).</i>	Acknowledge that multiple years of data collection may be required, but possible typo re 5 seasons.
	Guidelines for Data Collection	Guidelines for Data Collection	2	2	<i>However, a minimum of two wildlife/ecological site visits will still be required to verify and document</i>	<i>However, a minimum of one or two wildlife/ecological site visits will still be required to verify and document</i>	Sometimes one visit is enough to confirm similar habitat. Two visits needs mre clarity. Two seasons? Breeding bird update?
	Inventory Protocols	Inventory Protocols	1	5	1. Early Spring (late March/early April) <i>o Amphibians</i>	1. Early Spring (late March/early April) <i>o Amphibians, Bat Habitat, other specialized targeted studies when</i>	Also bat habitat, owls, even some snakes and turtles.

Appendix B:

London Development Institute and London Home Builders Association Comments on October 18 EMG

Submission 2/3

	Inventory Protocols	Inventory Protocols	1	6	2. Spring (late April – May) <i>o Amphibians, Reptiles, Vascular Plants, Vegetation Communities, Breeding Birds (May)</i>	2. Spring (late April – May) <i>o Amphibians, Reptiles, Vascular Plants, Vegetation Communities, Breeding Birds (late May), Aquatic Habitat</i>	
	Inventory Protocols	Inventory Protocols	1	7	3. Early Summer (June) <i>o Amphibians, Breeding Birds, Mammals (including Bat acoustic surveys), Vascular Plants,</i>	3. Early Summer (June) <i>o Amphibians, Breeding Birds, Mammals (including Bat acoustic surveys), Vascular Plants, Vegetation Communities, -Aquatic</i>	Aquatic assessment best in spring (hsbitat) and later in summer (hsbitat and community). While late June is peak for Butterflies, for practical reasons surveys are often undertaken in July/August.
	Inventory Protocols	Inventory Protocols	1	8	4. Summer (early July/early August) <i>o Vegetation Communities, Significant Wildlife Habitat, Vascular</i>	4. Summer (early July/ early August) <i>o Vegetation Communities, Vascular Plants, Butterflies and Insects, Terrestrial Crayfish, other incidental observations, Aquatic</i>	We don't look for SWH, we look for candidate habitat through ELC and assess using general or where applicable, targeted surveys.
	Inventory Protocols	Inventory Protocols	1	9	5. Fall (September-October) <i>o Migratory Birds Vascular Plants, Vegetation Communities Reptiles, Mammals, Butterflies and Insects</i>	5. Fall (September-October) <i>o Migratory Bird s Vascular Plants, Vegetation Communities Reptiles, Mammals, Butterflies and Insects</i>	Where does fall migratory birds fit into London/PPS policy? If justified, why fall but not spring when birds are in breeding plumage? Remove fall Butterfly and insect surveys, as out of season. Similar to migratory birds, migratory butterfly habitat is not relevant to London. With respect to Monarch, focus has been on egg-laying and nectaring habitat which can be
	Inventory Protocols 1. Vegetation Communities	Inventory Protocols - Vegetation Communitis	3	1	• A full list of vascular plant species present and an indication of their abundance.	• A full list of vascular plant species present and an indication of community dominance through the ELC protocols. Also indicate rarity / abundance of secondary indicator species (groundwater, provincially or locally rare).	The summary sheet lists the top 4 plants per layer, everything else is usually occasional or less. Merit in discussing the abundance, or lack of abundance of some select species. Ie one skunk cabbage versus dozens in a focused area
	Inventory Protocols 3. Breeding Birds	Inventory Protocols - Breeding Birds	2	1	• Where habitat is suitable, dusk and night visits to survey for crepuscular species (e.g., American Woodcock, Common Nighthawk) in accordance with standardized protocols as outlined in OBBA (2001).	OBBA 2021 - nightjar surveys	No mention of crepuscular surveys in OBBA 2001. Note that OBBA 2021 cautions that play-back surveys should not be used indiscriminantly as these disrupt normal bird activity. Health and welfare of all wildlife should be a priority during ecological surveys

Appendix B:

London Development Institute and London Home Builders Association Comments on October 18 EMG

Submission 2/3

	Inventory Protocols 4. Herpetofauna	Inventory Protocols- Herpetofauna	1	1 • <i>Surveys for newts and mole salamanders, where required, should be conducted during seasonal migration (mid March – late April) and may include a combination of minnow traps, visual surveys (e.g., carefully flipping suitable cover, observing vernal pool egg masses), pitfall or funnel traps, or fine mesh dip nets may be required as outlined in McLaren et</i>	move to only specialized	Emphasis should be on non-invasive survey methods unless otherwise justified. Red-backed salamanders and newts will use cover objects - this should be emphasized over flipping (and potentially wrecking) natural cover or trapping of any kind. Or perhaps road surveys on warm, spring nights where concerned about fragmenting populations? Is the concern that we're not sufficiently assessing/protecting wetlands because they don't meet criteria for calling amphibians? It may be better to assume significance in some situations than to conduct extensive and
	Inventory Protocols 4. Herpetofauna	Inventory Protocols- Herpetofauna	4	1 <i>Observational surveys are required during the spring (between March-June) when amphibians are concentrated around suitable breeding habitat in wetlands and woodlands. (MNRF, 2000b)</i>	<i>Observational surveys if required to determine amphibian presence and diversity during the spring (between March-June) when amphibians are concentrated around suitable breeding habitat in wetlands and woodlands. (MNRF, 2000b)</i>	2000b talks about looking simply for presence and diversity. Updated SWH guidelines targets Calling codes to assess for SWH. Standardized protocol (Marsh Monitoring Protocol) allows for estimate of relative abundance comparison among sites, whereas observational surveys have little reference point (ie. what does one adult frog observed during the day mean?)
	Inventory Protocols 4. Herpetofauna	Inventory Protocols- Herpetofauna	6	3 <i>o Hibernacula searches may be required and consist of visual encounter surveys to detect basking snakes during the first sunny, warm days in early spring.</i>	2+ VES surveys should be conducted around suspected hibernacula between late March and early May (with regard for weather variability), to catch early and late emerging snakes. Ideally 3+ VES: 1. late March/early April 2. Mid April 3. Late April/early May	Emergence date varies by species, and one criteria for SWH is that multiple species are present.
	Inventory Protocols 4. Herpetofauna	Inventory Protocols- Herpetofauna	6	6 <i>Queensnake (Regina septemvittata) surveys along the Thames River may be required and should be conducted in accordance with the</i>	specialized only	Caution! Consultation recommended before proceeding with surveys. Walking creekbeds can crush snakes.

Appendix B:

London Development Institute and London Home Builders Association Comments on October 18 EMG

Submission 2/3

	Inventory Protocols 4. Herpetofauna	Inventory Protocols- Herpetofauna	4	4	<i>Turtle surveys may consist of nesting surveys (late May – early July) in suitable nesting habitat or along gravel shoulders of roads, as well as visual encounter surveys to detect basking turtles following Ministry of Natural Resources and Forestry protocol for Blanding’s Turtle (MNRF, 2015b).</i>	Turtle surveys may consist of nesting surveys (late May – early July) in suitable, natural nesting habitat or along gravel shoulders of roads , as well as visual encounter surveys to detect basking turtles following Ministry of Natural Resources and Forestry protocol for Blanding’s Turtle (MNRF, 2015b).	Suggest more emphasis on basking than nesting - road shoulders are not SWH. Road surveys are helpful for species detection, but they don't tell you where the individual came from (what habitat feature, how far away?). Except for THR or END, non-natural nesting habitat is not protected. Surveys to detect PATU for SWH may not require 5 visits, as they bask readily. SNTU can also be observed within fewer than 5 visits if observer is knowledgeable and patient
	Inventory Protocols 8. Significant Wildlife Habitat (SWH)	Inventory Protocols- Significant Wildlife Habitat	1		<i>All potential SWH criteria should be surveyed using current accepted methodologies</i>	All potential <i>candidate SWH habitat criteria should be surveyed using current accepted methodologies. Alternatively, can be considered Candidate - Unconfirmed if appropriate (habitat protected and/or presence unlikely but studies are onerous ex. Ribbonsnake).</i>	Aligns with MNRF 2015; Note that SWH is an assessment involving identification of candidate habitat and surveys for targeted species - there is no survey for SWH. Further, in some cases SWH may be assumed without requiring targeted surveys
	Inventory Protocols 9. Regionally Rare Species	Inventory Protocols- Regionally Rare Species	1	1	NEW	add a process for reporting to help address database rarities rather than actual regional rarity	

Once the EIS has been submitted for review as part of the Draft plan approvals (EA process is guided by other documents), there are several subsequent review steps as outlined by File Manager (London, 2008). The intent of this EMG is to also guide the Impact assessment through those steps.

Draft Plan Comments Response

- this is addressed in the EIS Addendums Chapter (Suggested 8.0). In some instances, a full revision of the EIS may be more appropriate if there are policy changes since first writing or if there are substantial adjustments to the subsequent draft plan because of site design changes triggered by municipal review process and/or developer led revisions. Otherwise, the addendum section will allow the EIS report to be updated simply with explanation of the changes and how the prior recommendations have been altered. Essentially, this section would target the development proposal and impact and mitigations sections and should include the full list of updated recommendations for ease of creation of Draft plan conditions.

Subsequent Detailed File Manager steps through Detailed Design study there are several details that are not resolved until the design studies review which ultimately leads to site plan approvals. The previously submitted EIS, which was designed for Draft Plan approval, should not be updated as it should remain a standalone document which guided the original approval. Instead, letters of opinion can be submitted through each design study phase. These letters would provide the details and evaluate the consistency of detail design with the original intent of the EIS. Where necessary, the opinion letter would provide additional recommendations including avoidance, mitigation or compensation and/or confirmation that technical detail updates have or have not altered prior impact analysis (eg. hydrogeology, water balance, grading, trail design, tree preservation).

Comments in response to June 2021 Draft City of London Environmental Management Guidelines

- Comments prepared by David Wake on behalf of Nature London, November 10, 2021

Page	Section	Description	Comment
1-3	1.3	Introductory statement	Suggested revision for introductory statement: <i>This Environmental Management Guidelines document is organized in a series of chapters, each presenting an individual guideline. As noted below, these chapters replace separate guideline documents that have been in place since at least 2007.</i>
1-3	1.3	Guidelines 2 through 5	The text as written is confusing, most likely caused by inappropriate use of the words “superseded by.” As written, the meaning is completely reversed to what is intended. Also, the generally accepted spelling is supersede not supercede . Here is a suggested rewording of item 2. <i>2. Preparation of Environmental Studies (supersedes 1.0 Guidelines for the Preparation and Review of Environmental Impact Statements, November 2003)</i> <i>A similar approach should be used for items 3 through 5</i>
2-1	2.2.1	Heading	Incorrect acronym. I believe Environmental Study Scoping Checklist should be shortened to ESSC , as opposed to EESC.
2-1	2.2.2	First paragraph	Insert period at the end of the first sentence, after (scoping meeting) and before The environmental...
2-2	2.3	First paragraph	Replace second “required” with “require” so sentence will read “...and detail, they both require a background...”
2-3	2.5	First paragraph, second line	Insert a space in butnew so it reads but new
2-4	2.6.1	First paragraph, first sentence	Suggest rewording “ An EIS is required.. ”
Ui	2.6.1	Line 3	Try reorganizing the sentence to read, “no net negative impacts to the features and functions of the NHS as a result... . This will avoid awkward use of the apostrophe.
2-4	2.6.2	First sentence	In direct response to the question asked immediately above, it would be helpful to say “ An EIS is required for... ”

Page	Section	Description	Comment
2-5		Opportunities to Minimize EIS Requirements, first two sentences	I find the first two sentences difficult to follow. I suggest replacing this sentence with the following: <i>“Under certain circumstances, the city may waive the requirement for a full EIS. If the EIS requirement is waived, specific conditions must be met. An ecological buffer that meets or exceeds the city’s minimum buffer requirements (see Table 5.2) must be implemented. Additional mitigation measures may be stipulated by the city. A focused EIS...”</i>
2-5	2.6.3	Line 9	Revise spelling of “features”
2-6, 2-7	2.6.4	Overview of EIS process, Points 1 through 7	Review use of should / shall / must in these paragraphs. In some cases, “should” may not be strong enough. It is essential to be clear about which items are <u>required</u> as opposed to those that are <u>nice-to-have</u> .
2-7	2.6.6	Report Content	Again, throughout this section and sub-sections, it is essential to be clear about which components are <u>required</u> . Where appropriate, consider replacing “should” with “shall” or “must.”
2-10	2.6.6.4	First sentence	<i>Conditions</i> should be plural; <i>disciples</i> should be <i>disciplines</i> . Revised sentence should read <i>As noted above, the existing conditions for the natural environment section of the EIS should be divided into four (4) main disciplines.</i>
2-13	2.6.6.8	Avoidance, second last line on page	Check cross-reference: “As noted in the Proposed Development (Section 2.6.5.6) – Is this supposed to be 2.6.6.6 ?”
2-14	2.6.6.8	Mitigation, first line	Replace “director” with <i>direct or</i>
2-14	2.6.6.8	Mitigation, third line	Measures should be plural – “Each of these <i>measures...</i> ”
2-14	2.6.6.8	Mitigation, second paragraph	Measures should be plural – “One of the most important mitigation <i>measures...</i> ”
2-16		Last bullet	Replace “will” with “with” – “A Legend <i>with</i> all symbols...”
3-22		Criterion 3, Background	Verb should be singular to agree with presence: “The presence of large contiguous blocks... <i>...is used</i> ”
4-9		First sentence at top of page	Sentence does not make sense. Possible rewrite: <i>CFZs are natural areas that surround wetlands and can provide a suite of benefits to wetland function and to the species dependent on the wetland.</i>
4-9		Guideline 3	Change meters to <i>metres</i> .
4-13		First complete paragraph, final sentence	Sentence requires two insertions of the word “in”. Also, delete hyphen after agriculturally. This contribution is especially prevalent <i>in agriculturally dominated</i> landscapes, which are common <i>in</i> southern Ontario
4-13		Guideline 7 introduction	At end of introduction remove plantation from “criteriaplantation”

Page	Section	Description	Comment
4-13		Guideline 7 bullets	For bullets (d) and (e), remove “it”.
4-14		Figure 4.8 Guideline 7 Illustration	It would be desirable to keep this text with the illustration
4-14		Guideline 8	Item a) last line – should be qualify not qualify
5-1	5.1	Definition of a Buffer	Line 3: There should be no apostrophe following its
5-2	5.2	Approach	Paragraph 3, line two, replace toh with to
5-2	5.2	Paragraph 4	“At the City’s discretion...” I wonder if more could be said here. I suggest that pathways in buffers should be the exception, not the rule, and would prefer to see wording that emphasizes this.
		Pathways in buffers	Researchers at Western have been studying disturbance to wildlife, including human disturbance. I will provide a list of references.
5-2	5.3	Buffer Determination Process	Paragraph 2, line 3: “...with the understanding...”
5-5	Table 5.2	Formatting issues	<ul style="list-style-type: none"> Is it possible to show the entire table on one page? This would be helpful for those using this document. At the end of Table 5.2, there is a note about how unevaluated features will be addressed. It would be better to present this information as footnote #3, or perhaps create another row in the table.
5-5	Table 5.2	Content – First Row	Was this supposed to be “Coldwater and cool-water ...”?
5-5	Table 5.2	Wetlands less than 0.5 ha	If the wetland is small, then the importance of the buffer is even greater. Consider specifying a buffer of 30 m, with a footnote stating that it may be reduced depending on results of the EIS.
5-5	Table 5.2	Significant Woodlands less than 2 ha	If the woodland is this small to begin with, it will be important to maintain a 30-metre buffer as specified for Significant Woodlands.
5-5		Woodlands, and Woodlands less than 2 ha	I question whether 10 metres would provide a sufficient buffer. In the 2020 draft EMG, the minimum for Woodlands was given as 15 m. Why has it been reduced? Furthermore, if the intent of the table is to establish a “minimum” width for a buffer, the wording “less than 10 metres” is ambiguous. It will be difficult for proponents, and for residents to work with this definition. What is the minimum? Nine metres is less than 10, but so is one metre.
5-6	5.3.3	Step 3 – Determination of Site-Specific Buffer Widths	I would prefer to see a different emphasis in the first sentence. Here is a possibility. <i>The minimum buffers as outlined in Section 5.3.2 are considered to provide only basic protection for identified natural heritage features. An EIS may recommend...</i>
5-6	5.3.3	First bullet	Spelling of reference should be Johnson
5-6	5.3.3	Third bullet	Statement appears to be incomplete

Page	Section	Description	Comment
5-6	5.3.3	Second set of bullets, bullet 2	Did you intend to quote a second Beacon reference here?
5-6	5.3.3	General Comment	There are other references that may have relevance to this discussion. The <i>Natural Heritage Reference Manual</i> cites a 1995 paper in Conservation Biology by Friesen, Eagles and MacKay. Their data show that residential development within 100 metres of a woodland can degrade its quality as habitat for birds.
5-7	Table 5.3	Presence of Significant Wildlife Habitat	“Greater than minimum buffer width may be required when Significant Wildlife Habitat in accordance with criteria schedules for Ecoregion 7e <i>is</i> present.” (verb needs to agree with Significant Wildlife Habitat, not with schedules).
5-8	Table 5.3	Edge Conditions The first sentence is confusing	Possible rewrite: Understanding the slope and direction of flow aids in predicting areas that may receive more water than others. <i>This information helps with identification of pre-construction conditions that need to remain the same post-construction, and with the determination of appropriate buffer plantings.</i>
5-10	5.4	Prohibited and Permitted Uses within a Buffer	I would prefer to see stronger wording, making it clear that these exceptions will only be considered in the most exceptional circumstances.
5-10	5.4	Second bullet, spelling issue	“...buffer <i>functions</i> ...”
5-10, 5-11	5.4	Prohibited and Permitted Uses within a Buffer	The final sentence on page 5-11 conflicts with the first sentence on page 5-10. In both cases it should read <i>greater</i> than the minimum.
6-1	6.0	Ecological Replacement and Compensation	Last paragraph, line 4, suggest rewording as follows <i>“...this particular chapter is new and is expected will to be updated...”</i>
			On the matter of emerging science, I note the work of Professor Simard, dealing with the importance of mycorrhizal fungi in forests in Western Canada. Similar complexities likely exist in Ontario ecosystems.
6-2	Figure 6.1	Heading for this figure	Letter “t” is missing on “the City”
6-2	6.1.1	Policy Context	“based on the the language...”
6-3	6.1.2	Scientific and Technical Context Paragraph 2, line 5	Remove space from although: “Consequently, <i>although</i> most ecological...”
6-3	6.2	Approval Process, line 4	“..and <i>options</i> for mitigation...”
6-4	6.2	Paragraph beginning with “Notably”, last sentence	Last sentence does not make sense. Also, a closing bracket is missing.
6-4	6.2	Last paragraph on page, second line	“...where the feature <i>falls</i> within...”
6-5	6.2	First full paragraph	Redundancy: “It is...”
6-5	6.2	Second full paragraph	I believe it should read “No removals of part <i>or all...</i> ,”
6-5	6.2	Second full paragraph	Review inconsistent use of italics in this paragraph.

Page	Section	Description	Comment
6-5	6.3	Guiding Principles for Ecological Compensation	Second bullet: remove “to” at end of bullet
6-5	6.3	Guiding Principles for Ecological Compensation	Fourth bullet: consider reversing order of preference: “...functions are re-established before losses occur, or as soon as possible afterwards; ”
6-6	6.4	Bullet 7 and Bullet 10	Combine these bullets. Bullet 10 appears to be an expansion of Bullet 7
6-8	6.6.1	Line 3	Review spelling of preferably
6-8	6.6.1	Paragraph 3, line 5	Review spacing of words: “Further, not all sites are created equal...”
6-9	6.8	Tracking Compensation, line 4	Incorrect word: “...core function of providing amphibian...”
7-1	7.1	Bullet 6	Insert space between the words buffers and
7-3	7.2	Construction monitoring bullet, last sentence.	“The environmental monitoring program should be specific to the EMP...” This is confusing and redundant. Perhaps say “ This activity should be specific to the EMP...”
7-3, 7-4	7.2.1	Overview Comment	There appears to be some overlap and duplication involving Section 7.2.1 and the subsequent sections. Perhaps Section 7.2.1 could be shortened, with cross-referencing to following sections. As I read through chapter 7, I felt that information was being repeated more times than necessary.
7-4	7.2.1	Last bullet at top of page, dealing with monitoring of compensation	This bullet does not seem to fit with those above and goes into more detail than necessary. Necessary details are provided below in Section 7.2.5.2.
7-6	7.2.5	Post-Construction Monitoring, Paragraph 4	Insert the word to: “...this phase of monitoring is to evaluate...”
7-6	7.2.5	Last paragraph above second set of bullets, line 3	I believe it is customary to use a hyphen in die-off
7-7	7.2.5.2	Last bullet, line 2	“...to assess the project’s trajectory...”
7-8	7.2.5.2	Last bullet (Contingency measures)	This bullet appears to overlap with the one immediately above it. The “interventions and modifications” part of the previous bullet really addresses the contingency issue.
		Appendix C Data Collection Standards	Under Inventory Protocols, I note that there is a grouping called “Butterflies and Insects.” I wonder if this could be renamed “Butterflies and other insects”? I acknowledge that it is appropriate to highlight butterflies, but they are insects, so the grouping as printed is a bit confusing.
		Appendix B, C D and E	For Chapters 1 through 8, the page numbers include the chapter number. It would be helpful to do the same for Appendix B, Appendix C, Appendix D and Appendix E.
		Appendix D	There is a formatting issue on page 2, in the Low column, item (iv)

References

- Clinchy, M., Zanette, L. Y., Roberts, D., Suraci, J. P., Buesching, C. D., Newman, C., & Macdonald, D. W. (2016). Fear of the human “super predator” far exceeds the fear of large carnivores in a model mesocarnivore. *Behavioral Ecology*, *27*(6), 1826-1832.
- Newman, A. E. M., Zanette, L. Y., Clinchy, M., Goodenough, N., & Soma, K. K. (2013). Stress in the wild: chronic predator pressure and acute restraint affect plasma DHEA and corticosterone levels in a songbird. *Stress*, *16*(3), 363-367.
- MacDougall-Shackleton, E. A., Clinchy, M., Zanette, L. Y., & Neff, B. D. (2011). Songbird genetic diversity is lower in anthropogenically versus naturally fragmented landscapes. *Conservation Genetics*, *12*(5), 1195-1203.
- Zanette, L. Y., White, A. F., Allen, M. C., & Clinchy, M. (2011). Perceived predation risk reduces the number of offspring songbirds produce per year. *Science*, *334*(6061), 1398-1401.



London
CANADA

City of London Environmental Management Guidelines

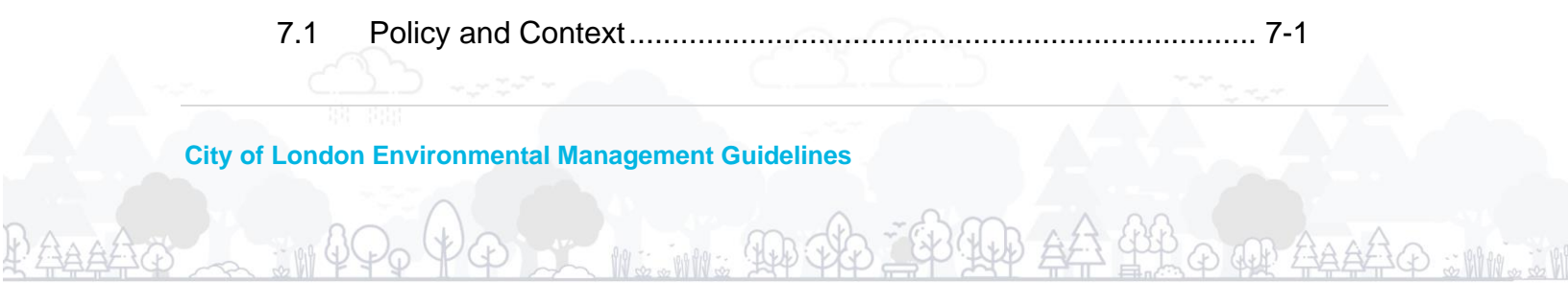
December, 2021



Table of Contents

1.	Introduction	1-1
1.1	The London Plan	1-1
1.2	First Nations Engagement & Consultation	1-2
1.2.1	Chippewas of the Thames First Nation.....	1-2
1.2.2	Munsee-Delaware Nation	1-3
1.2.3	Oneida Nation of the Thames.....	1-3
1.3	Guideline Document Organization	1-3
2.	Preparation of Environmental Studies.....	2-1
2.1	Pre-consultation and Determination of Required Studies	2-1
2.1.1	Subject Lands versus Study Area.....	2-1
2.2	Environmental Study Scoping.....	2-2
2.2.1	Environmental Study Scoping Checklist (ESSC) / Terms of Reference	2-2
2.2.2	SLSR and EIS Study Scoping Meeting.....	2-2
2.2.3	ESSC Approval.....	2-3
2.3	Background Information Review & Field Investigations	2-3
2.4	Subject Lands Status Reports (SLSR).....	2-4
2.5	Environmental Assessment for Infrastructure Projects	2-4
2.6	Environmental Impact Studies	2-5
2.6.1	The Purpose of an Environmental Impact Study (EIS)	2-5
2.6.2	The Requirement for an EIS.....	2-6
2.6.3	Focused EIS	2-7
2.6.4	Overview of the EIS Process.....	2-9
2.6.5	EIS Report Requirements.....	2-10
2.6.6	Report Content	2-11
3.	Evaluation of Significance and Ecological Function ...	3-1
3.1	Significant Woodlands and Woodlands	3-2
3.1.1	Policy and Context.....	3-2
3.1.2	Significant Woodland Evaluation Criteria.....	3-4
3.2	Environmentally Significant Areas (ESAs)	3-17
3.2.1	City of London Subwatershed Regions Policy and Context	3-17
3.2.3	Environmentally Significant Areas (ESAs) Evaluation Criteria ...	3-20
3.3	Provincially Significant Wetlands, Wetlands and Unevaluated Wetlands.....	3-27
3.4	Significant Wildlife Habitat (SWH).....	3-28
3.5	Significant Valleylands and Valleylands.....	3-28

4.	Boundary Delineation of Natural Heritage Features and Areas	4-1
4.1	Policy Context and General Guidance	4-1
4.2	Wetlands.....	4-2
4.3	Significant Woodlands and Woodlands	4-3
4.4	Valleylands and Significant Valleylands.....	4-3
4.5	Significant Wildlife Habitat	4-4
4.6	Environmentally Significant Areas (ESAs)	4-4
4.7	Vegetation Patches.....	4-5
4.8	Boundary Delineation Guidelines.....	4-5
5.	Determining Ecological Buffers	5-1
5.1	Definition of a Buffer	5-1
5.2	Approach	5-2
5.3	Buffer Determination Process	5-2
5.3.1	Step 1 – Determine feature to be protected, delineate boundaries and determine potential impacts.....	5-3
5.3.2	Step 2 – Apply Minimum Buffer Widths	5-5
5.3.3	Step 3 – Determination of Site-Specific Buffer Widths	5-7
5.3.4	Step 4 - Buffer Restoration and Enhancement.....	5-10
5.4	Permitted Uses within a Buffer.....	5-12
6.	Ecological Replacement and Compensation	6-1
6.1	Context and Process.....	6-2
6.1.1	Policy Context.....	6-2
6.1.2	Scientific and Technical Context.....	6-3
6.2	Approval Process.....	6-4
6.3	Guiding Principles for Ecological Compensation	6-5
6.4	Ecological Replacement and Compensation Plan	6-6
6.5	Determining Appropriate Measures	6-6
6.5.1	Wetlands.....	6-7
6.5.2	Significant Woodlands and Woodlands	6-7
6.5.3	Other Features.....	6-7
6.6	Implementing Replacement and Compensation	6-8
6.6.1	Site Selection.....	6-8
6.6.2	Replicating Ecosystem Structure and Functions	6-9
6.6.3	Plant Selection.....	6-9
6.7	Tracking Compensation	6-10
7.	Environmental Monitoring.....	7-1
7.1	Policy and Context.....	7-1



7.2	Environmental Management Plan (EMP) Requirements.....	7-2
7.2.1	Environmental Management Plan Report Requirements	7-3
7.2.2	Monitoring Timeline and Responsibilities	7-4
7.2.3	Pre-Construction Monitoring.....	7-5
7.2.4	Construction Monitoring.....	7-5
7.2.5	Post-Construction Monitoring	7-6
8.	Glossary of Terms.....	8-1
9.	References	9-1

List of Tables

Table 2.1:	Areas Subject to Environmental Impact Studies
Table 3.1:	Rare Plant Species Presence / Absence
Table 5.1:	Summary of Overall Buffer Width Determination Process
Table 5.2:	Recommended Minimum/Maximum Buffer Widths
Table 5.3:	Criteria for the Determination of Greater than Minimum Buffers
Table 5.4:	Potential Buffer Enhancement Measures

List of Figures

Figure 2.1:	Environmental Process Stages for Infrastructure Projects
Figure 2.2:	The EIS Process, including Subject Land Status Report and EIS Approval Process Steps
Figure 3.1:	City of London Glacial Geomorphology of the dominant physiographic units
Figure 3.2:	City of London Subwatershed Regions
Figure 4.1:	Boundary Delineation Guideline Legend
Figure 4.2:	Guideline 1 Illustration
Figure 4.3:	Guideline 2 Illustration
Figure 4.4:	Guideline 3 Illustration
Figure 4.5:	Guideline 4 Illustration
Figure 4.6:	Guideline 5 Illustration
Figure 4.7:	Guideline 6 Illustration
Figure 4.8:	Guideline 7 Illustration
Figure 4.9:	Guideline 8 Illustration
Figure 5.1:	Illustration of a buffer implemented for the protection of a Natural Heritage Feature adjacent to a development
Figure 5.2:	Illustration of buffer profile
Figure 6.1:	Illustration of the required approach whereby all options for avoiding and / or mitigating impacts must be explored with the City before compensation can be considered
Figure 7.1:	Environmental Monitoring Process

List of Appendices

Appendix A	– EMG Process Flow Chart
Appendix B	– Environmental Study Scoping Checklist
Appendix C	– Data Collection Standards
Appendix D	– Woodland Evaluation Form
Appendix E	– Net Effects Table Template

List of Acronyms and Abbreviations

ANSI	Areas of Natural and Scientific Interest
CFZ	Critical Function Zone
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
COTTFN.....	Chippewas of the Thames First Nation
EA.....	Environmental Assessment
EEPAC	Environmental and Ecological Planning Advisory Committee
ELC	Ecological Land Classification
ESSC.....	Environmental Study Scoping Checklist
EIS.....	Environmental Impact Study
EMG	Environmental Management Guidelines
ER	Environmental Review
ESA	Environmentally Significant Areas
GIS	Geographic Information System
IPR	Initial Proposal Report
LIO.....	Land Information Ontario
MBCA.....	Migratory Bird Convention Act
MCC	Mean Coefficient of Conservatism
MDN	Munsee-Delaware Nation
MECP	Ministry of Environment, Conservation and Parks
MNRF	former Ministry of Natural Resources and Forestry
MNDMNRF.....	Ministry of Northern Development, Mines, Natural Resources and Forestry
NHS.....	Natural Heritage System
Oneida.....	Oneida Nation of the Thames
OWES	Ontario Wetland Evaluation System
PSW	Provincially Significant Wetlands
SAR	Species At Risk
SWH.....	Significant Wildlife Habitat
SLSR.....	Subject Land Status Report
TRT	Technical Review Team

Please note these Environmental Management Guidelines (2021) incorporate updates to and supersede the former Environmental Management Guidelines (2007) in accordance with **The London Plan** (Policies 1432_ and 1424_). The specific locations and cross-references to the updated guidelines are summarized below.

Former Natural Heritage System Guideline (as listed in The London Plan Policy 1719)	Superseded by the Section in these Environmental Management Guidelines (2021) (as listed below)	The London Plan Policy Cross-Reference
<i>4. Guide to Plant Selection for Natural Heritage Areas and Buffers</i>	Key guidance included in Section 5 Determining Ecological Buffers.	1719_
<i>5. Guideline Documents for Environmentally Significant Areas Identification, Evaluation and Boundary Delineation</i>	Section 3 Evaluation of Significance and Ecological Function, Section 3.2 Environmentally Significant Areas (ESAs)	1367_, 1369_, 1719_
<i>6. Guidelines for Determining Setbacks and Ecological Buffers</i>	Section 5 Determining Ecological Buffers	1350_, 1414_, 1719_
<i>7. Guidelines for the Evaluation of Ecologically Significant Woodlands</i>	Section 3 Evaluation of Significance and Ecological Function, Section 3.1 Significant Woodlands and Woodlands	1340_, 1342_, 1719_
<i>8. Guidelines for the Preparation and Review of Environmental Impact Studies</i>	Section 2 Preparation of Environmental Studies, Section 2.6 Environmental Impact Studies	1413_, 1719_



Acknowledgements and Commitment to Review

The process for updating the former Environmental Management Guidelines (2007) involved a two year exercise over 2019, 2020 and 2021 that included three rounds of engagement and more than 20 meetings with various external resource groups including local nature groups, development organizations, Conservation Authorities, the City's Environmental and Ecological Planning Advisory Committee (EEPAC) and the First Nations communities within close proximity to the City of London. Through this process hundreds of comments from various perspectives and disciplines were received and many have been incorporated in this document.

This collaborative process has facilitated a comprehensive review of and update to these guidelines, and resulted in a document that is:

- more streamlined
- clarifies how environmental planning under the City's jurisdiction is intended to be implemented, and
- is aligned with the environmental policies in ***The London Plan***.

The City sincerely thanks all partners and participants for their input to date, and looks forward to continuing to work together to ensure that these guidelines help implement environmental policy in the City in accordance with ***The London Plan***, while also complementing other applicable regulations, policies and guidelines at the federal, provincial and regional levels.

The City recognizes that while these Environmental Management Guidelines (EMGs) represent a comprehensive update to the prior guidelines, that it is desirable and appropriate to provide a transparent process for regular refinements and updates to this document (e.g., in response to new information, opportunities to provide additional clarification, etc.). To this end, the City is committed to continuing to accept comments, engaging with its partners and considering comments received. The intent is to undertake such reviews on a biennial basis.

Special thanks to Dr. Gary Epp, Jillian deMan and many others at AECOM for undertaking the research, facilitating the engagement, and providing multiple drafts of and graphics for this document. Thanks also to Margot Ursic of Grounded Solutions Services Ltd. for her input.

1. Introduction

The following Environmental Management Guidelines (EMGs) are intended to provide technical guidance in implementing [the environmental](#) policies of **The London Plan** (2016a; hereafter **The London Plan**) as they relate to the identification, delineation and protection of the natural heritage features and areas that form the City of London's Natural Heritage System (NHS). The Natural Heritage policies of **The London Plan** provide direction for the identification and protection of natural heritage features and areas and the ecological functions, processes, and linkages that they provide over the long term

The City of London has prepared these EMGs for the effective, consistent, and streamlined implementation of [City](#) policies and legislation related to the protection of the NHS. These guidelines have been developed to align with and complement the applicable federal, ~~and~~ provincial [and Conservation Authority regulations and](#) policies, [and are not meant to supplant those policies. These guidelines have also been developed with careful consideration for relevant](#) ~~provincial and~~ municipal planning processes, ~~relevant~~ data sources, current scientific knowledge and best management practices. As an integral part of the environmental planning process [in the City](#), these guidelines also include the provisions for stakeholder and First Nations engagement and consultation.

These guidelines provide an overarching framework, [criteria and technical guidance](#) for implementing [environmental](#) policies related to the NHS. [However, it is recognized that each planning application and each study area is unique, and that these EMGs do not replace the need for professional and technical expertise to both scope and undertake the work required.](#) It remains the responsibility of the proponent to review the [full suite of](#) applicable policies and regulations, ~~and~~ be familiar with the current and relevant scientific and technical literature, [and to work with the City and other agencies as needed \(e.g., local Conservation Authorities, the Province\)](#) to ensure the [most up-to-date information is used throughout the process](#) ~~policies and regulations are implemented as intended.~~

This document replaces the previous Environmental Management Guidelines (2007) [and consolidates a series of other guideline documents as listed in 1719 including 1340 , 1342 , 1350 , 1367 , 1369 , 1413 , and 1414 .](#)

1.1 The London Plan

The London Plan identifies these EMGs as a source of technical guidance to facilitate in the implementation of its Natural Heritage policies. These policies are based on the *Provincial Policy Statement* which represents minimum standards. *“Within the framework of the provincial policy-led planning system, planning authorities and decision-makers may go beyond these minimum standards to address matters of importance to a specific community, unless doing so would conflict with any policy of the Provincial Policy Statement (MMAH, 2020).* The requirement for the preparation and up-date of these guidelines is outlined in **The London Plan**:

[The City may prepare environmental management guidelines setting out in more detail the requirements of environmental studies for development and site alteration. Environmental studies are the means by which the City establishes the precise boundaries of natural features and areas and the significant ecological functions within them. They also assess the potential impacts of development and site alteration on the Natural Heritage System and on their adjacent lands, and are required prior to the approval of development to prevent](#)

negative impacts on the Natural Heritage System, and to demonstrate that there will be no negative impacts on the natural heritage features and areas or their ecological functions. (Policy 1423_)

These guidelines shall be updated as required to reflect changes to provincial policy and technical documents and to reflect improvements in scientific knowledge regarding natural features and ecological functions” (Policy 1424_).

These EMGs also identify related requirements from other policies and legislation (e.g., *Provincial Policy Statement, Endangered Species Act*, etc.) that must be considered, where appropriate. Additional related requirements and / or studies may be required as part of the approvals process under provincial, federal, or Conservation Authority’s jurisdiction (e.g., Overall Benefits Permits for Species at Risk, additional hydrogeological studies under the *Conservation Authorities Act*, etc.) which will be identified by those agencies through the approvals process.

1.2 First Nations Engagement & Consultation

The City of London recognizes the importance of creating a working relationship with neighbouring First Nations communities and exploring opportunities for collaboration on common objectives, and has incorporated feedback from the following First Nation communities in to the EMG update process:

- Chippewas of the Thames First Nation (COTTFN);
- Munsee-Delaware Nation (MDN); and,
- Oneida Nation of the Thames (Oneida).

Early engagement and consultation with local First Nation communities within the vicinity of the Thames River (typically 120 m) provides important insight, and information, and is critical in protecting the NHS within and beyond the City of London’s boundaries. Consultation is based on whether a proposed development will have a direct or indirect effect on the Thames River.

COTTFN, MDN and Oneida have a deeply spiritual, cultural and practical reliance on the river that flows downstream of the City of London, through their communities. Early engagement and consultation will allow the communities sufficient time to assess, conduct early consultation with their respective advisory committees, and Chiefs and Councils (if required) and formulate a response back to the developer. Proponents are expected to plan and budget for First Nations engagement and consultation. It is expected that the applicable consultation protocols will be followed for each of the First Nations being engaged.

The following subsections, provided by each of the respective First Nations, outlines the background and distinctiveness of each Nation and provides links to information about how they can and should be contacted for engagement.

1.2.1 Chippewas of the Thames First Nation

Chippewas of the Thames First Nation (COTTFN) is an Anishinabek community also known as Deshkan Ziibiing (At/On/In Antlered [Thames] River in the Ojibway language). Their community is approximately 10,800 acres in size, and is located southwest of London, Ontario. There are roughly 3000 members, with nearly 1000 members living on-reserve. Their people and ancestors have lived and travelled throughout Turtle Island (North America) for countless generations. Traditions of hunting, fishing, and storytelling endure to this day, and will be passed on for countless generations to come.

COTTFN has developed its own consultation protocol called Wiindmaagewin (to talk through) — a document and a process that will guide the development of positive working relationships. The

background to the consultation process, along with Wiindmaagewin can be reviewed at the following link: <https://www.cottfn.com/consultation/>.

1.2.2 Munsee-Delaware Nation

The traditional lands of the Munsee speaking peoples covered an area in what is now the United States, from the mouth of the Delaware River up to its source, then east to the Hudson River and then south to its mouth and including Manhattan and Staten Islands. Their language is one of the oldest of the Algonkian languages and is acknowledged by the Algonkian speaking peoples as Grandfather.

The ancestors of Munsee-Delaware Nation (MDN) moved to their present location in 1783 based on a promise from the Crown for land lost in the United States. MDN has developed its own policy for “receiving free, prior and informed consent from Munsee-Delaware Nation” outlined in the Munsee-Delaware First Nation Consultation and Accommodation Policy. General and contact information for MDN can be found at their website: <http://munseedelaware.squarespace.com/>.

1.2.3 Oneida Nation of the Thames

Established in 1840 as the ‘Oneida Settlement’, the Oneida people are known within the Iroquois Confederacy as Onyota’a:ka (People of the Standing Stone). Much like their ancestors, the Oneida peoples of today, maintain a deeply rooted connection to the land and to their Iroquois culture and traditions.

The Oneida Nation of the Thames (Oneida) is home to 2,172 residents and has a total membership of 6,270. Located in picturesque southwestern Ontario, the Oneida Nation Settlement borders lush and fertile agricultural lands and is nestled along the eastern shore of the Thames River 30 kilometres south of the City of London. General and contact information for the Oneida Nation can be found at their website: <https://oneida.on.ca/>

1.3 Guideline Document Organization

This Environmental Management Guidelines document is comprised of the following six separate, but complementary guidelines:

- Section 2: Preparation of Environmental Studies (superceding *1.0 Guidelines for the Preparation and Review of Environmental Impact Statements (EIS)*);
- Section 3: Evaluation of Significance and Ecological Function (superceding *2.0 Data Collection Standards for Ecological Inventory* and *4.0 Guidelines for the Evaluation of Ecologically Significant Woodlands*);
- Section 4: Boundary Delineation (superceding *3.0 Guideline Documents for Environmentally Significant Areas Identification, Evaluation and Boundary Delineation*);
- Section 5: Buffer Determination (superceding *5.0 Guidelines for Determining Setbacks and Ecological Buffers*);
- Section 6: Ecological Compensation; and,
- Section 7: Environmental Monitoring.

In general, these guidelines are organized in chronological order in which they are intended to be undertaken. However, there is considerable reference between and among sections and some of the work must be undertaken iteratively to ensure that the processes are being completed efficiently and effectively. It is important to consider information from all of the guidelines outlined in this document, as well as external sources of information, as applicable.

2. Preparation of Environmental Studies

2.1 Pre-consultation and Determination of Required Studies

The London Plan identifies various studies that may be required to ensure the protection of the City's NHS. The determination of the type of studies, plans and reports that are needed to support an application for development, or site alteration project requires pre-consultation with the City of London and conformance with these Environmental Management Guidelines (EMGs). In cases where the proponent or applicant is a party other than the City pre-consultation will involve the preparation of the study Terms of Reference (ToR) by the proponent/applicant through engagement with City staff, including the Ecologist Planner.

The City of London's Development Application Approval Process includes mandatory pre-consultation through the submission of an Initial Proposal Report (IPR) followed by a Proposal Review Meeting. A depiction of the Environmental and Development / Infrastructure Process Timeline including where IPR stage occurs in the process can be found in **Appendix A**.

One of the key components of the Proposal Review Meeting is the identification of the studies required for a complete application. The information and level of detail required for the IPR submission is outlined in the City of London's Initial Proposal Report Guidelines (2008) as updated from time to time.

An environmental study will often be coordinated with, and draw on information from, other inter-related technical studies that may or may not include: hydrogeological, hydrological/stormwater management, geotechnical, noise and vibration, air quality, etc.

2.1.1 Subject Lands versus Study Area

To determine if an environmental study is required and, if one is required how it should be scoped, there must be consideration for natural heritage features and areas as well as their adjacent lands. As per **The London Plan** Policy 1382 "Adjacent lands are defined as lands contiguous to a specific natural heritage feature or area where it is likely that development or site alteration would have a negative impact on the feature or area". **The London Plan** (Table 13) specifies that adjacent lands, which are 120 m for most NHS components and 30 m for a few others¹.

- **Subject lands:** The **subject lands** are typically the limits of the lands owned by the proponent, but can also be the limits of disturbance associated with proposed works (e.g., in the case of infrastructure upgrades on public lands).
- **Study area:** Environmental studies typically need to consider features and functions beyond the subject lands. Confirmed, unevaluated or potential natural heritage features identified through the initial screening process and their adjacent lands need to be considered where they intersect with the subject lands. These features and areas are to be considered through the environmental study scoping process and, potentially, as part of the environmental study itself, as part of what can be referred to as the "study area",

¹ As per Table 13 of **The London Plan**, environmental studies must be considered for areas within 120 m of Fish Habitat, Habitat of Endangered and Threatened Species, Provincially Significant Wetlands (PSWs), Unevaluated Wetlands, Significant Woodlands, Significant Valleylands and Valleylands, Significant Wildlife Habitat, Areas of Natural and Scientific Interest, and Environmentally Significant Areas. Environmental studies must also be considered for areas within 30 m of Woodlands, Upland Corridors and Wetlands while distances from mapped Environmental Review lands will depend on the nature of the feature.

While in some cases the subject lands and the study area may be the same, generally when natural heritage is involved, the study area encompasses the subject lands plus:

- natural heritage features and areas that fall within the subject lands and extend beyond the subject lands boundaries (in whole or in part), and / or
- natural heritage features that are outside the subject lands but whose adjacent lands fall within the subject lands boundaries.

The boundaries of the study area should be confirmed as part of the environmental study scoping process outlined below. It is understood that it may only be possible to collect site-specific data within the subject lands, and that information related to the broader study area outside the subject lands will often be based on other sources of available information.

2.2 Environmental Study Scoping

Following the determination of the type of environmental study required, scoping of the study requirements must be completed. Study scoping ensures that the proponent, the City of London, relevant agencies, and the applicable City Advisory Committees agree to the required investigations, assessments and documentation.

Environmental study scoping shall include the following:

- **Preconsultation** to confirm the study area and determine the type of environmental study(ies) anticipated to be required (see **Section 2.1**) Completion of a Draft **Environmental Study Scoping Checklist (ESSC)** (see **Section 2.2.1** and **Appendix B**)
- An environmental study **scoping meeting**(see **Section 2.2.2**), and
- **Finalizing the environmental study scope** and ESSC Checklist (see **Section 2.2.3**).

The following sub-sections outline the general requirements for environmental study scoping.

2.2.1 Environmental Study Scoping Checklist (ESSC) / Terms of Reference

The completion of the ESSC is the first step in determining the scope of the environmental study, whether it is for the Natural Environment component of an Environmental Assessment (EA) for an infrastructure project, a Subject Land Status Report (SLSR) or an Environmental Impact Study (EIS) for a land development application. The ESSC constitutes the Terms of Reference (ToR) for the study and is referred to as the ESSC hereafter.

The proponent and / or their consultant is required to complete the ESSC as a draft for submission to the City of London.

Appendix B provides a template for the ESSC.

2.2.2 SLSR and EIS Study Scoping Meeting

The proponent for an environmental study must prepare and submit an environmental study scoping letter that includes a brief summary of the project, identifies the study area, provides the draft ESSC and a request to the City of London to convene an environmental study scoping meeting (scoping meeting). The environmental study scoping letter should be circulated to the Technical Review Team (TRT) prior to the scoping meeting. The intent of the scoping meeting is to review, discuss and agree to the ESSC for the environmental study to the satisfaction of the City.

The scoping meeting should be held with the proponent and the Technical Review Team (TRT). Typically the TRT will include a City Ecologist Planner and the City's Planner or Project Manager for the file, a representative from the local Conservation Authority, a representative from the City's applicable City

Advisory Committees , and, where applicable, a First Nations community representative. Other TRT members may include representatives from the Province² (e.g., related to Species at Risk), or other agencies.

During the scoping meeting the attendees will discuss comments and review the draft ESSC. The limits of the study area, the scope of the study investigations, the required evaluations and assessments, considerations for avoidance, mitigation and compensation, and required documentation and coordination with other studies / disciplines, where required, shall be discussed and agreed to. The TRT is to provide comments on the draft ESSC.

The City of London may request a site visit, including TRT members, as part of the scoping process if it is determined that a site visit would inform the study scoping.

2.2.3 Environmental Study Scoping Checklist Approval

Once all comments regarding the draft ESSC have been received by the proponent, the ESSC shall be finalized and sent to the City of London for approval. The City of London will then send written (e-mail or letter) approval and finalized copy of the ESSC to the proponent and the scoping meeting attendees.

The final ESSC will form the basis for the Environmental Study scope. The proponent and their consultant(s) may then proceed to conduct the required investigations.

In cases where field investigations are time-sensitive, the proponent may choose to initiate investigations prior to finalization of the ESSC. However, conducting investigations prior to ESSC finalization is done at the proponent's risk should the investigations conducted not meet the finalized ESSC requirements.

2.3 Background Information Review & Field Investigations

While the level of effort required to undertake a SLSR and / or EIS may vary significantly in level of effort and detail, they both require a background information review and field investigations.

A comprehensive background review of existing reports, atlases, information centers, databases, etc. is an important first step in establishing an understanding of the environmental conditions of a project site. Agency, First Nations, stakeholder and environmental organization consultation and / or engagement is an integral part of the background review and should include information requests for the study. Further details regarding background review requirements are provided in the City of London's **Data Collection Standards** found in **Appendix C**.

In some cases, field investigations may not be required if recent investigations have been completed to an appropriate level of detail, or if there are no natural heritage features within or adjacent to the **study areas/subject lands**. In such cases a site visit to confirm the absence of features and other conditions requiring assessment should be completed. Further details regarding field investigation requirements are provided in the City of London's **Data Collection Standards** found in **Appendix C**.

² To avoid having to update this document every time a provincial ministry is renamed or re-organized, for all references to Provincial data sources, regulations, policies and guidelines this document simply refers to "the Province" rather than a specific ministry (e.g., Ministry of Environment, Conservation and Parks) or branch (e.g., Species at Risk).

2.4 Subject Lands Status Reports (SLSR)

Consistent with **The London Plan** policies 1425 to 1428, a SLSR shall provide an assessment of natural features and areas on the subject lands with consideration for natural heritage features and areas in the broader study area including, but not limited to:

- those areas included in the Green Space or Environmental Review (ER) Place Types on Map 1 (**The London Plan**)
- any components of the NHS identified or delineated on Map 5 (**The London Plan**), and
- any unmapped features identified through the scoping process.

The objective of an SLSR is to inventory, evaluate, assess the significance of, delineate boundaries of, and make recommendations for protection of the NHS components on the subject lands in accordance with the applicable environmental regulations, policies and guidelines. This information may be used to inform refinements or updates to the applicable land use designation.

An SLSR must be scoped with the City and in consultation with relevant agencies. The SLSR shall address all of the items identified in the final site-specific ESSC and may require technical information from other disciplines (e.g. geotechnical, hydrogeology) to inform the assessment of natural heritage features and functions.

In cases where the initial scoping identified a need for a SLSR but the proponent wished to move forward with an EIS, Notably, the information and analyses within matters to be addressed in a SLSR may be addressed as part of carried forward into the EIS, as appropriate.

In these cases Alternately, rather than submitting a SLSR a proponent, in consultation with the City and other agencies, may submit a Draft EIS that addresses ~~these items~~ existing natural heritage conditions, and related constraints and opportunities related to development is to be submitted for review and confirmed confirmation by the City, in consultation with relevant agencies, prior to completing the balance of the EIS.

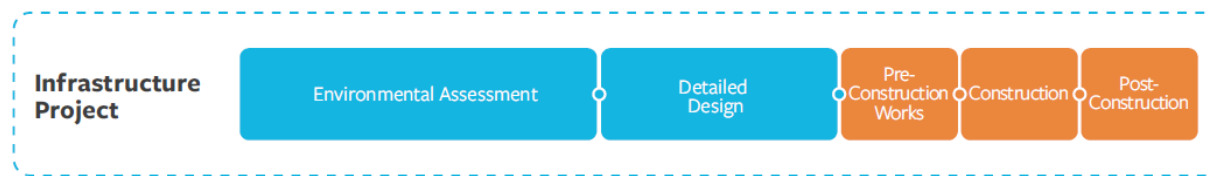
2.5 Environmental Assessment for Infrastructure Projects

As per policies set out in **The London Plan** (Policy 1395_), new infrastructure should generally not be located within the NHS, but new or infrastructure upgrades / expansions may be permitted within the NHS where it is clearly demonstrated through an EA process under the under the *Environmental Assessment Act*, that it is the preferred alternative for the location of the infrastructure.

In addition, as per policies set out in **The London Plan** (Policy 1397_), where new or expansions to existing infrastructure is proposed, an EIS is required as part of the EA process. The EIS shall (a) confirm no significant features are anticipated to be impacted such they they lose their significance and (b) further assess other potential impacts, identify mitigation measures, and determine appropriate compensatory mitigation, if required. Any alternative where the impacts of the proposed works as identified in the EIS would result in the loss of the ecological features or functions of the component of the NHS affected by the proposed works, such that the natural heritage feature would no longer be determined to be significant, shall not be permitted.

The Natural Environment and EIS component of an EA are to be scoped and completed in accordance with these EMGs.

Figure 2.1: Environmental Process Stages for Infrastructure Projects



2.6 Environmental Impact Studies

As per *The London Plan* (Policy 1427_) “If the subject lands status report identifies any lands that, in the estimation of the City, may meet the criteria for determining significance for specific components of the Natural Heritage System, the City shall require the preparation of an environmental impact study for these lands”.

This section outlines the three different types of EIS that may be required in the City depending on the type and extent of natural heritage features and areas within or adjacent to the subject lands, as follows:

- a) **A Full EIS** (comparable to a “Comprehensive EIS”, a term used by others such as UTRCA): A comprehensive range of aquatic, wetland assessment and terrestrial studies over multiple seasons are required.
- b) **A Scoped EIS:** Selected aquatic and / or wetland assessment and / or terrestrial studies are required, with seasonal requirements potentially scoped to reflect the species known or anticipated in the study area.
- c) **A Focused EIS:** Will allow for the typical aquatic and / or wetland assessment and / or terrestrial studies required as part of a Scoped EIS to be waived if the proponent commits to providing the minimum ecological buffers (as per **Table 5.2**) in conjunction with other mitigation measures as required and as a result does not anticipate negative impacts to the NHS components in relation to the proposed development.

Although in some cases a Full EIS is warranted, in most cases for site-specific development proposals a Scoped EIS will be required. The requirements for a Scoped EIS can vary from relatively simple (e.g., a site with limited natural heritage features and areas which only requires a Species at Risk screening and impact assessment) to fairly complex (e.g., a site with woodlands and wetlands adjacent to a valley requiring data collection for and assessment of these features as well as screening for Significant Wildlife Habitat, habitat of Threatened and Endangered species and an accompanying water balance study).

A Focused EIS may be permitted at the City’s discretion under specified circumstances (see **Section 2.6.3**).

2.6.1 The Purpose of an Environmental Impact Study (EIS)

An EIS is required where development or site alteration is proposed within or adjacent to components of the City of London’s NHS. The purpose of an EIS is to demonstrate that there will be no net negative impacts to the NHS’ features and functions as a result of the proposed development or project works. This is to be achieved through environmental investigations of the NHS components and the adjacent lands, typically completed as part of the Draft Plan approval process. An EIS will contain recommendations for avoidance of impacts and mitigation of unavoidable impacts, (including environmental management strategies, monitoring requirements and / or other measures to protect NHS features and functions before, during and following construction). In many cases, an EIS will be completed in conjunction with complimentary studies (e.g., hydrogeological assessment), and the results of each report will inform the other.

An EIS must be completed to the City's satisfaction in accordance with **The London Plan** policies, provincial policies, and in consultation with the relevant public agencies prior to the approval of planning and development applications.

2.6.2 The Requirement for an EIS

When is an EIS Required?

An EIS is typically required for development and infrastructure projects that are proposed wholly or partially within or adjacent to the NHS.

Table 2.1 identifies the NHS component types and the extent of adjacent lands to those components whose presence typically trigger an EIS. Most of these components are delineated on Map 5 and Map 1 of **The London Plan**. However, the City may require the EIS to include additional lands if (a) environmental study scoping process (as outlined in Section 2.2) identifies one or more previously unmapped natural heritage features for assessment or (b) to ensure the protection of identified natural heritage features and / or functions based on site-specific conditions and / or the proposed land uses.

Table 2.1. Areas Requiring Environmental Study

Natural Heritage System (NHS) Components*	Trigger Distance Requiring an Environmental Study and Area of Adjacent Lands
<ul style="list-style-type: none"> • Fish Habitat • Habitat of Endangered and Threatened Species • Locations of Endangered and Threatened Species • Provincially Significant Wetlands (PSW) • Unevaluated Wetlands • Significant Woodlands • Significant Valleylands and Valleylands • Significant Wildlife Habitat • Significant Areas of Natural and Scientific Interest (ANSI) • Environmentally Significant Areas (ESAs) Upland Corridors 	Within 120 metres
<ul style="list-style-type: none"> • Woodlands • Significant groundwater recharge areas, wellhead protection areas and highly vulnerable aquifers Special Concern Species • Upland Corridors • Wetlands 	Within 30 metres
<ul style="list-style-type: none"> • Environmental Review (ER) lands 	As appropriate (i.e., w Within a distance appropriate to the specific components of the NHS contained on the lands).

* As per Table 13 in **The London Plan**.

Opportunities to Minimize EIS Requirements

~~It is possible that an EIS may not be a development application requirement for lands that contain NHS components and / or adjacent lands. The conditions under which a full EIS (including, but not limited to, seasonal surveys and details site assessments) is waived, requires the implementation of an ecological buffer to a Natural Heritage Feature that meets or exceeds the City's minimum buffer requirements as shown in Table 5.2 of these EMGs and any additional mitigation requirements as stipulated by the City~~

~~(e.g. fencing without gates). A focused EIS that describes the site, outlines the limits of the feature(s) and function(s) and discusses restoration and enhancements and their implementation will continue to be a requirement of approval. Ultimately, the waiver of the EIS requirement will be at the discretion of the City of London.~~

Currency of EIS Data and Updates to EIS at Draft Plan Renewal

~~Site specific data and field work for an EIS is generally considered “current” for a period of up to five (5) years.~~

~~For convenience and keeping the development approvals process intact, the renewal of an EIS tied to a draft approved subdivision can be updated with an extension of the draft plan, provided the extension occurs within six (6) years of draft approval. This is consistent with the current practice where draft plan approvals lapse after three (3) years and extensions can be considered by Council provided the draft plan remains consistent with the in-force policies. To align with this process, in cases where draft plan extensions are being sought using an EIS that is older than five (5) years, the EIS can be updated with an extension draft plan, provided the extension occurs within six (6) years of draft approval.~~

~~This update is to be scoped in consultation with City staff to focus only on elements of the EIS related to recommendations that are still being or remain to be implemented. The scope of that review could be a reaffirmation of updates to status of SAR habitat, status of enhancements to protections for existing NHS features or other elements that have been discovered through the build-out.~~

~~This update is to be scoped in consultation with City staff to focus only on elements of the EIS related to recommendations that are still being or remain to be implemented scope of that review could be a reaffirmation of updates to status of SAR habitat, status of enhancements to protections for existing NHS features or other elements that have been discovered through the build-out.~~

2.6.3 Focused EIS

~~The Focused EIS process and report requirements offer a scope that meet the policy and application requirements in an abbreviated submission. The timing of a focused EIS will align with the approvals process, and would typically be submitted with focused design studies and/or engineering drawings. Ecological buffers to any natural heritage features must meet or exceed the City’s minimum buffer requirements as shown in **Table 5.2** for the most sensitive natural heritage features (i.e. 30 m) and include any additional mitigation requirements as stipulated by the City (e.g. fencing without gates). The focused EIS submission will describe the site, outline the limits of the feature(s) and function(s) and provide discussion on the restoration and enhancements and their implementation. Mapping illustrating the site, features and proposed buffers is a requirement. This plan and the associated mapping will be discussed during an EIS scoping meeting prior to waiving the requirements of the full EIS and associated studies. All provincial and federal legislative requirements are still applicable.~~

~~The Focused EIS process and report requirements offer a scope that meet the policy and application requirements in an abbreviated submission. Identification of the Full or Focused EIS approach to be incorporated into the SLSR and/or addressed as part of pre-consultation comments. The timing of a Focused EIS will align with the approvals process, and would typically be submitted with focused design studies and/or engineering drawings.~~

~~A Focused EIS shall included the proposal of the feature, buffer details including any environmental enhancements. Details specifying enhancements and implementation may be finalized during later project stages as part of an Environmental Management Plan, but all aspects shall be agreed upon and prior to draft approval. Ecological buffers to any natural heritage features must meet or exceed the City’s minimum buffer requirements as shown in **Table 5.2** for the most sensitive natural heritage features (i.e.,~~

~~30 m) and include any additional mitigation requirements as stipulated by the City (e.g. fencing without gates). The focused EIS submission will describe the site, outline the limits of the feature(s) and function(s) and provide discussion discusses potential requirements foron the restoration and enhancements and their implementation. Mapping illustrating the site, featues and proposed buffers is a requirement. Caution should be taken regarding unvaluated vegetation patches that may contain wetlands (i.e., swamps). Note that infrastructure must be located outside of the buffer (see Section 5.3 for prohibited and permitted buffer uses). This plan and the associated mapping will be discussed during an EIS scoping meeting prior to waiving the requirements of the full-EIS and associated studies. All provincial and feral legislative requirements are still applicable.~~

~~The Focused EIS process and report requirements offer the possibility of meeting the policy and application requirements with an abbreviated submission, where determined to be appropriate. A Focused EIS allows for the typical aquatic and / or wetland assessment and / or terrestrial studies required as part of a Scoped EIS to be waived in cases where the proponent is committing to provide the minimum ecological buffers (as per **Table 5.2**) in conjunction with other mitigation measures to protect all significant features associated with the subject lands, and as a result of this approach, can demonstrate no negative impacts to the NHS in relation to the proposed development.~~

~~The desire to submit a Focused EIS should be flagged by the proponent at the pre-consultation stage. The proponent should not proceed with this approach before obtaining in principle agreement from the City.~~

~~In order for a Focused EIS to be considered by the City, ecological buffers to natural heritage features must meet or exceed the City's minimum buffer requirements as shown in **Table 5.2** and also include mitigation requirements if stipulated by the City, intended to help ensure buffer effectiveness (e.g., fencing without gates at the development limit, buffer naturalization).~~

~~A Focused EIS shall include:~~

- ~~• A description of the land use and biophysical context of the subject lands and study area~~
- ~~• A description of the natural heritage features and areas in the study area~~
- ~~• Staked limits (see **Section 4**) for features on the subject lands, and an assessment of their significance based on the available information~~
- ~~• Mapping and a description of the proposed buffers, including any proosed enhancements~~
- ~~• A conceptual drawing and a description of the proposed development~~
- ~~• A description of the proposed servicing and other amenities potentially associated with the development~~
- ~~• A commitment that the proposal will not require any refinements to the identified buffers~~
- ~~• An outline of the the type(s) and scope of the enhancements and monitoring as part of the mitigation, and~~
- ~~• An assessment that demonstrates no negative impacts to the identified NHS components are anticipated in relation to the proposed development.~~

~~This plan and the associated mapping will be discussed during an EIS scoping meeting prior to waiving the requirements of the full-EIS and associated studies. All provincial and federal legislative requirements are still applicable.~~

~~The timing of a Focused EIS must align with the approvals process, with the report submitted and approved in principle prior to Draft Plan approval, and then the details of the measures approved (e.g., fencing, buffer naturalization, etc.) submitted in conjunction with focused design studies and / or engineering drawings. Details related to the proposed enhancements and related ecological monitoring may be finalized during later project stages as part of an Environmental Management Plan (see **Section 7**), but the type(s) and scope of the enhancements and monitoring shall be agreed upon and outlined in the Focused EIS prior to Draft Plan approval.~~

A Focused EIS may be permitted at the City's discretion and will typically only be considered by the City for simpler applications such as:

- subject lands associated with NHS components that are already well defined (e.g., redevelopment adjacent to an existing feature already characterized through previous studies completed) and / or
- study areas that are of limited complexity (e.g., an isolated upland significant woodland, as opposed to a Significant Woodland containing Wetlands adjacent to a Significant Valleyland).

2.6.4 Overview of the EIS Process

The EIS process is generally depicted in **Figure 2.2** below, and involves the following steps regardless of scope:

1. **EIS Scoping** – Study scoping should be completed before field investigations are initiated. EIS scoping shall follow the process and requirements as outlined in **Section 2.2** of these guidelines, including the completion of the ESSC (**Section 2.2.1**). If determined as a requirement during study scoping, a site visit may be included as part of this process.
2. **Background Review and Information Requests** - The proponent must complete a comprehensive review of background information to form the basis for a description of existing conditions, as outlined in **Section 2.3**. The background review should follow the City of London's Data Collection Standards found in **Appendix C**.
3. **Field Investigations** – Field investigations are to be completed at the appropriate times and frequencies, and include appropriate locations, in accordance with the approved ESSC. Field investigations must be completed in compliance with the City of London's Data Collection Standards found in **Appendix C**. Dates of investigations, names of investigators, conditions at the time of investigations, any variance of methods, data sheets, and photographs, should all be recorded at the time of investigations. Quality assurance and quality control measures to verify the accuracy of the data collected should be implemented as part of the proponent's (or their consultant's) internal EIS review process.
4. **Evaluation of Significance** – The evaluation of significance should be conducted for natural heritage features within the study area in accordance with the applicable federal, provincial and City of London policies. The City of London evaluation criteria, as outlined in **Section 3**, should be applied to unevaluated vegetation patches and other features not previously evaluated as appropriate. The evaluation criteria to be applied to a specific feature or subject lands should be identified in the ESSC. In instances where a Woodland Evaluation is appropriate, the evaluation shall be completed in the Woodland Evaluation Form found in **Appendix D**. However, if during the course of investigations it becomes evident that other evaluation criteria are appropriate, then they shall also be applied.
5. **Impact and Net Effects Assessment** – The impact assessment for any project should identify the potential impacts that may be generated from the design and layout, the construction, and the operations of the project and / or the post-construction conditions. The proponent should identify any existing impacts to study area natural heritage features prior to project initiation (as part of existing conditions), and the potential long-term and short-term impacts (e.g., construction related) of the project. For each potential impact, possible avoidance, mitigation and / or compensation measures shall be proposed and discussed. For any proposed development or works adjacent to a Natural Heritage Feature, ecological buffers (see **Section 5**) shall be applied as required (see **Table 5.2**) as part of the mitigation measures. The net effects of the project should then be assessed based on the anticipated net impacts after avoidance, mitigation and or compensation measures are implemented as recommended. If the project is assessed to result in a **significant** net negative effect, then the proponent should include additional mitigation and / or compensation measures, or re-work the

proposed project plan and / or design to minimize or avoid such effects. The objective for any EIS is to achieve no net negative impact, or a net environmental benefit.

The [MNR's Province's Natural Heritage Reference Manual \(2010b\)](#) provides a "Sample Checklist for Use in Assessing Impacts of Development" which can be referred to, however the proponent must consider of development activities and potential impacts on a site specific basis as outlined in the Net Effects Table Template is provided in **Appendix E**.

6. **Environmental Management Recommendations** – The environmental management recommendations for a proposed development or project is the primary "deliverable" of an EIS. Recommendations should be developed based on the avoidance, mitigation and compensation measures identified in the Impact Assessment and Net Effects Assessment. An important mitigation measure is recommending appropriate ecological buffers (**Section 5**). Another important mitigation measure is the identification of appropriate pre-, during and post-construction/ post-development monitoring. The recommendations for monitoring should outline the monitoring objectives, timeframe and protocols for each monitoring component. The EIS should also indicate if and how net environmental benefit will be achieved through the implementation of these recommendations. These recommendations will be carried forward to provide the basis for the Environmental Management Plan, as per **Section 7.2**.
7. **EIS Report Submission** – The proponent, or their consultant, is to submit the EIS report to the City of London for review and comments. The EIS report and its appendices should be submitted in electronic format to the City's Project File Handler.
8. **EIS Report Review and Approval** – Once received the City of London will distribute copies of the EIS report to the TRT for their review and comments. All comments from the TRT will be sent to the City of London for consideration and forwarding to the proponent and their consultant. The City may decide to:
 - **Approve the EIS** – the City may approve the EIS with no required revisions, or with minor revisions
 - **Return the EIS for revisions** – the City may return the EIS report for revisions based on the comments received from the TRT
 - **Reject the EIS** – the City may reject the EIS based on non-conformance with **The London Plan** policies, or based on the inadequacies of the EIS report itself

The final acceptance of an EIS report is to be provided in written correspondence (e-mail or letter) to the proponent.

Figure 2.2: The Subject Land Status Report and EIS Approval Process Steps.



Further details and the documentation requirements for the above steps are outlined in **Section 2.6.5**.

2.6.5 EIS Report Requirements

The following section outlines the required format and minimum standards for an EIS.

An EIS report for submission to the City of London shall include the following components and sections:

- Title Page
- Executive Summary
- Authors' Signature Page
- Table of Contents
- 1.0 Introduction
- 2.0 Physical Environment
- 3.0 Natural Environment
 - 3.1 Aquatic Habitat & Species
 - 3.2 Wetlands
 - 3.3 Terrestrial Habitat & Species
- 4.0 Evaluation of Significance
- 5.0 Proposed Development or Works
- 6.0 Impact & Net Effects Assessment
- 7.0 Avoidance, Mitigation & Compensation
- 8.0 Environmental Management Recommendations
- 9.0 Conclusions
- 10.0 References
- Appendices

Additional subsections to the above sections maybe required based on the scope and complexity of the **site-study area** and / or the proposal. Further details regarding the required content for the above report components and sections provided below.

2.6.6 Report Content

2.6.6.1 Title Page & Pre-Report Body Components

Title Page - The EIS Title Page should provide basic information for the EIS report including the following:

- Project name and study type (i.e., EIS)
- Any relevant File Reference numbers
- The proponent's company name, address, and primary contact name
- The consultant's company name, address, and primary contact name
- The City of London department to which the report is being submitted
- The date of report submission

Executive Summary - The Executive Summary for the EIS report should provide a brief summary of the report including the purpose of the EIS, the **subject lands and study area locations**, study scoping information, field investigations completed, study findings, identification of significant natural heritage features, summary of potential impacts and net effects, and a summary of the environmental management recommendations. The Executive Summary should be 1-4 pages in length.

Authors' Signature Page - A page with the names, signatures and qualifications of the principal authors of the EIS report should be provided. The names, signatures and qualifications of the senior reviewers should also be provided.

Table of Contents - A Table of Contents with page references should be provided for the EIS report. This should also include a List of Figures, List of Tables, and List of Appendices.

2.6.6.2 Introduction

The Introduction of the EIS report may stand as one complete section or it may be separated into several sub-sections, at the author's discretion. Regardless, the Introduction should include the following information:

Introductory Statement – The Introduction should state the purpose of the EIS report, and identify the proponent. Since most EIS reports are technical documents supporting a larger study or an application, the Introduction should reference the study or application that the EIS is supporting.

Background – The Introduction should provide some background regarding the project and any planning or studies for the subject lands that preceded the EIS.

Subject Lands and Study Area – The ~~subject lands study area~~ for the EIS should be clearly identified with the address (or other municipal reference numbers), ~~along with the limits of the study area of the subject lands,~~ and identification of any pertinent reference points (e.g., watercourses, major streets or roads, railways, etc.). A ~~study area~~ figure delineating the ~~subject lands and~~ study area boundaries and showing local streets/roads, watercourses, buildings/structures over a recent aerial photograph base must be included. A secondary figure~~7~~ should also delineate the mapped natural heritage features identified on Map 5 of *The London Plan*.

Policy Context – The policy context for the EIS should be identified in the Introduction. This should include the trigger for the EIS and the relevant policies in *The London Plan* that apply to the project/application. Other relevant federal, ~~and/or~~ provincial ~~and Conservation Authority~~ legislation and policies should also be identified.

EIS Scope – A subsection or paragraph should be provided in the Introduction that summarizes the EIS scoping process and some of the key aspects of the study scope. The final ESSC should be referenced and should be provided in the Appendices of the report.

Agencies, First Nations and Stakeholders Consultation – Consultation with government agencies, Conservation Authorities, First Nations communities, and stakeholders should be identified and referenced as part of the Introduction. Any relevant correspondence and consultation documentation should be provided in the Appendices.

2.6.6.3 Physical Environment

The physical environment provides key context for the natural heritage features on the broader landscape and on ~~a particular project site~~ ~~the subject lands~~ because of the direct interrelationship between the physical and natural environment. The description of the physical environment is, therefore, an important part of the EIS report. The physical environment section of the EIS should include information on the following:

Soils and geology – Soils and the underlying geology of the study area and surrounding landscape should be described in sufficient detail as to provide context for the ecological communities and ecosystems of the ~~study area~~ ~~subject lands~~ and broader study area (e.g., including adjacent lands as appropriate). If a soils or geotechnical investigation has been undertaken for the project, its findings should be summarized in this section. Key local sources of information include:

- The Canadian System of Soil Classification (1978)

- Pleistocene Geology of the St. Thomas Area (west half and east half respectively) (Dreimanis 1964a; 1964b), including Sardo and Vagners (1975) which accompanies the Dreimanis reports, but is for north London.
- <https://data.ontario.ca/dataset/surficial-geology-of-southern-ontario>, and
- Map of surficial geology of southern Ontario that can be viewed in Google Earth.

Surface water and drainage – The surface water and drainage patterns within and adjacent to ~~a study area~~ the subject lands determine the extent and characteristics of aquatic habitat features, wetlands and terrestrial vegetation communities. The watershed, sub-watershed, surface water features (water bodies and watercourses) and drainage patterns for the study area ~~and adjacent lands~~ should be described in this section of the EIS report.

A surface water and drainage figure showing all watercourses, water bodies, wetlands, and drainage patterns should be provided for the study area, as applicable. If a surface water or storm water management investigation has been completed for the project the findings with regard to existing conditions should be summarized in this section of the report. Where available from other disciplines, pre- and post-development catchment boundaries and flow paths should be referenced and potentially included in EIS mapping.

Hydrogeology – The hydrogeology of a study area ~~and adjacent lands~~ is often an important determinant of the area’s aquatic, wetland and / or terrestrial features and their functions. The existing hydrogeology for the study area should be described in this section, particularly as it relates to natural heritage features that depend on groundwater discharge and the depth of the shallow water table. If a hydrogeological study has been conducted for the project or as part of previous works in the area, the findings related to existing conditions should be summarized in this section of the report.

2.6.6.4 Natural Environment

As noted above, the existing condition for the natural environment section of the EIS should be divided into four (4) main ~~disciplines~~ ecological system types:

- (1) aquatic habitat and species
- (2) wetlands and species
- (3) terrestrial habitat and species, and
- (4) animal movement corridors and ecological linkages.

Each of these sections may be further subdivided depending on the complexity of the study area features and the investigations required by the ESSC.

For each discipline within a subsection of the Natural Environment section the following should be included:

Background Information – a summary of information obtained from the background review and information requests should be included to provide a baseline understanding of the features. Previous studies and reports should be referenced and any data or information of particular interest to the study should be highlighted.

Methods – the methods used for the investigations for each discipline should be detailed with reference to standard protocols used. The City of London’s **Data Collection Standards** found in **Appendix C** provide the recommended protocols for ecological investigations. The date and time of investigations should be provided, in Table format along with the names of field staff who conducted the surveys. Any variance with standard protocols should also be noted in this section.

Results and Discussion – the results of the field investigations should be presented in an organized manner by feature or area. The discussion should include a comparison of findings from previous relevant studies with those of the current study, where applicable. Summary tables with metrics relevant to the

discipline should be used wherever possible. For large data sets, spreadsheets should be included in the **Appendices** with summary tables included in the text where needed.

The following provides an outline of the four main ~~disciplines~~ ecological system types to be addressed in the EIS and the possible ~~sub-disciplines~~ biological components to be included within each ~~main disciplines~~ system. ~~For the main disciplines, if the feature is not present no biological components with the given ecological system occur within the study area, then~~ the system heading should be retained in the report with a single sentence stating that no ~~features~~ biological components related to this ecological system are present within the study area ~~or adjacent lands~~ (e.g., no aquatic habitat or species are present within the study area ~~or adjacent lands~~). For ~~sub-disciplines~~ the specific biological components, only those for which investigations were conducted should be included.

Aquatic Habitat and Species	Terrestrial Habitat and Species
<ul style="list-style-type: none"> • Fish & Fish Habitat • Benthic Invertebrates • Mussels • Water Chemistry & Physical Attributes • Vegetation Communities & Plant Species • Breeding Birds • Other Birds including Waterfowl • Amphibians • Reptiles • Butterflies & Dragonflies / Damselflies • Terrestrial Crayfish • Mammals 	<ul style="list-style-type: none"> • Vegetation Communities & Plant Species • Breeding Birds • Raptors, Crepuscular Species, Colonial-Nesters & Other Birds • Amphibians • Reptiles • Butterflies & Dragonflies / Damselflies • Terrestrial Crayfish • Mammals (e.g., Bat Habitat & Bats, Deer Congregation Areas) • Seeps & Springs
Wetlands	Animal Movement Corridors and Ecological Linkages
<ul style="list-style-type: none"> • PSWs • Wetlands • Unevaluated Wetlands 	<ul style="list-style-type: none"> • Aquatic / Lowland • Terrestrial / Upland

At a minimum the following figures should be included in the EIS or Natural Environment section of the EA report:

- Field Investigations – showing the locations of the field investigations completed;
- Aquatic Habitat – showing watercourses, spawning habitat, habitat characteristics, barriers to fish passage, etc.; and,
- Vegetation Communities – showing the delineation of Ecological Land Classification (ELC; as per Lee *et al.*, 1998) communities.

Other figures may include:

- Breeding Bird and Raptor Habitat – showing suitable habitat, nest locations, etc.
- Amphibian and Reptile Habitat – showing breeding areas, hibernacula, etc.
- Plant species – showing location(s) of one or more rare species
- Notably, for species whose location data is considered sensitive, mapping should be provided to the City separately in a map clearly labelled as confidential and for internal use only.

2.6.6.5 Evaluation of Significance

The Evaluation of Significance section of the EIS should identify previously evaluated and recognized or identified features and species by jurisdiction: federal, provincial and local. For those features or species not previously evaluated or identified, this section should present the evaluation and the recommended designation. The following lists some of the potential features or categories that may apply for each jurisdiction:

- **Federal**
 - Fish Habitat as defined under *the Fisheries Act*
 - Species at Risk (SAR) as listed under *the Species at Risk Act*
- **Provincial**
 - Provincially Significant Wetlands (PSWs) – for wetland evaluations the Ontario Wetland Evaluation System (OWES) shall be used by a certified wetland evaluator. Once completed the wetland evaluation shall be submitted to the [MNRF-Province](#) and the City of London. A summary of the evaluation should be included in this section of the EIS, and a copy of the evaluation should be provided in the Appendices. See **The London Plan** policies 1330_ to 1336_.
 - Areas of Natural and Scientific Interest (ANSIs) – as identified by the Province of Ontario ([MNRF](#)). See **The London Plan** policies 1356_ to 1360_.
 - Significant Woodlands – see **The London Plan** policies 1337_ to 1342_ and the City of London’s Woodland Evaluation Criteria in **Section 3.1.2**
 - Species at Risk (SAR) as listed under *the Endangered Species Act*
- **City of London and local Conservation Authorities**
 - *Significant Woodlands* – see above
 - *Woodlands* (non-significant) – see **The London Plan** policy 1343_
 - *ESAs and Potential ESAs* – See **The London Plan** policies 1367_ to 1371_ and **Section 3.1.2** for the *City’s Guidelines for the Evaluation of Environmentally Significant Areas*
 - *Significant Wildlife Habitat* – for habitats not already evaluated, the proponent’s Ecologist should complete a Significant Wildlife Habitat Assessment in accordance with the [ProvinceMNRF’s Significant Wildlife Habitat Technical Guide \(MNRF 2000\)](#) and Criteria Schedules for Ecoregion 7E (MNRF 2015), or subsequent updates to these documents. These are provincial criteria that are approved at the municipal level. **The London Plan** policies 1352_ to 1355_ shall also be applied
 - *Significant Valleylands* – valleylands not already identified or evaluated should be evaluated in accordance with **The London Plan** policies 1347_ to 1350_ [and Conservation Authority policies as applicable \(e.g., UTRCA 2017\)](#)
 - *Wetlands and Unevaluated Wetlands* – see **The London Plan** policies 1330_ to 1336_ [and Conservation Authority policies as applicable \(e.g., UTRCA 2017\)](#)
 - *Upland Corridors* see **The London Plan** policies 1372_ to 1377_.

Further details regarding the evaluation of significance is provided in **Section 3**.

2.6.6.6 Proposed Development or Works

In this section of the EIS report the proposed development or project works should be summarized in a manner that describes all aspects and stages of the project that may affect natural heritage features and their functions. The EIS should be based on, at a minimum, the Preliminary Design for the project. This enables the recommendations from the EIS to be incorporated into the Detailed Design for the project.

It is expected that the Preliminary Design presented in the EIS will be a product of an iterative process wherein the design has taken into consideration avoidance and mitigation recommendations provided by

the proponent's Ecologists for the project. Documentation of this iterative process should be provided where applicable.

The following information should be included in the description of the proposed development or works:

- A description of the project layout and design
- Changes to surface water drainage and site grading which may include predevelopment, post-development and interim variations when works are adjacent to natural areas
- An outline of project staging and timing
- Details regarding construction relating to potential impacts to natural heritage, including any proposed de-watering plans that depict preferred zones where discharge should be directed and potential impacts from dewatering activities (e.g., cutting off groundwater baseflow from potential receptors).
- Proposed protection measures, including erosion and sediment control (ESC) measures in accordance with the City of London's *Design Specifications & Requirements Manual* (City of London, 2019)
- Any details regarding post-construction operations or maintenance

The proposed layout and design shall be shown on a figure as an overlay depicting the site and plan over a recent air photo, and include the natural heritage features and ELC communities delineated. This figure shall recommend areas for protection with their associated recommended buffers and / or setbacks.

Further Preliminary Design and Detailed Design drawings and supporting documentation can be provided in the Appendices.

2.6.6.7 Impact and Net Effects Assessment

The Impact and Net Effects Assessment section of the report is critical ~~into~~:

- a) determining whether a project can meet the test of "no net negative impacts", ~~or~~and
- b) identify where "net environmental benefits", referred to in this document as "positive net effects", can be achieved.

While every EIS is required to meet the no negative impacts test (in accordance with the Provincial Policy Statement), to help build resilience in the NHS in response to urban and climate change stressors, opportunities for net environmental benefits should also be identified through the EIS process.

The following types of anticipated impacts to components of the NHS as a result of the proposed development should be documented-assessed and described in this section of the EIS and may each form a subsection in the Impact and Net Effects Assessment section:

- **Existing Impacts** – The report should identify any impacts from previous or existing land uses or activities that have affected the natural heritage features of the study area. This provides a baseline for comparison with potential project related impacts.
- **Direct Impacts** – The potential direct impacts of a project should be identified and described based on the proposed development plan. A figure showing the proposed project overlaid on the natural heritage features for the study area should be provided with an indication of any areas where direct impacts are anticipated.
- **Indirect Impacts** – Many indirect impacts ~~are~~ can be associated with the during or post-construction stages of land development or an infrastructure project. Indirect impacts that can be reasonably anticipated in relation to the proposed development should be described in this section of the EIS.

For each of the above categories of impact, the source of the impact, the feature that may be affected, possible avoidance, mitigation and / or compensation measures where appropriate, and the resulting net

effects should be described in detail. A summary of the impact assessment and net effects should be provided in a Net Effects Assessment Table. **Appendix E** provides a table template for the assessment of net effects, to be used in any EIS submitted to the City of London.

Net environmental ~~impacts-effects~~ are considered to be those impacts that are expected to remain or are residual after the recommended avoidance, mitigation and compensation measures, as applicable, ~~have been~~are implemented.

Through the EIS, all anticipated negative impacts should be addressed through a combination of avoidance, mitigation and compensation measures as appropriate so that the net effects are either neutral (i.e., No Net Effect = no measurable impact to the NHS is anticipated) or positive (i.e., Positive Net Effect = there is a gain in the area extent and / or improvement to the quality of one or more NHS feature / area identified for inclusion within the NHS).

~~The following criteria should be applied during the assignment of net effects.~~

- ~~● **No Net Effect** — Indicates no measurable impact to the identified natural heritage features and functions is anticipated.~~
- ~~● **Low Net Effect** — Indicates loss of habitat possessing limited habitat value, and/or loss of a portion of habitat, which will not result in long-term impact to the remaining habitat and/or reduction in associated key ecological functions is anticipated.~~
- ~~● **Medium Net Effects** — Indicates loss of habitat possessing moderate habitat value, and/or loss of a portion of habitat that may result in long-term impacts to the remaining habitat, and/or loss of associated key ecological functions is anticipated.~~
- ~~● **High Net Effects** — Indicates loss of habitat possessing significant habitat value, and/or loss of a portion of habitat that may result in long-term impacts to the remaining habitat, and/or significant loss of associated key ecological functions is anticipated.~~

In addition to the Net Effects Assessment, ~~where feasible~~, the proponent should have consideration for effects of development that may increase or decrease in magnitude with a changing climate (e.g., increased flooding, drought, invasive species range shifts, etc.) and, where feasible, identify enhancement measures to help build resilience to these stressors in the NHS, as well as the development's contributions to greenhouse gas emissions. ~~Any t~~ools may be developed or adopted by available from the City of London to assess anticipated climate change impacts to the NHS, and once available should be ~~used~~considered as part of the impact assessment process.

2.6.6.8 Avoidance, Mitigation & Compensation

While the Impact and Net Effects Assessment identifies avoidance, mitigation, and compensation measures that should be implemented, each of these will require development into detailed recommendations to be carried forward into the Environmental Management Plan (see **Section 7.2**). This section of the EIS should carry forward the avoidance, mitigation and compensation measures identified in the previous section and elaborate on each.

Avoidance – Avoidance of potential impacts should always be considered the preferred option where feasible. As noted in the Proposed Development (**Section 2.6.6.6**) avoidance of potential impacts should be considered iteratively through collaboration between the project Planners, Engineers and Ecologists prior to plan finalization. Consequently, this section may refer to the iterative process described in the Proposed Development Section, or it may propose additional avoidance measures for consideration.

Mitigation – Mitigation measures may take various forms and may apply to direct or to indirect impacts that are short-term (e.g., may occur only during the construction phase of the project) or long-term (e.g., may occur in the post development scenario). For example, during-construction impacts tend to be temporary in nature and preventable / manageable through proper construction practices, site

inspections, and other standard mitigation measures. Each of these measures should be identified and described in this section of the report.

One of the most important mitigation measures that will apply to natural heritage features identified for protection is the implementation of ecological buffers. The identification of appropriate ecological buffers must follow the guidance provided in **Section 5**. In this section of the EIS, the application of the guidelines to the project and site-specific rationale should be provided.

Compensation – Compensation for impacts to, or removal of, a natural heritage feature is only permitted under limited ~~and very narrowly prescribed~~ circumstances, but may be permitted in accordance with the applicable policies and, where appropriate, in consultation with agencies whose regulated areas encompass the feature in question. Where alternatives for avoidance and mitigation have been considered and compensation has been determined ~~to be required~~ as the preferred alternative for a project, the details of the compensation must be described in this section.

The development of compensation plans must comply with the applicable policies and follow the guidelines provided in **Section 6** of these Environmental Management Guidelines.

2.6.6.9 *Environmental Management Recommendations*

The Environmental Management Recommendations section is the primary deliverable of the EIS. The environmental management recommendations must be clearly articulated and must be specific enough to be translated into Conditions of Draft Approval, Development Agreement and / or Subdivision Agreement for a project. The recommendations should be organized by project phase, from planning and design, through construction, to post-construction and post-development. Depending on the size and complexity of the project, the environmental management recommendations may form the basis of an Environmental Management Plan (EMP, as per **Section 7.2**).

The following are typical components of an EMP:

- Natural Heritage System components on and adjacent to the subject lands
- Ecological Buffers
- Restoration, Enhancement and Compensation Measures/Areas
- Construction Mitigation and Monitoring Plans
- Post-Construction Monitoring
- Post-Development Monitoring

Environmental management recommendations identified during Preliminary Design that should appear on the contract drawings must be explicitly stated. Text should provide direction to include the complete EIS with the tender documents for later project stages. In instances where a detailed Construction Monitoring Plan is anticipated, the EIS should include a draft field inspection form template in the Appendices.

To effectively develop a post construction monitoring program, baseline conditions must be established through the EIS process and stations for long-term / post-construction monitoring in the protected NHS should be identified along with the recommended type(s) and frequency of monitoring. Assessing the success of the avoidance, mitigation and compensation will be determined based on various metrics.

Section 7 outlines the context and specific requirements of the EMP, and should be carefully reviewed and referenced as appropriate.

2.6.6.10 *Conclusions*

The Conclusions section of the EIS report should provide the following elements:

Summary of Key Findings – A brief summary of the key findings of the EIS report should be provided to indicate the confirmed natural heritage features and other NHS components on the subject lands and within-with reference to the broader study area, ~~with reference to adjacent lands~~ as needed.

Key Recommendations – Either a summary of key recommendations should be provided, or a reference to the Environmental Management Recommendations section of the report must be made. Where applicable, direction regarding the implementation of the recommendations must be stated.

Conclusion Statement – A clear statement of the conclusions of the EIS must be made as to whether the proposal ~~has met~~can meet the test of “no negative impacts on the natural features or on their ecological functions:” (MMAH, 2020) must be included in this section. This can be achieved demonstrated with through an Impact and Net Effects Assessment that results in either a no net effects or a positive net effects assuming the recommended avoidance, mitigation and / or compensation measures are implemented as recommended (as per Section 2.6.6.7). The conclusions should also state whether the project meets the intent and requirements of the environmental policies of **The London Plan**, the *Provincial Policy Statement* and any other relevant legislation or policies, including applicable environmental regulations and / or policies from the Conservation Authorities, Province or Federal government. A summary of the rationale for the conclusion statement must be provided to support the statement.

2.6.6.11 References, Appendices, and Figures

References – All relevant references used in the preparation of, or cited in the EIS report should be listed in a References section. References should be in alphabetical order by author. Each reference should indicate author(s), year of publication, title, and publisher. For journal articles the journal name, volume, and pages should be provided. For websites, the full website address should be provided.

Appendices – Supporting documentation as referenced in each section of the report should be provided in the Appendices section and separated by appendix title pages. The order of appendices should follow the order of reference in the sections of the report. Appendices will typically include many or all of the following:

- Environmental Study Scoping Checklist (ESSC)
- Resumes (two-page) for each of the study’s authors, reviewers, and field staff
- Aquatic habitat field sheets and sketches
- Aquatic species list and life history information
- Ecological Land Classification (ELC) data sheets including soil characterization
- Plant species list by ELC community type with rarity rankings
- Bird species list by survey location with rarity rankings
- Amphibian survey data sheets and species list
- Additional wildlife lists by survey locations with rarity rankings, as applicable (e.g., mammals, herpetofauna)
- Significant Wildlife Habitat (SWH) data sheets
- Significant Wildlife Habitat Assessment
- Species at Risk (SAR) screening and habitat assessment
- Photographs

Figures – All figures for the EIS report should be either embedded in the body of the report and presented on the first full page following the first reference in the text to the figure, or compiled in the Appendices. All figures should be sequentially numbered and have the following:

- A recent colour aerial photograph base
- The subject lands and study area boundaryboundaries

- Roads/streets (labelled), utility corridors, and other “surface” infrastructure such as rail lines
- Watercourses and natural heritage features boundaries
- North arrow
- A scale
- A Legend with all symbols and shading labelled

Where appropriate, figures should be prepared at a consistent scale to facilitate comparison and cross-referencing.

3. Evaluation of Significance and Ecological Function

The City's NHS is a system 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 native species, and ecosystems (The London Plan – Policy 1298). Evaluation of the significance and ecological functions of the various NHS components through the planning process informs the protection of the NHS and may lead to the addition, removal or refinement of NHS features included on City of London mapping (see Map 5 in The London Plan).

While these components are all generally protected within the broader system, the process for evaluating these components and the jurisdictional responsibility confirming their significance and enforcing the policies for their protection are not the same for all features and areas. As outlined in the *Provincial Policy Statement* and in *The London Plan*, the following applies to the City's NHS components:

- Fish habitat and the Habitat of Endangered and Threatened Species are to be assessed in accordance with the applicable federal and / or provincial regulations, policies and guidance in consultation with the appropriate federal and / or provincial agency, sometimes with technical support from the local Conservation Authority
- Provincially Significant Wetlands (PSWs) and provincially significant Areas of Natural and Scientific Interest (ANSIs) are identified and confirmed by the Province in accordance with provincial systems and criteria;
- Significant Woodlands, SWH and Significant Valleylands are identified and confirmed by the City using locally-developed criteria aligned with the criteria and guidance established by the Province, sometimes with support from the local Conservation Authority, particularly for valleylands which they typically regulate;
- As per *The London Plan* Policies 1361_ and 1362_, Water Resource Systems capture a range of surface and groundwater features and areas that are to be assessed in accordance with the applicable provincial regulations, policies and guidance in consultation with the appropriate provincial agency and local Conservation Authority;
- Environmentally Significant Areas may be assessed by the proponent but are identified and confirmed by the City using locally-developed criteria, sometimes with support from the local Conservation Authority, particularly when the area overlaps with lands they regulate (e.g., wetlands, watercourses, valleylands and the related adjacent lands); and
- Upland Corridors and Naturalization Areas are identified and confirmed by the City as per the policies in *The London Plan*.

The Environmental Policies section of *The London Plan* defines and provides policy guidance for the evaluation of all the NHS components, including locally-developed criteria where applicable, and points to applicable sources of additional technical guidance at the federal, provincial and / or local (i.e., municipal and Conservation Authority) levels. This section of the EMGs provides additional guidance related to the evaluation of NHS components where the City of London and, where applicable, the local Conservation Authority, are responsible for confirming the evaluation of significance.

The specific NHS components addressed in this section of the EMGs are:

- Provincially Significant Wetlands, Wetlands and Unevaluated Wetlands
- Significant Woodlands and Woodlands
- Significant Valleylands and Valleylands

- Significant Wildlife Habitat (SWH), and
- Environmentally Significant Areas (ESAs)

with more detailed guidance for the criteria application provided for Significant Woodlands and ESAs based on the current science and natural heritage studies completed in the City.

The locally-developed criteria and the related guidance in this section have been developed in accordance with the *Provincial Policy Statement* with careful consideration for the local biophysical and land use planning context, and for the applicable technical and scientific literature. Notably, the *Provincial Policy Statement* states that: “*planning authorities and decision-makers may go beyond these minimum standards to address matters of importance to a specific community, unless doing so would conflict with any policy of the Provincial Policy Statement*”. It further states that for NHS components that are to be locally confirmed that: “*Criteria for determining significance for the resources ... are recommended by the Province, but municipal approaches that achieve or exceed the same objective may also be used*” (MMAH, 2020).

In all cases, the proponent is expected to comply with the most current applicable policies and guidelines related to the evaluation of significance and ecological functions of NHS components in the City, including any that may be adopted following the approval of these EMGs.

3.1 Significant Woodlands and Woodlands

The objective of these guidelines is to provide a standardized and scientifically-based approach for the evaluation of woodlands that is consistent with **The London Plan** policies, the *Provincial Policy Statement*, and the *Natural Heritage Reference Manual* (MNRF 2010b). This section describes the required methods for evaluating the ecological significance of all Unevaluated Vegetation Patches, woodlands and vegetation patches greater than 0.5 ha (as per **The London Plan** Policies 1337_ through 1343_, and 1383_ through 1386_).

3.1.1 Policy and Context

Policies outlined in the *Provincial Policy Statement* protect Significant Woodlands by not permitting development and site alteration within or in the lands adjacent to Significant Woodlands south and east of the Canadian Shield, unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

According to the *Provincial Policy Statement*, woodlands are defined as: “*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*” and “*include treed areas, woodlots, or forested areas and vary in their level of significance at the local, regional, and provincial levels*”.

Furthermore, the *Provincial Policy Statement*, considers woodlands significant when an area “*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 MNRF, with the most current guidance provided in the *Natural Heritage Reference Manual* (MNRF 2010b).

The London Plan has built on the provincial guidance and incorporated local considerations to ensure the identification and evaluation of significance for woodland components of the City’s NHS that is aligned with local objectives and conditions. The policy framework for the identification and evaluation of Significant Woodlands and Woodlands are outlined in **The London Plan** – Significant Woodlands and

Woodlands.

Most potential Woodlands are shown as Unevaluated Vegetation Patches on Map 5 – Natural Heritage and as Environmental Review Place Type on Map 1 in **The London Plan**. However, as outlined in **The London Plan** – Policy 1216_, the absence of vegetation patches from the aforementioned mapping, does not necessarily mean that additional unevaluated vegetation patches do not exist where none have been mapped. Therefore, proponents must assess the subject lands in question to screen for the presence of any additional Unevaluated Vegetation Patches and / or other vegetation patches larger than 0.5 ha.

As per the *Provincial Policy Statement* definition above, woodlands are “treed areas”. Using the Ecological Land Classification (ELC) System for Southern Ontario (Lee *et al.*, 1998), individual vegetation communities are typically delineated as discrete polygons. One or more ELC polygons can make up a woodland patch.

According to the Ecological Land Classification (ELC) System for southern Ontario (Lee *et al.*, 1998), a treed area is any community with tree cover >10%. As such, the following ELC Community Classes and Series are potential components of woodland patches:

- **FOREST** - deciduous forest (FOD), mixed forest (FOM) or coniferous forest (FOC);
- **SWAMP** - deciduous swamp (SWD), mixed swamp (SWM) or coniferous swamp (SWC);
- **BLUFF** - treed bluff (BLT);
- **TALLGRASS** - savannah (TPS), woodland (TPW);
- **CULTURAL** - cultural woodland (CUW), cultural savanna (CUS) or cultural plantation (CUP).; and
- **SHRUB / THICKET** - shrub bluff (BLS), cultural thicket (CUT), and swamp thicket (SWT).

Note: In the *Middlesex Natural Heritage Study* (UTRCA, 2014), communities with shrub cover >25% may also qualify as woodland. In the ELC system shrub and thicket communities are similarly defined. Therefore, shrub and thicket communities that are contiguous with other woodland Community Classes may also be included in a woodland patch.

Other communities that contribute to the biological diversity and ecological function of woodlands include old fields (CUM), open prairies (TPO) and wetland communities (MAM, MAS, SAF, OAO, FEO, and BOG) as defined by the ELC. While these communities will not comprise entire woodland patches, they are important components and contribute to the ecological significance of the vegetation patch. As such they are included in the evaluation of significance for applicable criteria.

Evaluation criteria for woodland significance are outlined in **The London Plan** (Policy 1341) The following sections provide further detail with respect to how each of these criteria should be implemented and which specific measures should be applied for the evaluation of significance and ecological function for woodlands in London.

Based on the above information, a vegetation patch is considered to have a woodland component within the City of London if tree cover is greater than 10% or shrub cover is greater than 25%. To determine if a vegetation patch meets this criteria, appropriate ecological inventory (as described in **Section 4.3**) and significant woodland evaluation (described in the following sections) methods shall be used.

The woodland evaluation review summary sheet shall be completed and included as an EIS Appendix, where appropriate. The blank summary sheet can found in **Appendix D**.

Consistent with **The London Plan** a woodland will be considered significant if it meets either of the following evaluation scores:

- If one or more criteria meet the standard for High; or
- If five or more criteria meet the standard for Medium.

3.1.2 Significant Woodland Evaluation Criteria

The London Plan – Criterion 1341_1.

The woodland contains natural features and ecological functions that are important to the environmental quality and integrity of the NHS. These include site protection (hydrology and erosion / slope) and landscape integrity (richness, connectivity and distribution).

Criterion 1.1. – Site Protection

Ecological Function Measure

A) Presence of hydrological features within or contiguous with the patch.

This measure relates to *Hydrological and Related Values* as outlined in the *Natural Heritage Reference Manual* and the following concepts:

- a) “Waterbodies, including wetlands, often represent a relatively small percentage of the total land area, yet they can be disproportionately more valuable than other areas”, and
- b) “It is recommended that measures be taken to protect water features, wetlands and other areas of significant hydrological importance (e.g., headwaters, recharge areas, discharge areas) within natural heritage systems” (MNR 2010b).

Further, this measure relates to other concepts identified in subwatershed studies completed for the City of London to recognize the following:

- a) the linkage between protection of groundwater and vegetation on the surface;
- b) the interface between aquatic and terrestrial systems which have high biodiversity and are the focus of important ecological functions; and,
- c) the important hydrological functions of wetlands that complement and enhance those provided by woodlands.

For the purposes of this evaluation, hydrological features include the following features and / or areas:

- Groundwater discharge and recharge areas or evidence of groundwater dependent species
- Headwaters and watercourses;
 - Flood plain (as regulated by the local Conservation Authority)
 - River, stream, and ravine corridors (Valleylands) outside of flood plain regulated lands, and
- Wetlands³ (evaluated and unevaluated).

³ Notably, the Conservation Authorities regulate and protect natural hazards, including all features that meet the definition of “wetlands” under the *Conservation Authorities Act*.

Criterion Ranking:

- **HIGH** – One (1) or more hydrological features (as described above) located within or contiguous with the patch.
- **MEDIUM** – Within 50 m of a hydrological feature.
- **LOW** – No hydrological features present within 50 m of the patch.

B) Erosion and Slope Protection

Soil erosion may adversely affect a feature by removing nutrient rich soils, destroying vegetation, and the deposition of eroded soil material (MNRF, 1997b). As slopes increase, the erosion risk also increases; however, slopes less than 10% generally experience minimal erosion (MNRF, 1997b; MNRF, 2010b).

This measure relates to the need “to protect runoff processes, ground stability, and aquatic habitat (erosion potential) for slopes > 10%” (MNRF, 2010a).

Slopes are mapped in the Slope Stability Mapping Project (UTRCA, 1996) and can also be determined using Geographic Information System (GIS) applications such as ArcMap in combination with up-to-date contour mapping.

Additionally, this measure requires knowledge of the soil textures and types as described in the ELC Manual (Lee *et al.*, 1998) based on the Ontario Institute of Pedology (1985) and Canadian Soil Classification System (Soil Classification Working Group, 1998).

Criterion Ranking:

- **HIGH** – Patch present on steep slopes >25% of any soil type, OR on a remnant slope associated with other features such as moraines or remnant valley slopes no longer continuous with the river system OR on moderate to steep slopes >10% - 25% with erodible soils (silty loam, sandy loam and loam, fine to coarse sands).
- **MEDIUM** – Patch present on moderate to steep slopes > 10% - 25% with less erodible soils (heavy clay and clay, silty clay)
- **LOW** – Patch present on gentle slopes < 10% with any soil type.

Score for **Criterion 1.1** is based on the highest standard achieved between the two measures.

Criterion 1.2 – Landscape Integrity (Richness, Connectivity and Distribution)

Ecological Function Measures

A) Landscape Richness

The density of landscape fragmentation, or patchiness, as measured by the total area of all patches per unit area of land. Based on the demonstration that “*Native plant richness and flora quality are significantly related to local forest cover*” (UTRCA, 1997; Bowles and Bergsma, 1999). Further, the *Natural Heritage Reference Manual* outlines the following concepts:

- a) “*Clusters of areas that span a range of topographic, soil, and moisture conditions contain a wider variety of plant species/communities, and may support a greater diversity of ecological processes*”; and,
- b) “*Where large core areas do not exist, groupings of habitat patches with potential for restoration should be included to maintain ecological function at the landscape scale*” (MNRF 2010b).

For the purpose of this evaluation, local vegetation cover is defined as percent cover of vegetation (all habitat types) within a 2 km radius circle from patch centroid. Thresholds reflect cumulative frequency distribution of patches within London (Bergsma, 2004).

Criterion Ranking:

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

B) Landscape Connectivity (linkage and distance between patches not separated by permanent cultural barriers).

This measure relates to *Proximity, Connectedness, and Naturalness and Disturbance* outlined in the *Natural Heritage Reference Manual* and the following concepts:

- a) Blocks of habitat that are arranged close together limit fragmentation and are usually better than those that are located farther apart; and,
- b) Relatively undisturbed natural areas are generally more desirable than highly altered areas (MNRF 2010b).

Criterion Ranking:

- **HIGH** – patches directly connected by:
 - i. waterways or riparian habitat (generally primary or secondary aquatic corridors and streams with bridges and / or underpasses: for example, Thames, Dingman, Medway, Stoney, Pottersburg, Kettle, Dodd, Sharon, Oxbow, Kelly, Stanton, Mud, Crumlin);
 - ii. Contiguous or semi-contiguous habitat.
- **MEDIUM** – patches indirectly connected by:
 - i. habitat gaps < 40 m;
 - ii. areas identified as Anti-fragmentation, Terrestrial Corridor, Big Picture Corridor (https://caroliniancanada.ca/legacy/ConservationPrograms_BigPictureMaps.html) to enhance the viability of isolated woodlands by re-connection, buffering, expanding OR to infill disturbed areas or replace abandoned fields (Riley & Mohr, 1994);
 - iii. abandoned rails, utility rights-of-way (hydro corridors, water/gas pipeline);
 - iv. Open space greenways and golf courses;
 - v. Active agriculture or pasture;
 - vi. Watercourses connected by culverts; and,
 - vii. First or second order streams that exhibit channelized morphology.
- **LOW** – patches not connected due to the presence of permanent cultural barriers:
 - i. major roads and highways with no culverts;
 - ii. urban or industrial development, large parking lots;
 - iii. infrastructure;
 - iv. dams, buried watercourses, channelized third or greater order watercourses; and,
 - v. active recreational land-uses (campground, parks with major facilities – community centres, arenas).

C) Patch Distribution (isolation & arrangement of patches / patch clusters).

This measure relates to *Proximity, Connectedness, Size and Distribution* outlined in the *Natural Heritage Reference Manual* and the following concepts:

- a) Blocks of habitat that are arranged close together limit fragmentation and are usually better than those that are located farther apart; and,
- b) Large patches of natural area are more valuable than smaller patches (MNRF 2010b), although smaller habitat patches can also have value in supporting biodiversity, particularly when they are clustered (Fahrig 2020) .

Following a review of the empirical evidence in the literature, Fahrig (2020) concluded that;

The interaction or flow of organisms among patches appears to be influenced by the size of patches and the distance separating them. Patch clusters are defined as patches within 250 m of each other that are not separated by major roads, highways, or urban development.

Criterion Ranking:

- **HIGH** – patch clusters with total area > 40 ha OR identified as a Big Picture Meta Core (Carolinian Canada, 2000).
- **MEDIUM** – patch clusters with total area 20 – 40 ha.
- **LOW** – patch clusters with total area < 20 ha.

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

The London Plan – Criterion 1341.2.

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

Criterion 2.1 – Age and Site Quality

A) Community Successional Stage / Seral Age

This measure relates to *Uncommon Characteristics of Woodlands* as described in *Natural Heritage Reference Manual*, and the concept that: “*Older woodlands are particularly valuable for several reasons, including their contributions to genetic, species, and ecosystem diversity*” (MNRF 2010b).

For the purpose of this evaluation, community age is determined based on definitions in the provincial ELC for Southern Ontario (Lee *et. al.*, 1998). Seral age reflects the composition of the plant community (especially trees) with respect to light tolerance and moisture conditions). Generally, mature or advanced seral stage community types are under-represented in the London Subwatershed (Bowles, 1995), Middlesex County (UTRCA, 2003) and Oxford County (UTRCA, 1997).

Criterion Ranking:

- **HIGH** – patch contains one (1) or more mature or older growth communities
- **MEDIUM** – patch contains one (1) or more mid-aged communities
- **LOW** – patch contains only pioneer to young communities

B) Mean Coefficient of Conservatism (MCC) of communities or whole patch

This measure relates to *Species Rarity and Uncommon Characteristics of Woodlands* as outlined in the *Natural Heritage Reference Manual* and the following concepts:

- a) In general, habitats that contain rare species are more valuable than those that do not; and,

- b) Woodlands that are uncommon in terms of species composition should be protected (MNRF 2010b).

The MCC can provide useful information on the susceptibility of communities to adverse anthropogenic effects (Francis *et al.*, 2000; Catling, 2013). The MCC thresholds identified below have been based on the Floristic Quality Assessment System for Southern Ontario (Oldham *et al.*, 1995), analysis of distribution in the London subwatershed area (Bowles and Bergsma, 1999), results of the Middlesex Natural Heritage Study (UTRCA, 2014), and Oxford County Terrestrial Ecosystem Study (UTRCA, 1997).

Criterion Ranking:

- **HIGH** – one (1) or more vegetation community with an MCC ≥ 4.6 ; OR MCC of patch > 4.5
- **MEDIUM** – one (1) or more vegetation community with an MCC 4.2 – 4.5; OR MCC of patch $\geq 4.0 - 4.5$
- **LOW** – all vegetation communities with an MCC < 4.2 ; OR MCC of patch < 4.0 .

Score for **Criterion 2.1** based on the highest standard achieved for any one of the two standards.

Criterion 2.2 – Size and Shape

A) Patch Size

This measure relates to *Size* as described in Natural Heritage Reference Manual, and the concept that “*large patches of natural area are more valuable than smaller patches*” (MNRF 2010b).

Patch size is generally positively correlated with ecological function. Larger patches can provide functions that smaller patches cannot such as habitat for area-sensitive species, , reduced forest edge/increased forest interior, and increased resiliency from human disturbance (MNRF, 2010b).

The following thresholds have been derived from a cumulative frequency curve distribution for vegetation patches within the City of London (Bergsma, 2004).

Criterion Ranking:

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

B) Patch Shape and Presence of Interior

Patch shape influences the amount of edge and interior habitat, and thus can influence resilience, disturbance, and species-specific habitat requirements (as described above) (MNRF, 2010a). Edge habitat, specifically for woodlands, has increased across southern Ontario with increased fragmentation; and subsequently the area of forest interior has decreased.

This measure relates to *Shape* as described in *Natural Heritage Reference Manual*, and the following concepts:

- a) The shape of natural heritage areas affects their value as wildlife habitat and their resilience to disturbance effects; and,
- b) Round or block-shaped patches contain less edge per unit of area than long, narrow patches.

As edge effects can extend into woodlands (Environment Canada, 2013), the interior area for a patch is calculated based on a 100 m distance from the interior of the edge habitat (MNRF,

2010b). The locally-specific thresholds for perimeter:area ratios listed below have been based on analysis of London subwatershed studies patches and calculation of perimeter to area ratios (Bergsma, 2004).

Criterion Ranking:

- **HIGH** Patch contains interior habitat that is more than 100 m from the edge OR has a Perimeter: Area ratio $<1.5 \text{ m/m}^2$
- **MEDIUM** Patch contains no interior habitat but has a Perimeter:Area ratio 1.5 – 3.0 m/m^2 .
- **LOW** Patch contains no interior and has a Perimeter:Area ratio $> 3.0 \text{ m/m}^2$

C) Bird Species

This measure relates to *Species Diversity and Rarity* as described in *Natural Heritage Reference Manual*, and the following concepts:

- a) Areas that contain a high diversity of native plant and animal species are generally more important than areas that contain a lower diversity of species; and,
- b) In general, habitats that contain rare species are more valuable than habitats that do not (MNRF 2010b).

Birds can be indicators of habitat quality and the degree of forest fragmentation. The following criteria rankings have been developed based on the guidance from the: Significant Wildlife Habitat Ecoregion 7E Criteria Schedules (MNRF, 2015a) for "Habitat of Species of Conservation Concern, Special Concern and Rare Species" and the Avian Conservation Assessment Database (Partners in Flight, 2020) for "Regional Concern" species for the Lower Great Lakes/St. Lawrence Plain Bird Conservation Region.

Criterion Ranking:

- **HIGH** Patch provides breeding habitat for any three (3) or more bird species of conservation concern, including provincially rare bird species (MNRF, 2015a) or species of regional concern (Partners in Flight, 2020).
- **MEDIUM** Patch provides breeding habitat for one (1) or two (2) bird species of conservation concern, including provincially rare bird species (MNRF, 2015a) or species of regional concern (Partners in Flight, 2020).
- **LOW** Patch does not provide breeding habitat any bird species of conservation concern, including provincially rare bird species (MNRF, 2015a) or species of regional concern (Partners in Flight, 2020).

Score for Criterion 2.2 based on the highest standard achieved for any one of the three standards
--

Criterion 2.3 Diversity of Communities, Landforms and Associated Species

A) ELC Community Diversity

This measure relates to *Habitat Diversity, Complexity, and Uncommon Characteristics of Woodlands* as described in *Natural Heritage Reference Manual*, and the following concepts:

- a) Natural areas (or clusters of areas) that span a range of topographic, soil and moisture conditions tend to contain a wider variety of plant species and plant communities, and may also support a greater diversity of ecological processes;
- b) Older woodlands are particularly valuable for several reasons, including their contributions to genetic, species, and ecosystem diversity; and,
- c) Woodlands that are uncommon in terms of species composition, cover type, age, or

structure should be protected.

Native plant species diversity is related mainly to the number of communities in the patch, but also to patch area and landscape richness (UTRCA, 1997; MNRF, 2010b).

The following thresholds were developed based on an analysis of all vegetation communities (including cultural) identified at the Community Series level in the City of London digital GIS layer. Thresholds were derived from cumulative frequency distribution of London patches for a total of 23 Community Series categories (Bergsma, 2004). Assessments are to consider all Community Series types within a woodland patch, including cultural communities.

Criterion Ranking:

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

B) Community and Topographic Diversity (variation and heterogeneity)

This measure relates to *Habitat Diversity* and *Complexity* as described in *Natural Heritage Reference Manual*, and the concept that: “*natural areas (or clusters of areas) that span a range of topographic, soil and moisture conditions tend to contain a wider variety of plant species and plant communities, and may also support a greater diversity of ecological processes*” (MNRF 2010b).

This is applied to all communities as defined by this study and based on ELC Community tables (Lee *et. al.*, 1998) and topographic feature description. The seven (7) topographic feature categories for the City of London are as follows: riverine, bottomland, terrace, valley slope, tableland, rolling upland, bluff.

Criterion Ranking:

- **HIGH** – Patch contains three (3) or more Ecosites in one (1) Community Series OR four (4) or more Vegetation Types OR three (3) or more topographic features (e.g. tableland, rolling upland, valley slope, terrace, bottomland).
- **MEDIUM** – Patch contains two (2) or more Ecosites in one Community Series OR by three (3) Vegetation Types OR two (2) topographic features, or one (1) Vegetation Type with inclusions or complexes.
- **LOW** – Patch relatively homogenous; one (1) Ecosite OR one (1) to two (2) Vegetation Types on one (1) topographic feature.

C) Diversity (species and individuals) and Critical Habitat Components for Amphibians

This measure relates to *Species Diversity* and *Rarity* as described in the *Natural Heritage Reference Manual*, and the concept that: “*areas that contain a high diversity of plant and animal species are generally more important than areas that contain a lower diversity of species*”.

Amphibians are indicators of healthy woodlands with well-functioning processes (MNRF, 2000b; MNRF, 2010b).

This measure is applied at the patch level based on the presence of amphibians and / or important habitat components including the following:

- 1) shallow water that remains wet for the breeding season (presence of vernal pools);
- 2) emergent and submergent aquatic vegetation (presence of aquatic ELC community types);
- 3) presence of instream logs and shoreline shrubs (fish habitat);

- 4) closed canopy offering a shaded moist understory environment (presence of forest or treed swamp communities); and,
- 5) abundance of coarse woody debris (deadfall/logs, firm or decayed in the 10-24, 25-50 or >50 cm size classes).

Criterion Ranking:

- **HIGH** – three (3) or more species of amphibians present in the patch, OR one (1) species of amphibian that is abundant* in one (1) or more communities; OR two (2) or more critical habitat components present in the patch.
- **MEDIUM** – 1-2 species of amphibians present in the patch; OR one (1) species of amphibian that is occasional* in one (1) or more communities; OR one (1) critical habitat components present in the patch.
- **LOW** – No species of amphibian present in the patch, OR no critical habitat components present in the patch.

* *Abundance is based on call codes from the amphibian survey protocol as part of the Marsh Monitoring Program (Bird Studies Canada [BSC], 2009a). Presence is determined with a call code ≥ 1 ; occasional is defined as any species with a call code 2; abundant is defined as any species with a call code 3.*

D) Presence of Conifer Cover

This measure relates to *Representation* and *Habitat Diversity and Complexity* as described in *Natural Heritage Reference Manual*, and the following concepts:

- a) The full range of natural features that occur in an area, including both rare and common features, should be protected as a fundamental step in NHS planning to preserve biodiversity at the species and community levels; and,
- b) Natural areas (or clusters of areas) that span a range of topographic, soil and moisture conditions tend to contain a wider variety of plant species and plant communities, and may also support a greater diversity of ecological processes.

Important for providing winter food and shelter for a variety of wildlife species (MNR, 2000a; MNR, 2010b). For this measure, conifer communities are based on ELC (Lee *et al.*, 1998) and include FOC, FOM, SWC, SWM, and CUP.

Criterion Ranking:

- **HIGH** – Patch contains one or more conifer communities that are > 4.0 ha in size.
- **MEDIUM** – Patch contains one or more conifer communities that are between 2.0 and 4.0 ha in size.
- **LOW** – Patch contains conifer communities < 2.0 ha in size.

E) Fish Habitat Quality

This measure relates to *Hydrological and Related Values* and *Water Protection* as described in *Natural Heritage Reference Manual*, and the following concepts:

- a) Waterbodies, including wetlands, often represent a relatively small percentage of the total land area, yet they can be disproportionately more valuable than other area; and,
- b) Source water protection is important and natural hydrologic processes should be maintained (MNR 2010b).

The health of an aquatic habitat is determined by the health of the water body and surrounding land use practices. Both permanent and intermittent watercourses can provide critical habitat for many species.

Criterion Ranking:

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

Score for **Criterion 2.3** based on the highest standard achieved for any one of the five standards.

The London Plan – Criterion 1341 4.

The Woodland provides significant habitat for endangered or threatened species.

Criterion 4.1 – Significant habitat for endangered or threatened species.

A) Species At Risk Habitat This measure relates to *Species Rarity* as described in the *Natural Heritage Reference Manual*, and the concept that in general, “habitats that contain rare species are more valuable than habitats that do not” (MNRF, 2010b).

Identification, evaluation, and listing of provincially endangered or threatened species is the responsibility of the [MECProvince](#). Federally endangered or threatened species, as outlined in the *Species at Risk Act*, that are not covered under provincial legislation should also be considered. Planning authorities may wish to have assessments of the significant portions of the habitat of SAR reviewed by the [MECProvince](#).

SAR habitat present or previously identified: **YES** or **NO**

The presence of SAR habitat will add one **HIGH** score to the overall assessment

The London Plan – Criterion 1341 5.

The Woodland contains distinctive, unusual or high-quality natural communities or landforms.

Criterion 5.1 – Distinctive, unusual or high-quality communities.

This criterion relates to *Habitat Complexity and Diversity*, *Species Diversity and Rarity*, and *Uncommon Characteristics of Woodlands* as described in the *Natural Heritage Reference Manual*, and the following concepts:

- Natural areas (or clusters of areas) that span a range of topographic, soil and moisture conditions tend to contain a wider variety of plant species and plant communities, and may also support a greater diversity of ecological processes;
- Areas that contain a high diversity of plant and animal species are generally more important than areas that contain a lower diversity of species;
- Woodlands that are uncommon in terms of species composition, cover type, age or structure should be protected (MNRF 2010b).

A) ELC Community SRANK

Conservation status ranks for the province (SRanks) are based on vegetation communities’ risk of elimination. This measure should be evaluated based on the most up-to-date conservation status rank as applied by Natural Heritage Information Centre.

Criterion Ranking:

- **HIGH** – One (1) or more communities with an SRANK of S3 or lower.
- **MEDIUM** – No communities with an SRANK lower than S4.
- **LOW** – No communities with an SRANK lower than S5.

B) Significant Wildlife Habitat

Significant Wildlife Habitat (SWH; including habitat for species of conservation concern and rare species) occurrences within the patch as determined through the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF, 2015a). This criteria applies to any SWH that is not evaluated through any other criteria within these guidelines (e.g., Criteria 2.2c).

SWH habitat present or previously identified: **YES** or **NO**

The presence of SWH habitat will add one **HIGH** score to the overall assessment

C) Rare Plant Species Presence / Absence

This measure assesses the number of element occurrences of regionally uncommon or regionally rare vegetation (further outlined in the glossary) and the presence of S1-S3, SRank species (which are also identified as SWH) within a patch. Oldham (2017) identifies the regionally rare and regionally uncommon vascular plant species in Middlesex for this criterion. **Table 3.1** includes the Criterion Ranking.

Criterion Ranking:

- **HIGH** – One (1) Rare Plant (S1-S3) or 4 Regionally Rare plants.
- **MEDIUM** – One to three (1-3) Regionally Rare plants.
- **LOW** – One (1) Regionally Uncommon plant.

Table 3-1: Rare Plant Species Presence / Absence

Type and Status of Species	HIGH	MED	LOW
Rare Plant (S1-S3)	1		
Regionally Rare plant	4	1-3	
Regionally Uncommon plant			1

D) Size and distribution of trees

Criterion Ranking:

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

Relative abundance, as it related to this criterion (i.e., rare, occasional, abundant), is described in **Section 8**.

E) Basal Area

This criterion aims to evaluate stand characteristics for total basal area, and basal area by tree species and size classes for each community. The post-logging provincial standard for tolerant hardwoods will be used as a measure of high-quality woodlands (MNRF, 2000a). It has been estimated that 45% (UTRCA, 2003) to 73% (Bowles, 2001) of forests in the City of London and

surrounding area had basal areas lower than the recommended for optimal vegetation community resiliency and stability (MNRF, 2000a).

Criterion Ranking:

- **HIGH** – Average basal area of trees for any community in the patch $\geq 16\text{ m}^2/\text{ha}$ for trees $>25\text{ cm}$ DBH; OR $> 24\text{ m}^2/\text{ha}$ for trees $> 10\text{ cm}$ DBH; OR all diameter class sizes are represented in the stand (saplings $< 10\text{ cm}$; polewood 10-24 cm; small sawlog 26-36; medium sawlog 38-48 cm; large sawlogs 50-60 cm; x-large or veteran trees $> 62\text{ cm}$).
- **MEDIUM** – Average basal area for any community in the patch $12 - 24\text{ m}^2/\text{ha}$ of trees $>10\text{ cm}$ DBH; OR missing one of polewood, small, medium, or large size classes.
- **LOW** – Average basal area for all communities in the patch $< 12\text{ m}^2/\text{ha}$ for trees $> 10\text{ cm}$ DBH; OR missing two or more of polewood, small, medium, or large size classes.

Score for Criterion 5.1 based on the highest standard achieved for any one of the five standards

NOTE: 5.1d and 5.1e may require field investigations to determine size, distribution, and basal areas of trees within a given vegetation community.

Criterion 5.2 – Distinctive, Unusual or High-Quality Landforms

This criterion relates to *Habitat Complexity and Diversity* as described in *Natural Heritage Reference Manual*, and the following concepts:

- a) Natural areas (or clusters of areas) that span a range of topographic, soil and moisture conditions tend to contain a wider variety of plant species and plant communities, and may also support a greater diversity of ecological processes (MNRF 2010b).

A) Distinctive landform types

Analyses of the five broad landform types listed below that occur in the City were undertaken to assess landform-vegetation representational significance. This was derived by calculating the proportion of all vegetation patches overlapping with each of the five landforms areas that are considered protected (i.e., as Earth Science ANSIs, Environmentally Significant Areas, PSWs or river corridors) :

1. **Beach Ridge** landform is unusual and rare in the City with portions identified as Earth Science ANSI and PSW/ESA.
2. **Sand Plain** landform has very little protected areas present. It is considered high quality for the aggregate extraction industry.
3. **Spillway** is the 2nd largest landform unit with the greatest proportion of protected areas and contains most of the ESA's. It is the most distinctive landform unit including the Thames River, Stoney Creek, Medway Valley and Dingman Creek.
4. **Till Plain** is the largest landform unit with the least amount of protected areas and the highest amount of vegetation. Most of the land is considered high quality agricultural.
5. **Till Moraine** is the 3rd largest landform unit with fair amount of protected land. It accounts for the patches that fall on the upland landforms (Westminster Ponds – Pond Mills ESA / Meadowlily Woods).

Refer to **Figure 3.1** for glacial geomorphology mapping of landforms within the City of London.

Criterion Ranking:

- **HIGH** – Patch located on an Earth Science ANSI OR on the Beach Ridge or Sand Plain

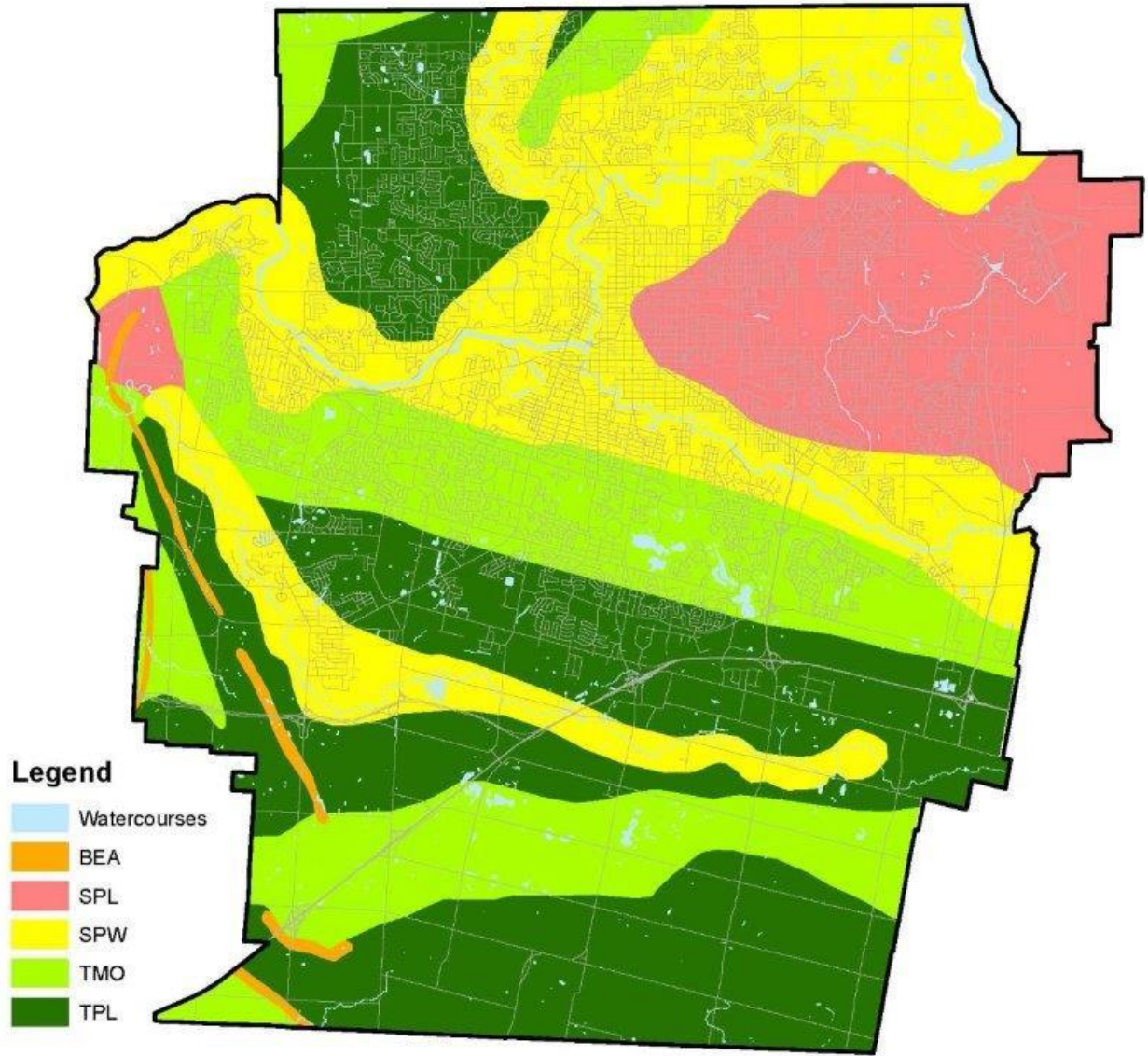
physiographic landform units.

- **MEDIUM** – Patch located on the Till Plain or Till Moraine physiographic landform unit.
- **LOW** – Patch is located on the Spillway physiographic landform unit.

Score for **Criterion 5.2** (based on the highest standard achieved).

The woodland evaluation review summary sheet shall be completed and included as an EIS Appendix, where appropriate. The blank summary sheet can be found in **Appendix D**.

Figure 3.1: City of London Glacial Geomorphology of the dominant physiographic units



3.2 Environmentally Significant Areas (ESAs)

As outlined in *The London Plan*, ESAs are relatively large areas in the City that contain natural features and perform ecological functions that warrant their retention in a natural state. ESAs often capture a complex of wetlands, woodlands, SWH, and / or valleylands. The approach for delineation of wetlands, valleylands and SWH is described in **Section 4**.

In the City of London there are ESAs which have been confirmed as meeting the established criteria (which are included in the Green Space Place Type) and Potential ESAs that still require evaluation (which are included in the Environmental Review Place Type). ESAs that clearly satisfy two (2) or more of the criteria (as outlined in **Section 3.2.3**) will be considered for recognition as an ESA. These criteria are to be applied to all potential ESAs delineated on Map 5 of *The London Plan*.

3.2.1 City of London Subwatershed Regions Policy and Context

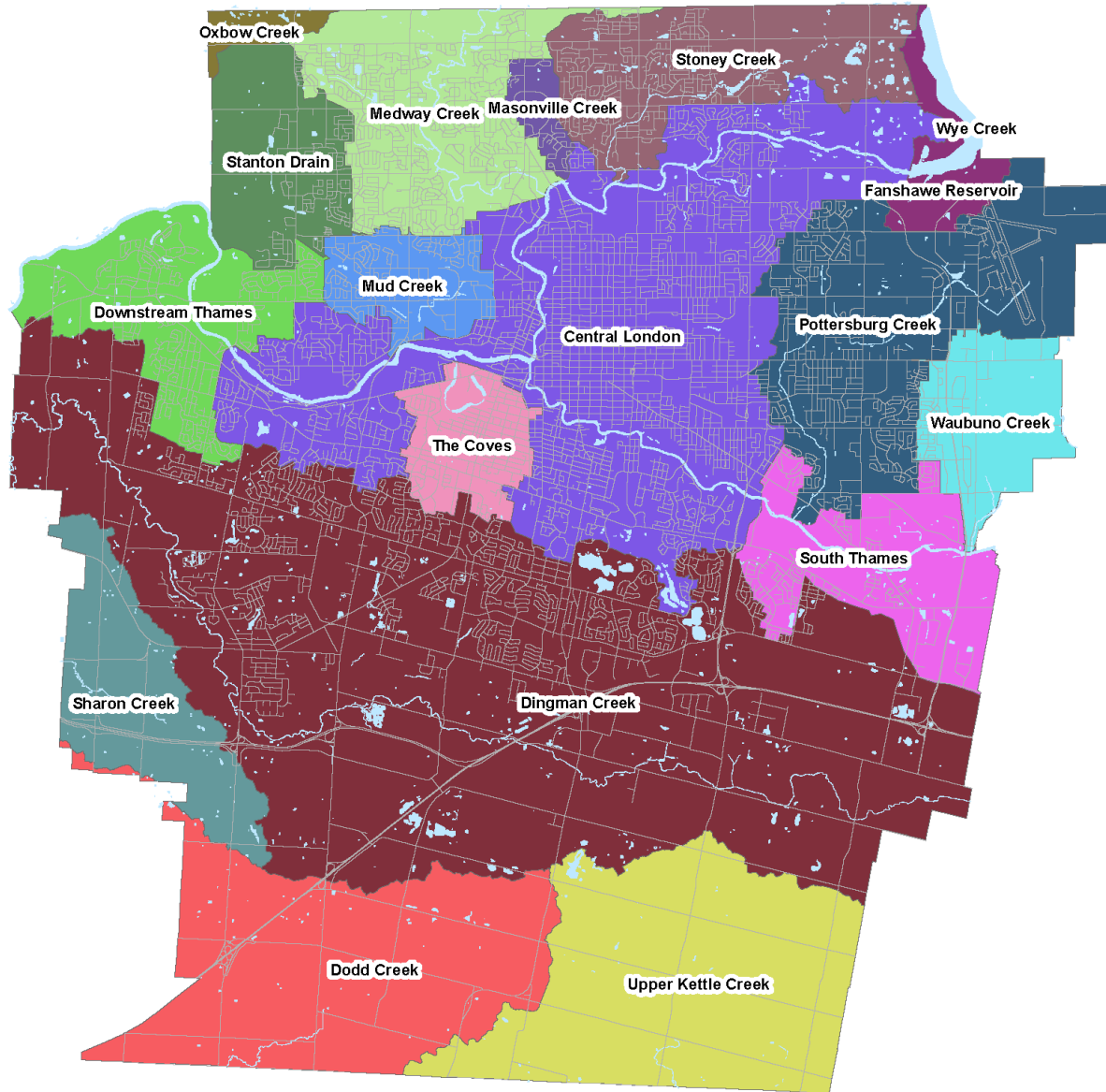
The policy framework for the identification and evaluation of ESAs is outlined in *The London Plan – Policies 1367_ to 1371_*. These policies provide the basis for the following guidelines and should be considered in conjunction with the Guidelines for Boundary Delineation as outlined in **Section 4**.

The following interpretations of the application guidelines should be noted:




















- These ESA guidelines are to be applied to Potential ESAs. Please refer to **Section 4.6** related to boundary delineation to determine whether Potential ESA(s) form part of an ESA patch. If a Potential ESA is not included in an ESA patch boundary, it must be assessed as a separate patch.
- The same natural heritage feature cannot be counted to satisfy more than one criterion for a given area. However, each feature shall be evaluated and listed under the criterion that it meets.
 - For example, if a community is identified as rare or uncommon, it would meet Criterion 1 listed below. If this community also contained high-quality, natural landform-vegetation communities representative of typical pre-settlement conditions, it would also meet Criterion 2 listed below. The community would be listed under both criteria but would only be applied towards the evaluation of significance for one of the criteria.
 - However, if there were other high-quality, natural landform-vegetation communities representative of typical pre-settlement conditions identified within the Potential ESA, Criterion 2 could also be applied towards the evaluation of significance.
- “Regional level” refers to the lands covered by the City of London subwatershed studies, including Oxbow Creek Subwatershed, Dingman Creek Subwatershed and the Central Area Subwatershed. For mapping of subwatersheds, refer to **City of London Subwatersheds** mapping and / or submit a **GIS Data Request** to the City of London – Geomatics Department.
- The term “County” refers to Middlesex County.
- Appropriate expertise, provided by a qualified professional (as outlined in **Section 2.6.6.11**) may be required to apply certain elements of Criterion 1 (unusual landforms), Criterion 4 (significant hydrological processes), Criterion 5 (aspects of biodiversity), Criterion 6 (important wildlife habitat or linkage functions), and Criterion 7 (significant habitat). Each time a criterion is applied, the rationale and source of expertise should be documented.
- The minimum data requirements to apply certain measures of a criterion, such as diversity indices, are detailed in the guidelines below, as well as the **Data Collection Standards** outlined in **Appendix C**. A standardized approach to data collection will enable more consistent application of these indices, and can inform long term planning.

- For documentation of rare community and species status, the most up-to-date resources and authorities will be utilized. Lists of rare and unusual communities and species will be considered open-ended, since data collected from other natural areas inventories may result in additions and deletions.
- For vegetation communities, the ELC system for Southern Ontario (Lee *et al.*, 1998) will be the standard protocol used to differentiate natural vegetation communities within patches.
- The term "area" in this document refers to patches or patch clusters (i.e., the combined area of contiguous patches), which are defined during boundary delineation (as outlined in **Section 4**).
- The focus of each criterion is to identify features of significance for protection.

Figure 3.2: City of London Subwatershed Regions



Legend

	Watercourses		Medway Creek		Stoney Creek
	Central London		Mud Creek		The Coves
	Dingman Creek		Oxbow Creek		Upper Kettle Creek
	Dodd Creek		Pottersburg Creek		Waubuno Creek
	Downstream Thames		Sharon Creek		Wye Creek
	Fanshawe Reservoir		South Thames		
	Masonville Creek		Stanton Drain		

3.2.3 Environmentally Significant Areas (ESAs) Evaluation Criteria

The London Plan 1371_ - Criterion 1:

The area contains unusual landforms and / or rare to uncommon natural communities within the country, province or London subwatershed region.

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

Application: Unusual Landforms

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

Provincial level: Provincially significant Earth Science ANSIs

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

Rare to Uncommon Natural Communities

National/Provincial level: Significance as interpreted from the Carolinian Zone community Subnational (Ontario) S-Ranks outlined in the **Natural Heritage Information Centre** (MNRF, 2020) or subsequent updates and / or amendments. A natural community is considered rare to uncommon if the S-Rank is between S1 and S3. Community identification can be determined through existing data and / or data obtained from the Subwatershed Studies. Rare vegetation communities can also be identified as evaluated through the SWH Criteria Schedules for Ecoregion 7E (MNRF, 2015a).

Regional level: Regionally significant Earth Science ANSIs and vegetation communities identified as rare to uncommon based on an analysis of the London Subwatershed Studies Life Science Inventories (Bowles *et al.*, 1994) or the best available data. This list will be open-ended to incorporate any new data collected from the London subwatershed region. It will include communities or "species assemblages" that have limited distribution and occurrence within the region (e.g. fens, older growth forests, boreal species assemblages), or that are at the limits of their distributional ranges (e.g. bogs), or that are remnants of original habitat (e.g. prairie and oak savanna). Vegetation communities meeting the criteria for SWH as outlined in **The London Plan – Policy 1354** are also considered rare.

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

There may be special cases where rare to uncommon vegetation communities are described by the presence of Nationally, Provincially, or Regionally rare plant species, if they are abundant or dominant (as described in **Section 8**) in one or more strata (i.e., canopy, understorey, etc as described in Lee *et al.*, 1998). In these situations, the presence of the rare plant would not be used to meet **Criterion 7** for rarity.

The London Plan 1371 - Criterion 2:

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

Background: The focus of this criterion is to identify representative examples of the full range of landform-vegetation types that occur on each of the five dominant physiographic units within the London subwatershed region (**Figure 3.1**). By representing all landform-vegetation associations in a protected areas system a significant portion of the biodiversity of an area will be maintained (Crins, 1996). By capturing representative native vegetation in the NHS, examples of pre-European settlement landscapes are also protected.

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

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

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

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

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

Provincial level: Presence of Provincially significant ANSIs as identified in Land Information Ontario (LIO). Presence of PSWs as defined by the **OWES** (MNRF, 2014a).

Regional level: All wetlands within the City of London are protected in accordance with **The London Plan**.

Presence of regionally significant ANSIs identified in LIO.

Presence of Ecosite vegetation community types (as outlined in ELC; Lee *et al.*, 1998) of high quality on distinctive topographic, landform, or cultural features, applied through existing data and data obtained from the Subwatershed Studies.

The following community types are examples, and thus not an exhaustive list:

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

Comments: Ecosite vegetation communities, as classified through ELC (Lee *et al.*, 1998), can be considered high-quality and thus applicable for this criterion based on the following:

- Rare vegetation communities as evaluated through the SWH Criteria Schedules

for Ecoregion 7E (MNRF, 2015a);

- Vegetation communities meeting the criteria for SWH as outlined in **The London Plan – Policy 1354**; and, Vegetation communities with an SRank 1-3 as described by the Natural Heritage Information Centre.

The London Plan 1371 – Criterion 3:

The area, due to its large size, generally more than 40 hectares, provides habitat for species intolerant of disturbance or for species that require extensive blocks of suitable habitat.

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

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

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

Application: This criterion can be met in any one (1) of two (2) ways:

1. The size of a patch is generally greater than 40 ha or the combined size of patches is generally greater than 40 ha and the patches are not interrupted by gaps wider than 20 m; or,
2. The area either a) contains some interior forest habitat which is at least 100 m from all forest edges and is not interrupted by gaps wider than 20 m, OR b) there is confirmed presence of one or more breeding birds which are either forest-interior species or area-sensitive species.

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

Comments: For patches or patch clusters straddling the City boundary, the area determination shall be based on the whole patch or patch cluster since this represents the ecological unit to which the criterion is applied.

The minimum size limit will result in the inclusion of only the largest areas in the London subwatershed region, as determined through available data and data from the subwatershed studies. [Note: Of 25 ESAs or Potential ESAs, four (4) fell within the range of 150 to 500 ha and two (2) were greater than 500 ha].

The London Plan 1371 - Criterion 4:

The area, due to its hydrologic characteristics, contributes significantly to the healthy maintenance (quality or quantity) of a natural system beyond its boundaries.

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

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

Application: Presence of indicators of hydrological processes noted during subwatershed studies include but are not limited to:

- water storage;
- water release (discharge);
- wetlands;
- water quality improvement;
- first order stream / headwater;
- groundwater recharge and discharge areas identified on subwatershed maps as high potential; and,
- water conveyance (i.e. floodplain and overland flow paths).

For wetlands, those that meet three or more of five key hydrologic functions as identified in the hydrology section of the **OWES** (MNR, 2014a) would be considered significant by the City of London. [Threshold was determined based on a review of ten evaluated wetlands within the City of London].

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

Permanent, non-channelized first-order streams containing Type I-II habitat (DFO, 1994) qualify for inclusion as part of the ESA.

Source
References: Sources of information include but are not limited to wetland and hydrologic information presented by the UTRCA and by the Subwatershed Studies Aquatic Resources Management Reports for Vision '96 Subwatersheds (Beak Consultants 1995).

[The London Plan 1371](#) – Criterion 5:

The area has a high biodiversity of biological communities and / or associated plant and animal species within the context of the London subwatershed region.

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

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

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

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

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

Comments: Evaluation of biodiversity should consider the variability of data obtained through different

levels of field efforts.

Vegetation community classification will be based on *An Ecological Land Classification for Southern Ontario* (Lee *et al.*, 1998).

The London Plan 1371 – Criterion 6:

The area serves an important wildlife habitat or linkage function.

Background: The focus of this criterion is to identify significant wildlife habitats or linkages between significant natural features as identified in SWH Criteria Schedule for Ecoregion 7E. These habitats and linkages contribute to overall landscape richness and provides habitat for wildlife (MNRF, 2015a).

Application: Important wildlife habitat functions are outlined in depth in the SWH Criteria Schedule for Ecoregion 7E (MNRF, 2015a) and are grouped under the following four broad categories:

- Seasonal Concentration Areas of Animals;
- Rare Vegetation Communities or Specialized Habitat for Wildlife;
- Habitat for Species of Conservation Concern; and,
- Animal Movement Corridors.

The site fulfills an external linkage or corridor function between two or more significant habitats. The value of a linkage or corridor will be based upon characteristics such as habitat, shape, width, and length. Linkage function and attributes are described in the *Natural Heritage Reference Manual* (MNRF, 2010b). Linkages may include, but are not limited to, the following:

- early successional woodlands and plantations;
- water bodies, watercourses and valleylands;
- riparian zones;
- steep slopes and groundwater discharge areas;
- old fields;
- hydro and pipeline corridors;
- abandoned road and rail allowances; and,
- recreational greenway parks.

Source **References:** ~~MNRF-Provincial~~ files and maps; subwatershed studies; other data obtained through site specific field investigations; MNRF (1997); Riley and Mohr (1994).

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

The London Plan 1371 – Criterion 7:

The Area provides significant habitat for rare, threatened, or endangered indigenous species of plants or animals that are rare within the country, province, or county.

Background: The focus of this criterion is to identify populations of rare, threatened or endangered species for protection. This criterion is focused on SAR and rare species not covered

under significant wildlife habitat under Criterion 6 (e.g., species of conservation concern).

Definitions of significant habitat are given under each of the categories of vascular plants and animals. The most current sources of rarity designations will be used. Lists of rare species are considered open-ended as new information will result in amendments over time. Data from the Subwatershed Studies Life Science Inventories (Bowles *et al.*, 1994) were used to update Middlesex County status for plants.

Application: Plant Species

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

Federal SAR : COSEWIC Status reports

NHIC Global Ranks (GRANK) for Rare Vascular Plants (Oldham, 1994a) and Mosses (Oldham, 1994b).

- Species listed with a global rank of G1 to G3
- SAR listed under the *Species at Risk Act*

Rare Vascular Plants in Canada (Argus and Pryer, 1990), Database of Vascular Plants of Canada (VASCAN; Canadensys, 2020)

Provincial SAR: NHIC Provincial Rank (SRANK) for Rare Vascular Plants (Oldham, 2009; Oldham, 2017) and for Mosses (Oldham, 1994b).

- Species listed with a provincial rank of S1 to S3
- MECP-Provincially designated SAR in Ontario

Atlas of the Rare Vascular Plants of Ontario (Oldham & Brinker, 2009; Oldham, 2017)
COSSARO Status reports

Middlesex County Rare Species: Status of the Vascular Plants for Ecoregion 7E (Oldham, 2017)

- Rare in SW Ontario

SWFLORA database for Subwatershed Life Science Inventories (Bowles *et al.*, 1994)

- Rare in Middlesex County

Species recorded that have 1-4 records (stations) in Middlesex County. Note: Plant records collected from the subwatershed studies were used to update the rare status at the county level.

Animal Species

Habitat for animal species should be interpreted to mean areas where one (1) or more rare species are resident or breeding in the area, and / or making use of the area for a key component of their life cycle (e.g. territory, nesting, critical feeding grounds or wintering concentrations). Documentation of repeated (multi-year) use of an area by a species adds to the significance of the habitat. For breeding birds, the presence of suitable habitat for territory, nesting and feeding; for butterflies, the presence of suitable habitat including the host plants upon which they feed; for mammals, the presence of signs of active use of an area (e.g. dens, bedding areas, well-used trails, scat, etc.); for herpetofauna, the presence of suitable habitat for breeding (e.g. vernal pools, downed woody debris) and hibernating (presence of hibernacula).

Federal SAR: COSEWIC Status reports

NHIC Global Ranks (GRANK) for Amphibians and Reptiles, Mammals, Birds, Insects (e.g.,

butterflies, moths, odonata, hymenoptera, etc.) and Fishes

- Species listed with a global rank of G1 to G3
- SAR listed under the *Species at Risk Act*

Provincial SAR: NHIC Provincial Rank (SRANK) for Amphibians and Reptiles, Mammals, Birds, Insects, and Fishes

- Species listed with a provincial rank of S1 to S3
- [MECP-Provincially listed](#) SAR in Ontario
- COSSARO Status reports

Middlesex County Rare Species: Southwestern Ontario regional status based on records in provincial atlases:

- mammals – e.g., Atlas of the Mammals of Ontario (Dobbyn, 1994)
- breeding birds – e.g., Avian Conservation Assessment Database (Partners in Flight, 2020), Atlas of the Breeding Birds of Ontario (OBBA) 2001-2005 (OBBA, 2007)
- insects – e.g., Ontario Butterfly and Moth Atlases (Toronto Entomologists' Association, 2020)
- herpetofauna – e.g., Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019)

Middlesex County status of rarity is based upon the most recent existing county records:

- mammals - provincial mammal atlas and records from [MNRF-the appropriate Provincial](#) District office
- breeding birds - open ended lists from the provincial bird atlas (OBBA, 2007; Partners in Flight, 2020) and best available county information;
- insects - best available county information;
- herpetofauna - status of amphibians and reptiles in Middlesex County (Ontario Nature, 2019)

Comments: Other non-vascular plant (e.g. mosses) and faunal groups (e.g. Odonata) should be included where and when the information is available.

The following sections provide guidelines for the evaluation of significance and ecological function for the following natural heritage features as specifically outlined in ***The London Plan***:

- Wetlands;
- Significant Wildlife Habitat; and,
- Valleylands.

Although other natural heritage features may require evaluation and subsequent protection (e.g., fish habitat, wetlands, etc.), the guidelines for evaluating those natural heritage features are outlined in the applicable provincial, federal, or other technical documents. It is expected that all natural heritage features be evaluated in accordance with the appropriate and most up-to-date guidelines and / or policies.

3.3 Provincially Significant Wetlands, Wetlands and Unevaluated Wetlands

There are three (3) categories of wetlands within the City of London protected as per **The London Plan** (Policies 1330_ to 1336_) [and the applicable Conservation Authority policies \(e.g., UTRCA 2017\)](#):

- Provincially Significant Wetlands (PSWs)
- Wetlands, and
- Unevaluated Wetlands.

PSWs (on the City's Map 5 and / or in the [MNRF's Province's](#) mapping data layers), ~~as identified and mapped by the MNRF~~, may be re-evaluated by proponents in accordance with the Ontario Wetland Evaluation System (OWES) (MNRF, 2014a) as outlined in the *Natural Heritage Reference Manual*. [MNRF The Province](#) remains responsible for reviewing and approving any additions, deletions or refinements to identified PSWs.

Assessments under the OWES system must be done by a qualified professional who is certified and experienced in application of the system.

Unevaluated Wetlands mapped in the City of London (on the City's Map 5 and / or in the [MNRF's Province's](#) mapping data layers) are also to be evaluated for significance using the OWES as outlined in the *Natural Heritage Reference Manual*. The evaluation is to be submitted to [MNRF the Province](#) for their review and decisioning.

Unmapped wetlands identified through the vegetation community assessment process may need to be evaluated for significance using the OWES system. These include the following ELC Community Series:

- SWAMP - deciduous swamp (SWD), mixed swamp (SWM) or coniferous swamp (SWC);
- FEN – open fen (FEO), shrub fen (FES) and treed fen (FET)
- BOG – open bog (BOO), shrub bog (BOS) and treed bog (BOT)
- MARSH – meadow marsh (MAM), shallow marsh (MAS)
- SHALLOW WATER – submerged shallow aquatic (SAS), mixed shallow aquatic (SAM) and floating-leaved shallow aquatic (SAF), and
- OPEN WATER (OAO).

Guidance for boundary delineation of wetlands is provided in **Section 4**.

Wetlands evaluated for provincial significance that do not meet the criteria for designation as a PSW (per OWES), as confirmed by the [MNRF Province](#), will be identified as "Wetlands" within the City of London, irrespective of size or condition.

PSWs, Unevaluated Wetlands and other Wetlands will be added, removed or refined to Map 5 – Natural Heritage in **The London Plan** as new information becomes available. PSWs and Wetlands are also mapped as Green Space Place Type on Map 1, while Unevaluated Wetlands are mapped as features for Environmental Review.

All wetlands (including PSWs) and their adjacent lands are also regulated by the local Conservation Authorities and may also require consideration under the applicable Conservation Authority policies, as well as the Natural and Human-made Hazards Policies in **The London Plan**.

For more information related to the evaluation of significant wetlands using the OWES, and its application under the Provincial Policy Statement, refer to the *Natural Heritage Reference Manual* (MNRF, 2010b) as well as Ontario's Wetlands evaluation website.

3.4 Significant Wildlife Habitat (SWH)

Policies outlined in the Provincial Policy Statement and **The London Plan** (Policy 1353_) protect Significant Wildlife Habitat (SWH) by not permitting development and site alteration within or in the lands adjacent to SWH unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

The London Plan (Policies 1352 and 1354) provides key considerations for the determination of significance for wildlife habitat within the City of London. As per these policies, candidate Significant Wildlife Habitat (SWH) should be screened for and assessed utilizing the process outlined in the *Natural Heritage Reference Manual*, specifically utilizing the *Significant Wildlife Habitat Technical Guide* (MNRF, 2000), in conjunction with the criteria in the supplementary *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF 2015a)- and the criteria outlined in Policy 1354_1 through 1354_3.

With respect to Policy 1354_3, passive recreation opportunities refer to activities such as hiking, photography and eco-tourism.

Within the City of London, areas confirmed as SWH is-are to be designated as a natural feature/area within the Green Space Place Type and included in Map 1.

3.5 Significant Valleylands and Valleylands

Valleylands, as defined in the *Provincial Policy Statement*, refers to natural areas that occur in a valley or landform depression with standing or flowing water for a period of the year. Valleylands include features such as rivers, streams, other watercourses, and ravines. Valleylands provide many important ecological functions (e.g., wildlife habitat, water storage/transport), as well as linkages/connectivity between other natural heritage features and areas within the NHS.

Policies for the identification and protection of Significant Valleylands and Valleylands are provided in **The London Plan** (Policies 1344 to 1349) and should be considered in conjunction with the applicable Conservation Authority policies (e.g., UTRCA 2017). The policies provide considerations for the identification and determination of significance for valleylands based on the evaluation of landform-related functions and attributes, ecological features and restored ecological functions.

Table 8-1 in the *Natural Heritage Reference Manual* outlines specific standards on the evaluation of function criteria for valleylands (e.g., surfacewater functions, distinctive landforms, habitat value, etc.). These criteria should be referenced when determining the significance of valleylands in conjunction with the guidance provided in **The London Plan**.

The London Plan also includes direction (Policy 1350) for the determination of valley corridor width. Supplemental guidance related to boundary delineation for valleylands is described in **Section 4.2.2** of the EMGs.

Within the City of London, Significant Valleylands are designated as a natural feature/area within the Green Space Place Type, therefore Green Space Place Type policies outlined in **The London Plan** are also applicable. Valleylands that have been identified but not yet assessed are identified within the Environmental Review Place Type, pending evaluation. Note that air photo interpretation and / or site investigations may identify additional valleyland features.

In consultation with the applicable Conservation Authority, the City of London may consider alterations to river or stream valleys and watercourses to enhance, rehabilitate, and / or restore the system (e.g., bank stabilization, riparian plantings, and barrier removal) in accordance with Policy 1351.

4. Boundary Delineation of Natural Heritage Features and Areas

Delineation of natural features and areas requires an understanding of both technical and policy elements related to the feature and / or area being considered. Ecological boundary delineation is an important part of the planning process as it determines what will be considered for further evaluation. The City of London recognizes that it is important for the approaches taken to be as transparent and consistent as possible both to preserve the integrity of the City's Natural Heritage System (NHS) and ensure the planning process is being implemented appropriately.

Ecological boundary delineation is required before natural features and areas can be evaluated for significance, and may be reviewed when site alteration or development is proposed adjacent to natural heritage features and areas that have already been identified and confirmed. This section provides guidelines for delineating the ecological boundaries of natural heritage features and areas including currently mapped and unmapped features. It specifically includes:

- An overview of the jurisdictional responsibility and policy direction related to ecological boundary delineation for each NHS component in the City;
- General guidance for delineation of unevaluated vegetation patches in the City of London; and,
- Feature-specific boundary delineation guidance for: Wetlands, Woodlands and Significant Woodlands, Valleylands and Significant Valleylands, Significant Wildlife Habitat, Environmentally Significant Areas (ESAs) and other lands to be identified through an environmental study (such as critical Function Zones [CFZs] and linkages).

Notably, the boundaries delineated for natural heritage features do not include any setbacks, buffers, or adjacent lands. Guidance for Ecological Buffers is provided in *The London Plan* (Policies 1412_ to 1416_) and supplemented with the guidance in Section 5 of these EMGs.

In addition, these boundary guidelines are focused solely on ecological boundaries irrespective of property lines. However, it is understood that while natural heritage features and areas may cross property boundaries, that field verification of such boundaries may be limited to the subject property.

The purpose of these guidelines is:

1. To document and describe a repeatable process based strictly on ecological considerations, leading to credible mapping which can be used for planning, protection and monitoring;
2. To provide the basis for resolving variations between different scales and types of mapping; and,
3. To establish a common understanding and approach between planners, consultants, and the public regarding the ecological aspects of boundary delineation for natural features.

4.1 Policy Context and General Guidance

Some components of the City's NHS must have their boundaries confirmed by the appropriate federal or provincial agency, while the boundaries of other components are the City's responsibility to confirm, sometimes in consultation with the local Conservation Authority. An overview of the jurisdiction responsible for confirming boundaries for the various NHS components, as specified in *The London Plan*, is summarized in **Table 2-1**.

The following applies to any natural heritage feature or area, including vegetation patches, mapped or unmapped, to be considered as part of an Environmental Study through the planning process.

1. The term “vegetation patch” refers to an area that contains natural vegetation, along with associated features and functions. Vegetation patches are considered as one unit and can be comprised of multiple “natural heritage features” inside the patch (e.g., woodland, wetland, etc.). The initial feature boundary will be drawn at the interface between naturalized vegetation and the adjacent lands, generally conforming to the patch outline.
2. The ecological boundary is determined based on ecological principles, refined through the application of these guidelines, and ~~are irrespective of~~without regard for property lines. Boundary delineation guidelines shall not be used to separate a vegetation patch into specific parts that can be treated individually as having lesser or greater significance and / or contribution to ecological function.
3. Application of these guidelines should be illustrated at a map scale of 1:10,000, using aerial photography and other tools as necessary. Further refinements will be made at a smaller scale (e.g., 1:5,000 or 1:2,000 scale), and may require field investigations. For the completion of an Environmental Study, boundaries must be geo-referenced to the best accuracy possible.
4. The diagrams and examples that form part of the conditions for boundary delineation provided below are intended to convey the intent of the guidelines. While not drawn to scale, these diagrams do depict the relative sizes and distances of the areas shown. A legend has been included to aid in the interpretation of the diagrams.
5. In the application of these guidelines, the most recent map sources, current and historical aerial photographs, and ecological background studies/documents should be used to verify the initial boundary.

4.2 Wetlands

The overarching policy framework for PSWs, Wetlands, and Unevaluated Wetlands is outlined in ***The London Plan*** – Policies 1330 to 1336. Wetlands of any size must be identified, delineated and screened in accordance with both City and Conservation Authority policies (e.g., UTRCA 2017).

The first step in delineating wetland features is to define the wetland types and delineate these vegetation communities approximately utilizing the ELC System (Lee *et al.*, 1998). The second step, is to confirm and, if needed, refine the delineation of internal boundaries (e.g., between different types of wetlands, boundary between wetland and upland communities), external boundaries (e.g., between wetlands and non-natural land uses), and wetland complexes (if applicable) using the Ontario Wetland Evaluation System (OWES) (MNR, 2014a). The OWES provides in-depth instructions on the delineation of internal and external boundaries and generally consists determining wetland boundaries within areas of gradual ecological change (i.e., transitional areas, eco-tones) utilizing a combination of the following information:

- Transition (i.e., a 50% split) between wetland and upland plant community (percent cover);
- Topography, such as elevation and slope; and,
- Soil substrate.

Wetland boundaries should be scaled to 1:10,000 for mapping purposes, with the width of the boundary line being scaled to cover the equivalent of 15 m in real world application (MNR, 2014a).

The wetland boundary delineation must be conducted by a qualified professional (i.e., a person certified and experienced in the application of OWES), and is typically undertaken in the field with the applicable Conservation Authority. Existing boundaries of PSWs remain as mapped unless any proposed revisions are approved in writing by the MNR the Province.

Beyond the wetland community boundaries, the Critical Function Zone (CFZ) must also be included for constraints mapping and site planning. CFZs are non-wetland areas within which biophysical functions or attributes directly related to the wetland occur (Environment Canada, 2013). Effectively, the CFZ is a functional extension of the wetland into the upland. For example, this could include: upland grassland

nesting habitat for waterfowl (that use the wetland to raise their broods), upland foraging areas, overwintering and nesting habitat for reptiles and amphibians. Foraging areas for frogs and dragonflies, and / or nesting habitats for birds that straddle the wetland-upland ecozone could also be considered part of the CFZ.

CFZs do not replace the functions of a buffer. For more in-depth information on determining CFZs, refer to Environment Canada (2013).

4.3 Significant Woodlands and Woodlands

The overarching policy framework for the identification and evaluation of woodlands is outlined in **The London Plan** – Policies 1337 to 1343, 1383 and 1386, and includes local criteria aligned with the *Natural Heritage Reference Manual*.

The *Provincial Policy Statement* protects Significant Woodlands by not permitting development and site alteration within these features or on adjacent lands unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

Most potential Woodlands are shown as Unevaluated Vegetation Patches on Map 5 – Natural Heritage and as Environmental Review Place Type on Map 1 in **The London Plan**. However, as identified in **The London Plan** – Policy 1316, the absence of vegetation patches from the aforementioned mapping does not necessarily mean that additional unevaluated vegetation patches do not exist. Therefore, proponents must assess the subject lands in question to screen for the presence of any additional Unevaluated Vegetation Patches and / or other vegetation patches larger than 0.5 ha.

Significant Woodland and Woodland boundary delineation shall be conducted by qualified professionals with expertise in ecology, hydrology and geomorphology. All woodland boundaries are to be delineated in the field at the Drip Line of the feature.

Section 3.1 includes guidance related to the evaluation of woodlands.

4.4 Valleylands and Significant Valleylands

The overarching policy framework for the identification of Significant Valleylands is outlined in **The London Plan** – Policies 1347 to 1349, and includes local criteria aligned with the *Natural Heritage Reference Manual* guidance, but also refers to this guidance for additional criteria. [Relevant guidance from the applicable Conservation Authority policies \(e.g., UTRCA 2017\) should also be considered.](#)

The *Provincial Policy Statement* defines valleylands as natural areas that occur in a valley or other landform depression that have water flowing through or standing for some period of the year, and includes rivers, streams, other watercourses and ravines) (MMAH, 2020). Significant valleylands also play an essential role in the NHS, such as providing connectivity (e.g., migration and dispersal corridors) (MNRF, 2010b).

Valleylands may be clearly defined (e.g., with steep ravines sloping down towards a permanent watercourse), or may not have a well-defined corridor or permanent flows (e.g., in areas of headwaters, seeps) (MNRF, 2010a).

Specific policies for the boundary (width) delineation of Significant Valleylands are outlined in **The London Plan** Policy 1350. Significant valleyland boundary delineation shall be conducted by a qualified professionals with expertise in ecology, hydrology and geomorphology.

Section 3.5 includes guidance related to the evaluation of valleylands.

4.5 Significant Wildlife Habitat

The overarching policy framework for the protection and determination of the significance of Significant Wildlife Habitat (SWH) is outlined in **The London Plan** Policies 1352_ to 1355_. These policies point to the guidance in the SWHTG (MNRF 2000b) and the *Natural Heritage Reference Manual* (MNRF 2010b), the Province's criteria schedules for Ecoregion 7E (MNRF 2015a) for determination of the significance and delineation of SWH and municipal criteria outlined in Policy 1354_.

SWH is the most complex habitat category in the City's NHS (and in the *Provincial Policy Statement*) as it seeks to capture ecologically important and somewhat specialized habitat types for a broad cross section of species and ecological functions. In Ecoregion 7E, the ecoregion in which London is situated, there are 35 categories of SWH. SWH often occurs as a subset of or within other natural heritage features or areas (such as wetlands or woodlands), but may also extend beyond or occur outside of such features or areas.

The applicable guidance, particularly for the ecoregional criteria, largely relies on vegetation community polygons delineated at the Ecosite level using the ELC system (Lee *et al.*, 1998) to determine the extent of habitat to be considered as SWH, although a few SWH categories are delineated using the presence or absence of other habitat features not linked to one or more specific Ecosite type. Nonetheless, in most cases, the presence of one or more of the specified Ecosite types in conjunction with the presence of one or more of the defining criteria within the applicable polygons is sufficient to warrant consideration of a feature or area as candidate SWH. The current and proposed land use context should, however, also be considered in conjunction with the habitat needs and sensitivities of the species / group of species in question, and the broader context of the NHS on a City-wide scale, in determining appropriate boundaries for the SWH type.

It is the City of London's responsibility to determine whether or not the candidate SWH should be confirmed, the extent of the habitat to be protected, and the mitigative measures required, if any. Depending on the nature and location of the SWH, boundaries should also be determined in consultation with the other applicable agencies (e.g., Conservation Authority).

Further, delineation of SWH should be informed by information collected from aerial mapping and observations from site investigations, and should be confirmed in the field by a qualified professional.

Section 3 provides supplemental guidance on the evaluation of SWH.

4.6 Environmentally Significant Areas (ESAs)

The overarching policy framework for the evaluation of Environmentally Significant Areas is outlined in **The London Plan** – Policies 1367_ to 1371_, and includes local criteria unique to London. As outlined in **The London Plan**, ESAs are relatively large areas in the City that contain natural features and perform ecological functions that warrant their retention in a natural state. ESAs often capture a complex of wetlands, woodlands, SWH, and / or valleylands and are delineated based on the features that they contain.

ESAs that have been evaluated are included as Green Space Place Type on Map 1 – Place Types and are mapped on Map 5 – Natural Heritage. However, Potential ESAs patches or other vegetation patches greater than 0.5 ha (as identified through subwatershed plans or other environmental studies) should be delineated and assessed for significance (as outlined in **Section 3**). It is important to note that mapping in **The London Plan** is dynamic in nature, and not all potential vegetation patches or those identified for protection may be included in the mapping at a given time. It is the responsibility of the proponent to determine potential vegetation patches for evaluation as part of the planning process and development application.

Appropriate expertise provided by a qualified professional is required to delineate ESA elements. For vegetation communities, the ELC system for Southern Ontario (Lee *et al.*, 1998) will be the standard protocol used to differentiate natural vegetation communities within patches. The term "area" in the context of an ESA refers to patches or patch clusters (i.e., the combined area of contiguous patches), which are defined during boundary delineation and included in the feature boundary).

Section 3.2 includes guidance related to the evaluation of ESAs.

4.7 ~~Boundary Delineation Guidelines~~ Vegetation Patches

In general, vegetation patches have been identified through subwatershed plans or other environmental studies and have been mapped in **The London Plan** on Map 1 – Place Types and Map 5 – Natural Heritage. Vegetation patches that have been evaluated for significance may become designated as an NHS component (e.g., Significant Woodland or Woodland) in whole or in part, in accordance with the guidance provided in **Section 3**.

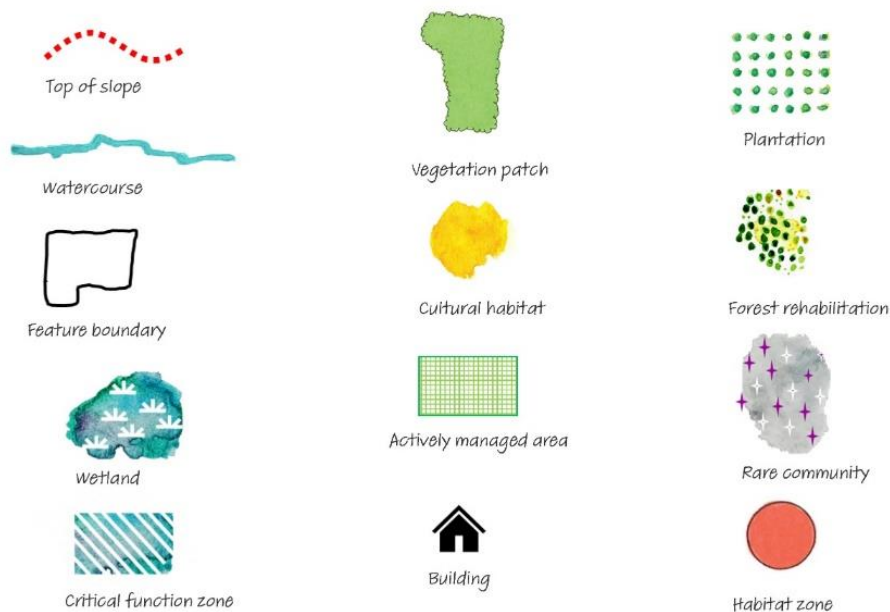
As outlined in **The London Plan**, vegetation patches that have been evaluated ~~are~~ may be included as Green Space Place Type on Map 1 – Place Types and mapped as the corresponding natural heritage feature (e.g., as Significant Woodlands ~~and or~~ Woodlands) on Map 5 – Natural Heritage.

Unevaluated Vegetation Patches or other vegetation patches greater than 0.5 ha (identified through subwatershed plans or other environmental studies) should be delineated and assessed for significance as outlined in **Section 3**.

It is important to note that mapping in **The London Plan** is dynamic in nature, and that not all potential vegetation patches ~~greater than 0.5 ha or those identified for protection~~ may be included in the mapping at a given time. It is the responsibility of the proponent to ~~determine potential~~ identify and assess vegetation patches for evaluation as part of the planning process ~~and development application in accordance with the guidance in The London Plan and this document.~~

4.8 Boundary Delineation Guidelines

Figure 4.1: Legend for all Boundary Delineation Guideline Graphics



The following guidelines outline the process for determining ~~the natural~~ feature boundaries ~~ies.y-of-a~~ ~~vegetation patch~~.

GUIDELINE 1: Species at Risk (SAR) habitat and Significant Wildlife Habitat (SWH) **must be included within the feature boundary.**

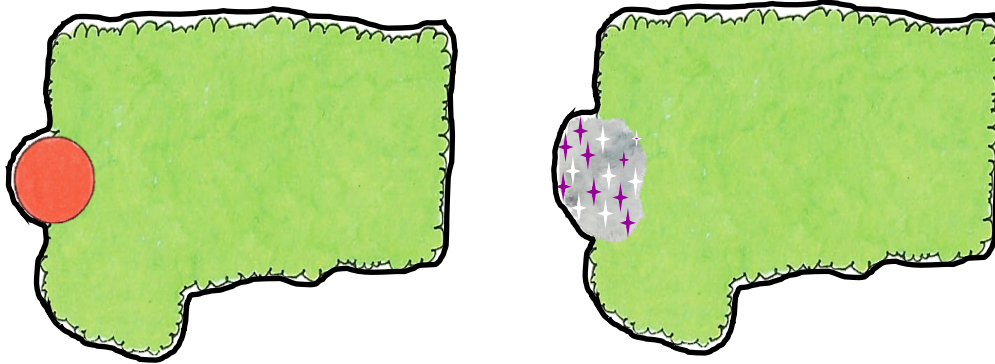


Figure 4.2: Guideline 1 Illustration

Conditions:

Confirmed SAR habitat (including associated habitat zones) is to be included within the feature boundary include habitat for Federal and Provincial SAR protected under the federal *Species at Risk Act* and provincial *Endangered Species Act*. For the City of London's policies related to SAR habitat, refer to **The London Plan – Policies 1325-1327**.

In addition to SAR habitat, all confirmed SWH is to be included as determined through ELC (Lee *et al.* 1998) and further assessed using the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF, 2015a) and the *Significant Wildlife Habitat Technical Guide* (MNRF, 2000b) and, for the City of London's policies related to SWH, refer to **The London Plan – Policies 1352-1355**.

Rationale:

SAR habitat and SWH are essential for maintaining critical life processes, biodiversity, and aiding in the protection and recovery of rare species/communities and SAR (MNRF, 2010b). Further, underrepresented or rare species and communities (i.e., SAR, SWH) are under pressure from habitat fragmentation and overall loss of habitat, therefore one important goal for ecological function when establishing/defining natural heritage features is to provide habitat to these rare species (MNRF, 2010b).

In regards to SAR habitat, a habitat zone is a feature or area used regularly for a key lifecycle requirement for a species or habitat that requires special protection. The vegetation in the habitat zone doesn't necessarily need to be of natural origins and could contain culturally influenced communities. The critical habitat of a plant species may extend to areas in the immediate vicinity of population that have similar soil, moisture, exposure, and community conditions.

Examples of habitat zones that may require special protection are:

- Old fields, hedgerows, and woodland edges that may be important habitat for American badger (*Taxidea taxus jacksoni*) maternal and other den sites, as well as migration corridors for the dispersal of young (Ontario American Badger Recovery Team, 2010); and,
- Sandy shorelines that provide critical nesting habitat for the Eastern Spiny Soft-shell Turtle (*Apalone spinifera*) often occurring along the Thames River.

GUIDELINE 2: Swamps, Marshes, Thicket Swamps, or other Untreed Wetland communities and their associated Critical Function Zones (CFZs) contiguous with a patch **must be included within the feature boundary** (inset d of **Figure 4.3**).

To be included in the patch boundary, the wetland communities must meet at least one of the following criteria:

- a) The wetland strengthens a linkage between natural areas by filling in a bay or connecting two or more patches or is contiguous with the patch;
- b) The wetland is located above the top-of-slope of stream corridor or ravine;
- c) The wetland connects a patch to a permanent, natural watercourse; or,
- d) The wetland CFZ is included within the feature boundary.

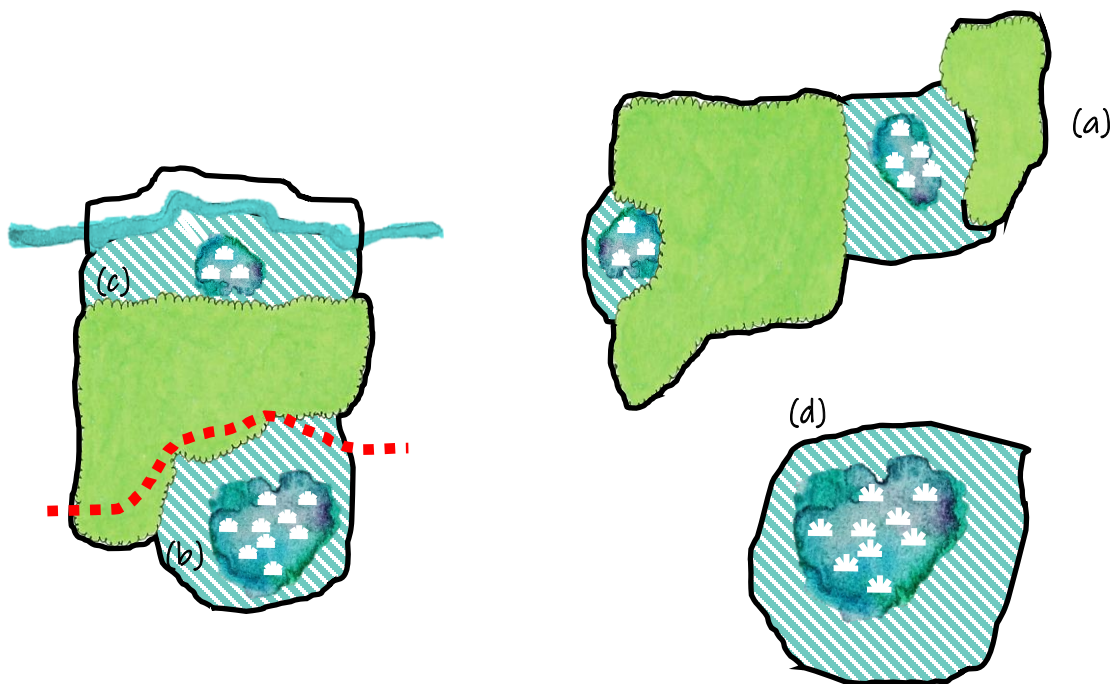


Figure 4.3: Guideline 2 Illustration

Conditions:

Although all wetlands are protected under the City of London’s policies related to PSWs, Wetlands, and Unevaluated Wetlands (*The London Plan* – Policies 1330-1336), marshes, thicket swamps, and other untreed wetlands (along with their associated CFZs) that meet the criteria above must be included within the overall vegetation patch boundary. All other wetlands, including PSWs, Wetlands, and Unevaluated Wetlands and their associated CFZs that do not meet the above criteria are to be delineated as their own vegetation patch. CFZs include non-wetland areas within which biophysical functions or attributes directly related to the wetland occur (Environment Canada, 2013). Reference to Environment Canada (2013) can be made for more information on determining specific CFZs, however review of the most up-to-date documents on CFZs should be conducted.

Rationale:

Wetlands provide important habitat for plants, fish and wildlife. Wetlands also influence the quality and temperature of water flowing through them and some wetlands provide storage capacity to offset peak flows associated with storm events.

CFZs are natural areas that surround wetlands and can provide a suite of benefits to wetland function and to the species dependent on the wetland. In many cases, these natural areas, although they extend beyond the limits of the wetland, are inherently part of the wetland ecosystem and provide habitat for critical life processes to wetland species (Environment Canada, 2013).

GUIDELINE 3: Projections of naturalized vegetation **less than thirty meters (30 m) wide that extend from the main body of the patch:**

- a) **must** be included within the boundary if the projection includes a wooded ravine or valley with untreed or successional habitat below the top-of-slope; and
- b) **must** be included within the boundary if the projection provides linkage within the landscape.

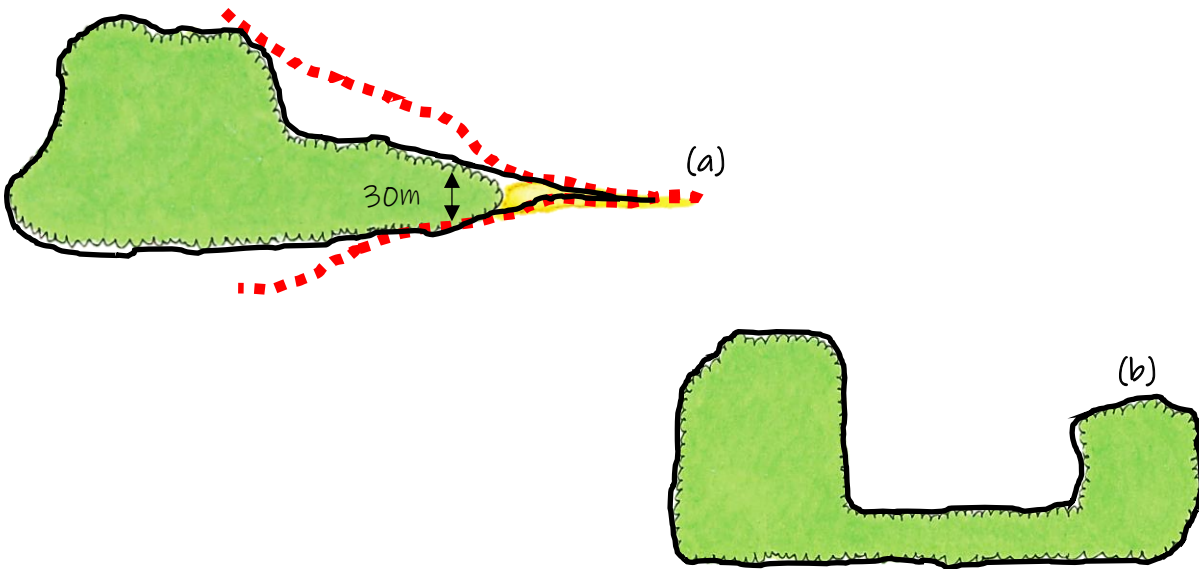


Figure 4.4: Guideline 3 Illustration

Rationale:

Ravine, valley, and upland corridors are important components of the NHS because they contain natural habitat, provide linkages, increase species richness and diversity, and facilitate movement and dispersion. Landscape connectivity (e.g., through linkages) is important in the maintenance of ecological function of patches and reduces landscape fragmentation that lead to smaller, more isolated features (MNRF, 2010b). For example, linkages can provide a dispersal route for species (i.e., connectivity) to complete different aspects of their life cycles, such as allowing reptiles and amphibians to travel between breeding and overwintering habitat (MNRF, 2010b).

GUIDELINE 4: All Watercourses **must be included within the feature boundary**.

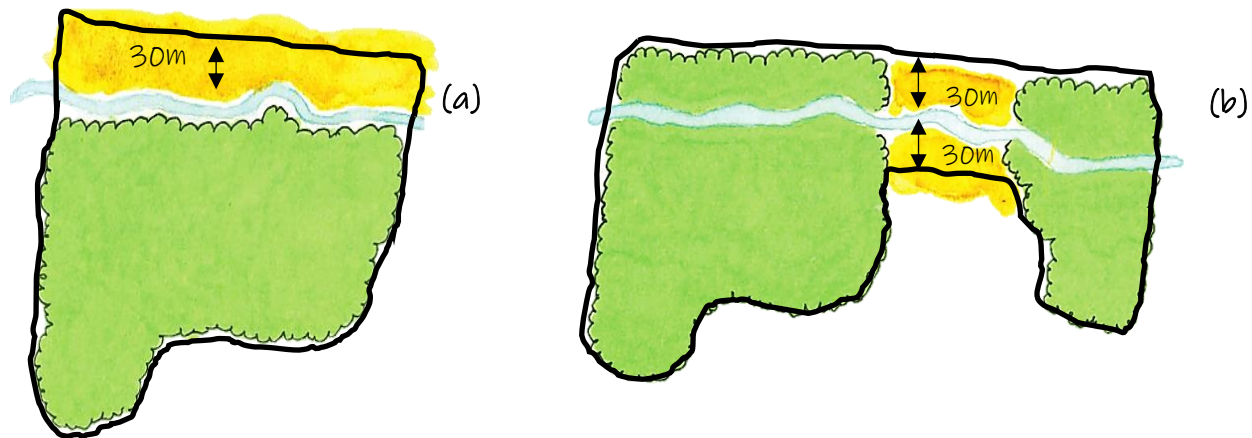


Figure 4.5: Guideline 4 Illustration

Figure 4.5 is an example of the inclusion of watercourses for defining vegetation feature boundaries, where a) depicts a watercourse at the edge of a vegetation patch and b) depicts a watercourse connecting two (2) patches.

Conditions:

The edges of the watercourse **must** be measured **from the high-water mark** and will include the following minimum corridor widths:

- 15 m on each side of small watercourses (valleylands);
- 30 m on each side of significant watercourses with a warm- or cool-water thermal regime (**The London Plan** – Policy 1350);
- 50 m on each side of watercourses with a cold-water thermal regimestreams;; or,
- 100 m on the side(s) of large rivers (Thames River, Medway Creek, Stoney Creek, Dingman Creek) where the patch occurs (City of London, 2011).

The high-water mark is defined as the average **highest** level that a watercourse or waterbody rises to and remains at long enough to alter the riparian vegetation (DFO, 2007; DFO, 2019). In flowing watercourses, this is often referred to as the “active channel” or “bank-full level”, usually reflecting the 1:2 year flood level (DFO, 2007).

Rationale:

Watercourses act as important habitat providing wildlife resources and functions as well as contributing substantially to connectivity within and between significant natural areas. Riparian areas adjacent to watercourses are important for protecting the water quality and ecological health of aquatic habitats. First order, headwater streams are recognized as indicators of hydrological processes. These hydrologic processes are important for ecological function and should be protected within NHS (MNRF, 2010b).

A watercourse is generally defined according to several federal and provincial Acts and Regulations and typically consists of a distinct (somewhat to well-defined) channel in which water naturally flows at some time of the year [i.e., permanent, intermittent, or ephemeral flow as defined by MNRF’s Stream Permanency Handbook for South-Central Ontario (MNRF 2013)]. This includes anthropogenically created / maintained / altered features as well as natural features.

GUIDELINE 5: Satellite woodlands that are less than 2 ha and are located within 100 m of another woodland patch:

- a) **must** be included within the boundary if the satellite contains Species at Risk or Significant Wildlife Habitat; and,
- b) **must** be included within the boundary if they contribute to biological diversity and ecological function of the other patch and / or act as stepping stone linkages within the greater landscape

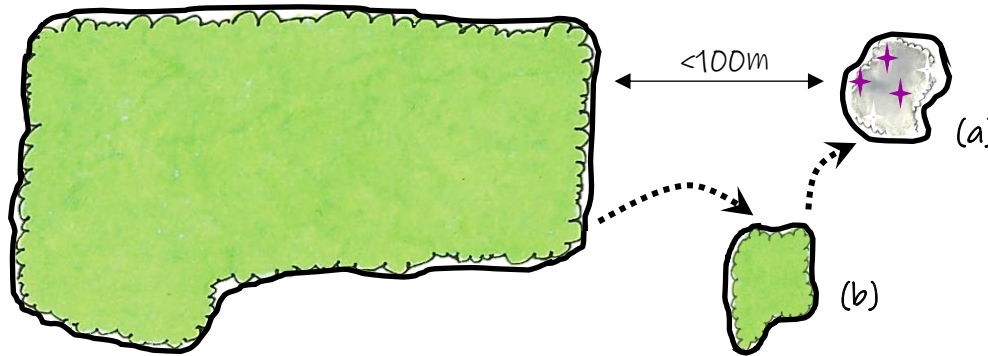


Figure 4.6: Guideline 5 Illustration

Conditions:

Contribution to biological diversity, ecological function, and connectivity may include, but is not limited to the following (MNRF 2010b):

- the satellite supports native tree cover;
- the satellite is located adjacent to or contains a wetland;
- the satellite is located between two (2) larger patches that are within 250 metres of each other, where the land between the patches is absent of permanent barrier;
- the satellite meets the habitat needs of one or more species that are not met by the larger patch;
- the satellite contains a natural vegetation community type that is not already represented in the larger patch;
- the satellite supports or is dependent upon a surface- or ground-water connection that maintains fish or aquatic habitat in either patch; and,
- the satellite provides a temporary refuge that facilitates movement between habitats.

Rationale:

There is limited evidence to support the principle that large contiguous patches contain more biodiversity than multiple small patches of the same total area (Fahrig, 2019). Woodlands ≥ 4 ha are important in Middlesex County, and have the potential to support habitat for disturbance sensitive species (UTRCA, 2014; MNRF, 2010b). Smaller woodlands have the potential to deliver multiple ecological services at higher performance levels per unit area than larger woodlands in agricultural landscapes (Valdés *et al.*, 2020). Further, multiple small, connected patches can support higher species richness, are more likely to contain wide-ranging taxa (e.g. predators), and have fewer extinctions compared to single large patches (Hammill & Clements 2020).

The presence of native conifer cover is considered important for providing wildlife shelter. Further, the importance of a woodland increases if it is located adjacent to a wetland or it contains a wetland, as

wetlands can increase vegetation diversity, provide important wildlife habitat features, and contribute to hydrological functions (Hilditch, 1993; Riley and Mohr, 1994).

Small woodlands that are in close proximity to one another or interspersed amongst larger habitat patches, may have value for area-sensitive birds and species with low mobility (Riley & Mohr 1994). Further, small woodlands located between natural heritage features or areas can act as stepping stones for movement of species, thus functioning as a linkage (MNRF, 2010b)

Clusters of patches that collectively meet several of the habitat needs of one or more species are generally more valuable than clusters of patches that meet fewer habitat needs (MNRF, 2010b). Natural areas that consist of several patches containing a diversity of native vegetation community types can sometimes provide better representation of the range of habitats than a single larger habitat patch (MNRF, 2010b; Fahrig, 2020).

GUIDELINE 6: Cultural meadows **must** be included if they meet one (1) of the following criteria:

- a) a portion of meadow habitat surrounds a feature on one or more sides, and provides improved ecological function to the patch by its inclusion;
- b) strengthen internal linkages in the patch by filling in "bays";
- c) connect a patch to a watercourse; or
- d) connect two or more patches (inset d of **Figure 4.7**); or,
- e) are below the top-of-stable-slope in a stream corridor or ravine.

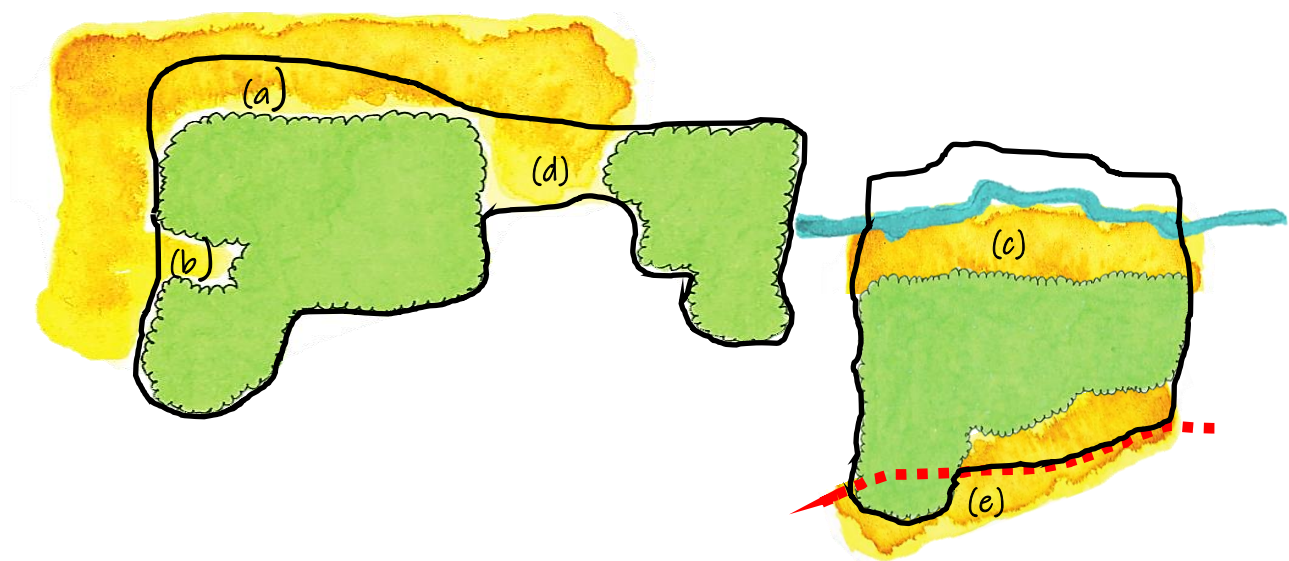


Figure 4.7: Guideline 6 Illustration

Condition:

A cultural habitat meeting any one of the above conditions is included in the vegetation patch boundary. However, it is not intended that the cultural habitat will occupy a large proportion of the total area of the patch being delineated.

Rationale:

Cultural habitats may act as significant supporting habitat to the patch, where the loss of such communities would result in loss of ecological integrity of the entire patch boundary. The inclusion of

cultural habitats may increase the biological diversity of the area if the other similar cultural habitat is not already present.

Cultural habitats may provide increased community and species diversity, important breeding and foraging wildlife habitat, landscape connections between naturalized areas, habitat for rare flora and fauna, and / or reduce negative effects from surrounding land-use. Cultural habitat adjacent to woodlands also has potential for rehabilitation and may contribute to a net environmental benefit in ecosystem health. Although cultural habitats are not pristine or unaffected by human activity, they have the potential to contribute natural values. This contribution is especially prevalent in agriculturally dominated landscapes, which are common southern Ontario (Geomatics International, 1995; Milne and Bennet, 2007).

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

GUIDELINE 7: Plantations contiguous with patches of natural vegetation **must** be included in the feature boundary if they meet one (1) of the following criteria:

- a) was originally established for the purposes of forest rehabilitation or has been managed towards a natural forest or is developing/has developed characteristics of a natural forest, such as natural regeneration of native species.
- b) strengthens internal linkages or reduces edge to area ratios by filling in bays;
- c) connects a patch to a permanent watercourse;
- d) connects two or more patches; or,
- e) is below the top-of-slope in a stream corridor or ravine.

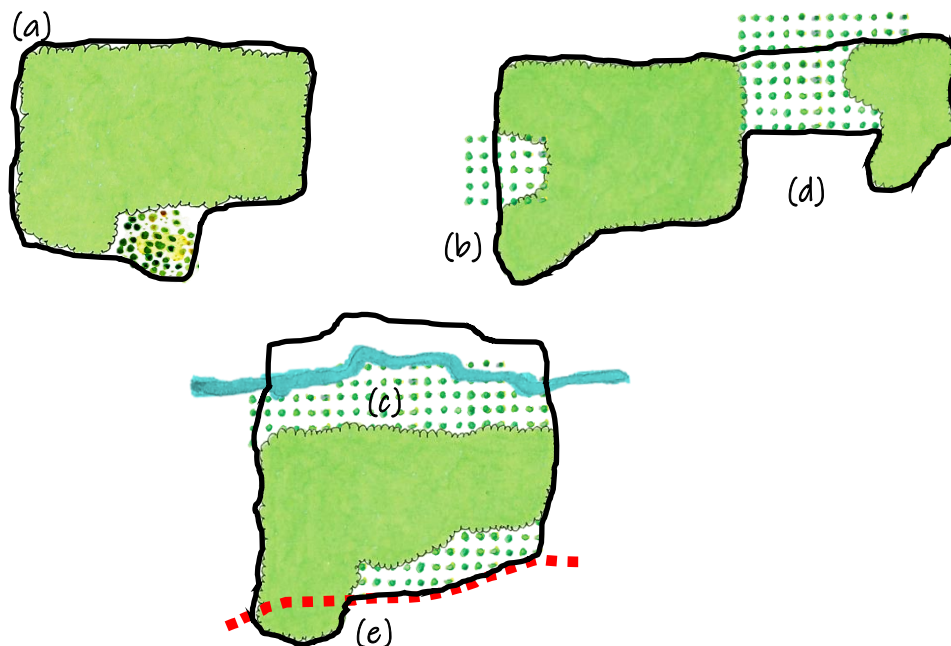


Figure 4.8: Guideline 7 Illustration

Example of the inclusion of plantations for defining feature boundaries where a) depicts a plantation providing protection for adverse effects, b) depicts a plantation filling in a 'bay', c) depicts a plantation connecting a vegetation patch to a watercourse, d) depicts a plantation connecting two (2) patches, and e) depicts a plantation below the top-of-slope of a stream corridor/ravine.

Rationale:

Cultural plantation communities may provide significant wildlife or supporting habitat for important wildlife processes (e.g., butterfly stopover areas, raptor nesting areas, etc.; MNRF, 2015a). Plantations form connections between naturalized areas, provide wildlife habitat, stabilize soils, and have the potential for regeneration to natural habitats.

GUIDELINE 8: Existing land uses within or adjacent to a patch are subject to the following boundary considerations:

- a) Existing heavily managed or manicured features that are surrounded on at least three sides by a patch are included in the feature boundary if they are less than one hectare (1 ha) in total area (**Figure 4.9**). Such features include, but are not limited to agricultural croplands, active pasture, golf courses, lawns, ornamental treed lots, gardens, nurseries, orchards, and Christmas tree plantations. Subsequent abandonment or potential for rehabilitation of patches larger than one hectare (1 ha) may qualify such areas for inclusion in the patch; and,
- b) Existing residential building envelopes and institutional building envelopes surrounded on at least three sides by a patch are not affected by the protective designation. Building envelopes and access routes of existing structures within the patch must be determined on a site-specific basis.

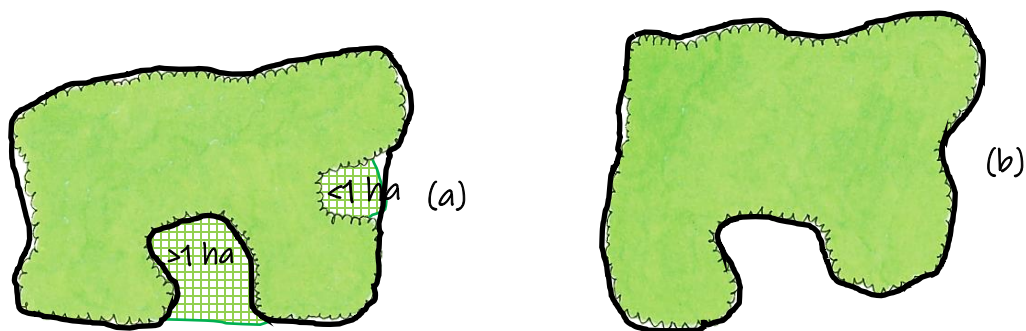


Figure 4.9: Guideline 8 Illustration

Rationale:

Existing heavily managed or manicured features (e.g., croplands, pastures, orchards, etc.) can provide a large number of ecological and environmental services. These services include providing wildlife habitat, carbon sequestration and climate change mitigation, protection from erosion, stormwater catchment, and protection from disturbance (Troy and Bagstad, 2009; FAO, 2013).

5. Determining Ecological Buffers

Ecological buffers are one of the primary planning tools that must generally be implemented to help ensure the protection of natural heritage features and their functions in accordance with **The London Plan** (see Environmental Policies 1412_to 1416_). The following section provides guidance for: i) the determination of suitable site-specific buffer widths and ii) the implementation and management of site-specific buffer restoration and / or enhancement treatments.

This section defines a buffer (**Section 5.1**), outlines the approach to be taken in the City related to buffers (**Section 5.2**), and describes the process to be followed for buffer determination (**Section 5.3**) that must be followed in order for an EIS to be accepted by the City of London.

This process is best applied by professional Ecologists who have experience with, and an understanding of, the many interrelationships of the various natural heritage features and areas, and their ecological functions, that may be present and that are potentially affected by a development proposal.

5.1 Definition of a Buffer

Buffers are strips of land kept in a vegetated state that provide a physical separation between development and a protected natural heritage feature (MNR, 2010b). The width of a buffer is to be determined based on the type of Natural Heritage Feature and its functions as well as the potential impacts resulting from the proposed adjacent development. Buffers originate at the boundary of a Natural Heritage Feature and extend outwards to the limits of development (MNR, 2010b; Carolinian Canada, 2000). In the case of wetlands, as described in **Section 4**, Critical Function Zones (CFZs) are included in the overall feature boundary. Therefore, for wetlands, the buffer is to originate at the external boundary of the CFZ. Buffers shall not be included within the limits of development, or within the boundary of the feature. Ecological buffers are not intended to contribute to feature-based compensation goals, should they be required. Buffers should not be treated as extensions of the natural feature to allow for management practices should they be required (MNR, 2010a).

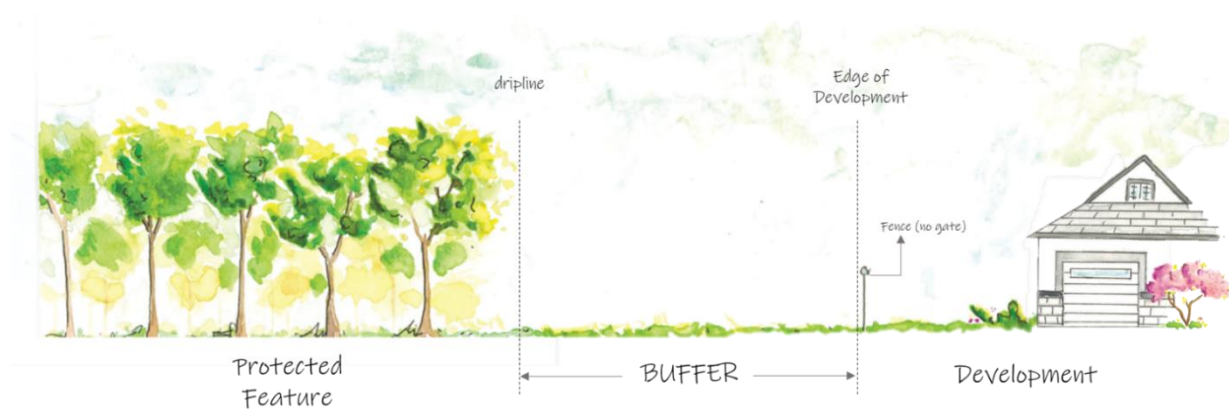


Figure 5.1: Illustration of a buffer implemented for the protection of a Natural Heritage Feature adjacent to a development.

Note that a setback is different from a buffer, although in some cases the natural feature buffer and setback may overlap in whole or in part. A natural feature setback is intended to account for physical constraints based on geotechnical assessments, identified hazards (Carolinian Canada, 2000), or other

physical constraints such as those related to flooding. For example, a property must be setback a certain distance from the stable top of slope for safety purposes and property protection. In cases where both physical setbacks and ecological buffers are required, the greater of the two will establish the development limit line.

Adjacent lands are also not synonymous with buffers, although buffers are often contained within the adjacent lands to natural heritage features and areas. As stated in the *Natural Heritage Reference Manual* (MNRF 2010b), “*In contrast to adjacent lands, which are usually established before development is proposed (e.g., through official plan and or zoning by-law provisions), identified buffers should be determined once the nature of the development is known and the extent of potential impacts can be determined*”.

5.2 Approach

The process of determining a site-specific buffer width requires the consideration of information about the sensitivities and functions of the natural heritage feature and area(s) being considered and the nature and scope of the proposed adjacent land uses. The science of buffer efficacy is ever evolving. Since the science is constantly changing, the process outlined below is intended to allow for flexibility and the inclusion of new scientific information as it becomes available.

In general, the precautionary principle is to be used when it comes to the protection of features, functions, and species given that impacts may be documented decades after a development has been completed and *in situ* buffer efficacy is not yet well studied. However, in certain cases, the City and the Proponent, in consultation with any other applicable agencies, may agree to a buffer width less than that which is required as determined through the process outlined in **Section 5.3**.

Other techniques, including those outlined in **The London Plan** Policy 1415_, may be required in addition to the application of buffers to limit the impacts anticipated with proposed development.

At the City’s discretion, in consultation with any other applicable agencies, pathways or trails may be permitted within the buffer ~~provided that the buffer is of sufficient size (i.e., meeting the minimum requirements), remains naturalized outside of the pathway~~ in accordance with the guidance in Section 5.4, and is supported by the recommendations of the approved EIS.

This approach is based on policies and guidance provided in **The London Plan** and the provincial *Natural Heritage Reference Manual* (MNRF, 2010b), with consideration for the policies of the Oak Ridges Moraine Conservation Plan (MMAH, 2017b) and Greenbelt Plan (MMAH, 2017a).

5.3 Buffer Determination Process

Table 5-1 below outlines the general step-by-step process to determine a site-specific buffer width for the protection of Natural Heritage Feature(s) within the City of London. Although ultimate buffer widths can only be confirmed at the site-specific EIS stage, where possible, preliminary buffers should be identified at the broader Subwatershed Study or Secondary Plan stage to provide an early and realistic determination of lands that may be suitable for development and so that opportunities for mitigation using buffers is available during the design of draft plans (MNRF, 2010b).

The following process has been developed primarily for application at the site-specific stage through an EIS, but many of the same steps and considerations could be applied at the broader Subwatershed Study or Secondary Plan stage with the understanding that refinements would need to be considered in the context of the EIS once the details of the proposed development are known.

5.3.1 Step 1 – Determine feature to be protected, delineate boundaries and determine potential impacts

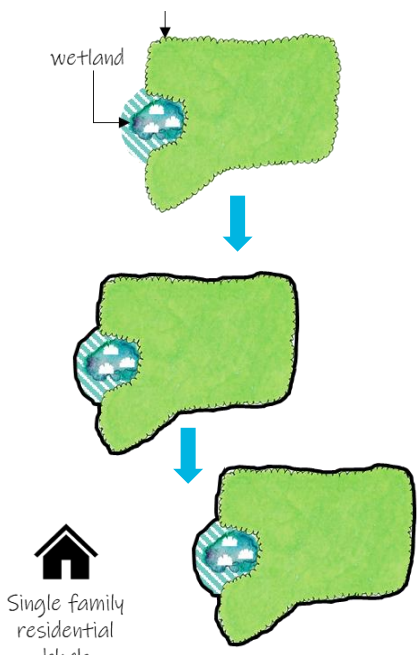
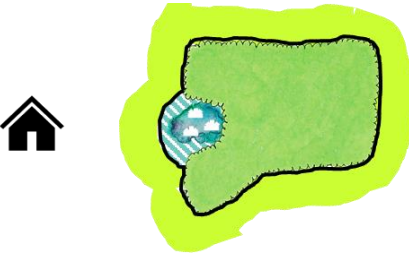
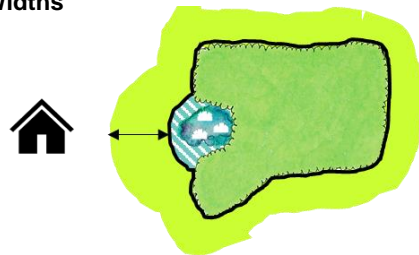
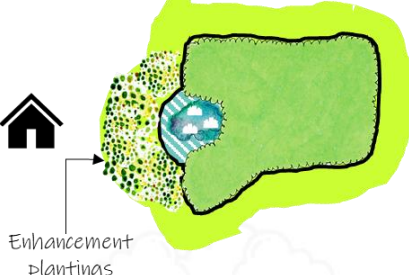
5.3.1.1 *What is being protected and what are their boundaries?*

Gaining an understanding of the protected Natural Heritage Feature(s) and its function(s) is the first step in the overall process of determining a site-specific buffer width. It is the responsibility of the professional undertaking the buffer width determination to complete a comprehensive background review and the appropriate field studies such that the various habitats, and the species that occupy those habitats, are well understood.

It should be noted that multi-disciplinary investigations may be required to understand the features, their functions and the interactions with different components of the environment. These may include, but are not limited to, ecological surveys (vegetation surveys, wetland evaluations, breeding bird surveys, amphibian call surveys, reptile surveys, bat habitat surveys, SWH surveys, etc.), hydrological studies, hydrogeological studies, geotechnical investigations, etc.

Direction related to boundary delineation and evaluation of the natural heritage features and areas that are part of the City's NHS is provided in **The London Plan** Environmental Policies and the supporting guidance as described in **Sections 3** and **4** of these EMGs.

Table 5-1: Site-specific Buffer Width Determination Process

<p>Step 1: Determine the feature to be protected, delineate feature boundaries and determine the potential impacts</p> <p>a) Collect the necessary information from the EIS and other associated studies to gain an understanding of the Natural Heritage Feature(s) and function(s) that are to be protected,</p> <p>b) delineate feature(s) boundaries, and</p> <p>c) determine the potential impacts of the proposed site alteration or development..</p>	 <p>The diagram illustrates the process of identifying a natural heritage feature. It starts with a green area representing a wetland. A blue hatched area within it is labeled 'wetland'. A blue arrow points down to a second stage where the wetland boundary is more clearly defined. A second blue arrow points down to a third stage where a house icon is placed to the left of the wetland, labeled 'Single family residential block'.</p>	<p>Example: Studies determined the presence of a Significant Woodland with corresponding wetland (including Critical Function Zone) per Section 2 and 3. Boundaries defined per Section 4. Proposed development is a single family residential subdivision consisting of twenty lots located on the west side of the feature.</p>
<p>Step 2: Apply the Minimum Buffer Widths</p> <p>Apply the minimum widths for the type(s) of natural heritage features that are being protected. Identified minimum buffer widths are to start at the delineated boundary of the natural heritage feature.</p>	 <p>The diagram shows the same house icon and wetland feature as in Step 1. A bright green shaded area now surrounds the wetland, representing the minimum buffer width. A house icon is also shown to the left of the buffer.</p>	<p>Minimum buffer widths applied per Table 5.2.</p>
<p>Step 3: Determination of Site-specific Buffer Widths</p> <p>Determine if a greater than minimum buffer width is required for the protection of the identified Natural Heritage Feature(s) and functions. Greater than minimum buffer widths are to start at the same point as Step 2, the delineated boundary of the Natural Heritage Feature(s).</p>	 <p>The diagram shows the same house icon and wetland feature. The bright green buffer area is now significantly larger than in Step 2, particularly around the wetland area. A double-headed arrow indicates the increased width. A house icon is also shown to the left.</p>	<p>Wetland found to support Species at Risk habitat, buffer width increased in the wetland area per Table 5.3.</p>
<p>Step 4: Buffer Enhancement</p> <p>Site-specific enhancement within the buffer area; the objective being to enhance the functioning of the buffer and to minimize overall potential negative effects to the protected feature(s) and functions.</p>	 <p>The diagram shows the same house icon and wetland feature. The bright green buffer area is now filled with small green dots representing plants. A label 'Enhancement plantings' points to these dots. A house icon is also shown to the left.</p>	<p>Enhancement plantings per Section 5.4 applied in area of Natural Feature that is most sensitive.</p>

5.3.1.2 What are the potential development-derived Impacts?

Understanding the proposed development and the elements that may affect a Natural Heritage Feature(s) and its function(s) is the responsibility of the professional undertaking the Buffer Determination Process. Buffer width(s) should be based on the functions and sensitivities of the feature(s) and the type(s) and scope of development adjacent to a Natural Heritage Feature and the potential development-derived effects that can reasonably be anticipated. For example, studies have demonstrated significant impacts to forests with adjacent residential development including those associated with off-trail use leading to compaction and erosion of soils, changes to hydrological regimes, loss and damage to vegetation, reductions in the regeneration success of trees and the spread of exotic plants and animals (McWilliams *et al.*, 2012).

When determining the potential effects of a proposed development, refer to **Section 2**.

5.3.2 Step 2 – Apply Minimum Buffer Widths

The ultimate width of the buffer will depend on the local conditions and sensitivities of the protected feature, the anticipated impacts associated with the change in adjacent land use, and the impacts that a buffer can, and cannot, reasonably be expected to mitigate (Beacon, 2012). As determined through a review of current policies and literature, **Table 5-2** outlines the required minimum buffer widths that are considered necessary to maintain the natural, physical and chemical characteristics of natural heritage features (MNRF, 2010b). Depending on the sensitivities of the natural heritage features(s) being considered and the type of development, these required minimum widths may not provide sufficient protection. Therefore, additional buffer width may be necessary to maintain the various biological components of natural heritage features (MNRF, 2010b), as outlined in **Section 5.3.3**.

Minimum buffers for the Habitat of Endangered and Threatened Species, as well as Significant Wildlife Habitat, will vary on a case-by-case basis as the minimum width will depend on a range of factors including the species identified and their lifecycle processes. Buffers should be determined on a case-by-case basis with consideration for the applicable provincial guidance and, in the case of Endangered and Threatened Species, in consultation with the [MECP the Province](#).

Table 5-2: Required Minimum Buffer Widths¹ for Protected Natural Heritage Components

Natural Heritage Component	Required Minimum <u>Width</u> ²
Coldwater and Cool -water Fish Habitat	30 metres ³
Warm-water Fish Habitat	15 metres ³
Provincially Significant Wetlands (PSW), Wetlands	30 metres
Wetlands less than 0.5 ha	less than 30 metres ⁴
Significant Woodlands	30 metres ⁴
Significant Woodlands less than 2 ha	less than 30 m
Woodlands	less than 10 metres ⁴
Woodlands less than 2 ha	less than 10 metres
Significant Valleylands and Valleylands	Required minimum for the component of the NHS
Environmentally Significant Areas (<u>ESAs</u>)	Required minimum for the component of the NHS
Upland Corridors and Meadows	5 metres

¹ The relevant science and applied technical literature used to support the identified minimums are cited throughout [Section 5](#).

² Buffers are to be measured from the feature boundary, as outlined in [Section 4](#).

³ Buffers are required on both sides of the watercourse.

⁴ ~~For unevaluated features a 30 m buffer is to be applied until it can be determined what the~~ [which NHS component it falls under](#). The City may accept a buffer less than the required minimums for [Wetlands less than 0.5 ha](#), [Significant Woodlands less than 2 ha](#), and [Woodlands where it is supported through an Environmental Impact Study that is accepted by the City in consultation with the other applicable agencies where appropriate](#).

Why do “Woodlands” have smaller minimum buffers than “Significant Woodlands” in the City of London?

The City of London is unique from most other municipalities in that in addition to having policies that protect all natural wooded areas considered significant from a natural heritage perspective, it also has policies to support the protection and integration of other wooded areas recognizing the contributions such features can make in helping the City build resilience to climate change.

- [Significant Woodlands are identified using a comprehensive suite of criteria focused on their ecological and natural heritage functions, and are protected in accordance with the policies *The London Plan* as described in Policy 1341 and \[Section 3.1\]\(#\) of these EMGs.](#)
- [“Woodlands”, as per *The London Plan* are described as:](#)
 - [“Smaller woodlands \[that\] may not meet the test for significance, but may be retained for their aesthetics and as a recreational amenity are highly connected to more dense portions of as part of a park” \(Policy 418 \).](#)

- “Woodlands that are not determined to be ecologically significant but are to be retained for public open space or park purposes, or woodlands to be retained at the property owner’s request as a private woodland” (Policy 1343).

These Woodland policies are intended to support the protection of wooded areas that are not considered significant from a natural heritage perspective but still provide environmental and social value to the community, and therefore are protected as opportunities arise through the planning process. As a consequence of this unique approach, Woodlands do not warrant the same level of protection with buffers as Significant Woodlands.

5.3.3 Step 3 – Determination of Site-Specific Buffer Widths

Minimum buffers as outlined in **Section 5.3.2** should generally be sufficient for the protection of identified natural heritage features and their associated functions. However, an EIS may recommend a buffer width different from less than the minimum in accordance with Table 5-2 or greater than the minimums in Table 5-2 based on the size of the feature, the sensitivity of the feature and the nature of the proposed adjacent development.

The buffers required for NHS components do not supercede or in any way supplant the need for other applicable setbacks related to natural hazards in accordance with the applicable provincial and Conservation Authority policies and regulations. In cases where buffers and natural hazard setbacks overlap, the more restrictive requirement shall apply to inform the development limit.

Some key site factors drawn from the current and applicable literature that should be considered in relation to potential increases from the required minimums are provided below, with some supplemental criteria and sources provided for consideration in Table 5-3.

- Site-specific drainage patterns and flows, with sheet flows towards a feature more readily intercepted / slowed by a vegetated buffer than channelled flows (e.g., Castelle and Johnson 2000; Sheldon *et al.*, 2005 as cited in Beacon 2012), with this factor being closely related to slope and soil type;
- Slope, with vegetated buffer effectiveness generally being reduced with increasing slope, particularly in excess of 15% (e.g., Schueler 1987, Norman 1998 as cited in Beacon 2012); and
- Soil type and related infiltration capacity, with soils with better drainage and more organic matter providing more effective infiltration.

Other factors that can help improve buffer effectiveness and mitigate the need for potential increases from the required minimums are provided below.

- Vegetative composition of buffers, with well-vegetated buffers that mimic the composition of the feature being protected expected to be the most effective (Beacon 2012); and,
- The presence of design features – such as a continuous fence, formal trails along the feature edge with some barriers, bioswales, berms – that effectively prevent encroachments into the protected feature (e.g., McWilliam *et al.*, 2011 as cited in Beacon 2012, Beacon 2014).

As the impacts of adjacent development become better understood and more research is conducted on the ecology of various features, buffer requirements may change. Therefore, current literature may also be consulted to review the impacts relevant to the feature under consideration (MNR, 2010b). Ideal sources include studies designed to determine the impacts of an anthropogenic activity on biological systems, and comprehensive reviews or meta-analyses related to natural resource management. Such studies can be located in peer-reviewed academic journals, statements and reports from reputable experts and / or expert bodies , standard textbooks or handbooks and reference guides. City of London Ecologist Planners may recommend appropriate sources.

Table 5-3: Criteria for the Determination of Variation from Required Minimum Buffer Widths

Criteria	Rationale	Literature
Landscape		
Connected within the Landscape	Greater than minimum buffer width required for natural heritage features that are well-connected within the overall landscape.	Lemieux <i>et al.</i> , 2021; Hilty <i>et al.</i> , 2020; Powney <i>et al.</i> , 2012
<p>Ecological connectivity is the unimpeded movement of species and the flow of natural processes that sustain life on Earth. While important in its own right to maintain species interactions and gene flows, connectivity conservation is also vital to facilitate species movement and adaptation in response to climate-induced ecological changes (Lemieux <i>et al.</i>, 2021; Hilty <i>et al.</i>, 2020). The more well-connected populations are, the greater the opportunity for dispersal, colonization and re-colonisation of habitat patches, reducing the risk of extinction and maintaining biological diversity in systems that have been fragmented (Powney <i>et al.</i>, 2012; Hilty <i>et al.</i>, 2020).</p> <p>Natural heritage features that are considered well-connected are features where there are vegetated or natural corridors (e.g. strips of natural vegetation, hedgerows, and watercourses). In these cases, document any hedgerows or strips of natural vegetation that are located within and outside the feature boundaries, as defined per Section 4. When documenting these features, include species composition, as well as overall canopy height and width.</p>		
Specialized Features and Functions		
Presence of Significant Wildlife Habitat	Greater than minimum buffer width may be required when Significant Wildlife Habitat in accordance with criteria schedules for Ecoregion 7e are present (MNRF, 2015a).	MNRF, 2015a; Environment Canada, 2013; MNRF, 2010b
<p>The presence of Significant Wildlife Habitat (SWH) indicates specific conditions that are enabling that type of habitat to be present and therefore, a higher degree of protection may be required. Consultation with the City of London is required.</p> <p>Buffers for the protection of SWH <u>must-should</u> be based on evidence and include reference to:</p> <ul style="list-style-type: none"> • Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNRF, 2015a) • COSEWIC Reports where applicable • COSSARO Reports where applicable • Environment Canada’s <i>How much Habitat is Enough?</i> (Environment Canada, 2013) • Significant Wildlife Habitat Mitigation Support Tool (MNRF, 2014b) • Academic journal articles, <u>where available</u> 		

Criteria	Rationale	Literature								
Presence of Species at Risk	Greater than minimum buffer width may be required when species considered Endangered or Threatened per the <i>Endangered Species Act</i> are present.	Environment Canada, 2013; various COSEWIC and COSSARO reports; MNRF, 2010b								
<p>The presence of an Endangered or Threatened species indicates specific conditions that are enabling that species to survive and therefore, a higher degree of protection may be required. If it is determined that a SAR is negatively affected by a proposed development, a permit under the <i>Endangered Species Act</i> may be required. In the case of any SAR, consultation with both the City of London as well as MECP-the Province is required.</p> <p>Buffers for the protection of Endangered and Threatened species must be based on evidence and include reference to:</p> <ul style="list-style-type: none"> • Ontario government's SAR database • COSEWIC Reports • COSSARO Reports • Environment Canada's "How much Habitat is Enough?" • Various independent academic journal articles <p>Note that any habitat or species information for Endangered and Threatened species is sensitive information and should not be identified in public documents (MNRF, 2010b).</p>										
Edge Conditions⁴Slope										
Slope/Overland Flow	Greater than minimum buffer width is required <u>should be considered</u> where <u>the overall feature</u> slope is greater than 5%, <u>particularly when the slope is towards a protected wetland or watercourse.</u>	Adamus 2007; Beacon 2012 ; Mitchell & Crook, 1996								
<p>Understanding the slope and direction of flow aids in predicting areas that may receive more water than others, help determine appropriate buffer plantings, as well as pre-construction conditions that need to remain the same post-construction. (Slope may be Measure-measured slope using a geo-referencing tool or handheld clinometer <u>or desktop analyses using current topographical information</u>).</p> <p>The following are <u>recommended</u> buffer widthss-requirements starting at the edge of a natural heritage feature where slope is:</p> <table border="0"> <tr> <td>5-15%</td> <td>30 m buffer</td> </tr> <tr> <td>16-30%</td> <td>50 m buffer</td> </tr> <tr> <td>31-45%</td> <td>70 m buffer</td> </tr> <tr> <td>>45%</td> <td>90 m buffer</td> </tr> </table>			5-15%	30 m buffer	16-30%	50 m buffer	31-45%	70 m buffer	>45%	90 m buffer
5-15%	30 m buffer									
16-30%	50 m buffer									
31-45%	70 m buffer									
>45%	90 m buffer									
Development Conditions										

⁴-An edge is the border, or transition zone between a natural heritage feature and adjacent land. The condition of an edge contributes to the resistance and resilience of a natural heritage feature, where ecological structure, function and connectivity contribute to a feature's ability to resist and recover from anthropogenic disturbance.

Criteria	Rationale	Literature
Development Type	Greater than minimum buffer width may be required as addressed and identified by the EIS based on specific development conditions (e.g., stressors).	McWilliam et al., 2012; Sawatzky and Fahrig, 2019; Environment Canada, 2013
Encroachment into natural features is a common impact associated with residential development. Buffers provide some area for minor encroachment without affecting actual features (MNR, 2010a). Stressors such as human disturbance (e.g., landscaping, dumping, urban wildlife, noise) shall be considered when establishing buffer width. <i>The following has been adapted from Environment Canada's Recommended Buffer table in How much Habitat is Enough.</i>		

5.3.4 Step 4 - Buffer Restoration and Enhancement

Once a site-specific buffer width is determined following Steps 1 through 3 as outlined in **Sections 5.3.1, 5.3.2 and 5.3.3**, the required buffer restoration and enhancement measures can be defined based on the characteristics of the adjacent natural heritage feature(s).

5.3.4.1 Buffer Enhancement Strategy

In most cases, the land set aside for the site-specific buffer will be comprised of farmed agricultural lands, mown grass or abandoned land with ruderal vegetation. In some redevelopment scenarios it may be open gravel or paved. It is the responsibility of the professional undertaking the buffer determination process to document and understand the edge conditions of an identified Natural Heritage Feature, including what is present within the adjacent lands so that appropriate enhancement strategies can be developed and implemented.

The intent of the strategy should be to reduce edge effects, improve buffer functions (e.g., through restoration or enhancement of site-appropriate native vegetation), and enhance habitat connectivity to build resilience of the Natural Heritage Feature(s) being protected.

When determining a buffer enhancement strategy, the following should be considered:

- Allocate a greater proportion of buffer enhancements in areas that reduce the total edge: area ratio of the feature (i.e., bays and projections);
- Allocate a greater proportion of buffer enhancements to areas which minimize climatic, structural or anticipated impact gradients (e.g., consider the orientation of the patch to flows in the landscape such as prevailing winds and sources of disturbance and encroachment such as urban cats, wind-dispersed seeds, noise, light and chemical pollution); and
- Allocate a greater proportion of buffer enhancements proximal to areas that contain sensitive feature(s) and functions.

Table 5-4 outlines buffer enhancement measures that shall be implemented to reduce of negative edge effects, protect features and their ecological functions, and improve habitat quality.

Table 5-4: Potential Buffer Enhancement Measures



Buffer Enhancement Measure

Native Plantings

Plantings of native tree, shrub, seed mixes and individual herbaceous species within a site-specific buffer width increases the structural gradient and reduces exposure to light, moisture and wind conditions. Natural heritage features with a dense multi-layered edge structure are more likely to maintain interior conditions after experiencing anthropogenic disturbance (Fry and Sarlöv-Herlin, 1997; Powney et al., 2012). Further, the physical separation of development from a natural feature reduces the penetration of light and noise into the natural feature. This will be further reduced if the buffer supports dense vegetation (MNRF, 2010b).

Increasing the structural gradient means having vegetation at various heights in various areas. This is especially important for treed natural heritage features with simple, open edges as well as features that are smaller in size with low connectivity. A multi-layered approach with respect to native plantings increases habitat suitability for resident species as well as landscape connectivity (Fry and Sarlöv-Herlin, 1997).

Vegetated buffers slow down surface runoff and absorb nutrients and chemicals used for lawn care, agriculture and road maintenance, thus reducing impacts on natural features. If runoff is not controlled, impacts can include soil erosion/sedimentation, destruction of vegetation, and flushing of nests or eggs of amphibians and waterfowl. This is particularly important to adjacent wetlands and aquatic features where nutrients can enrich the system and lead to an abundance of nuisance weeds and / or algae (MNRF, 2010b).

Recommended native plantings should:

- enhance diversity with consideration for species shifts resulting from warming temperatures due to climate change;
- enhance diversity with consideration for existing and future pest impacts to tree/ shrub species;
- add complexity to both horizontal and vertical structure;
- consider mosaics of different trees and shrub species;
- consider light and noise impacts by creating a physical barrier;
- use native pollinator friendly seed mixes to promote the establishment of pollinator and foraging habitat; and
- select species appropriate to the species composition of the natural heritage feature(s) being protected as well as the local soil composition and structure.

Management of Invasive Plants

Removal of invasive plants within the buffer area and within 10m of the edge of the identified Natural Heritage Feature will improve overall species diversity. Priority species that must be removed include: common buckthorn, glossy buckthorn, common reed (Phragmites), Japanese knotweed, dog strangling vine, and giant hogweed (City of London, 2017). Those on the watch list should also be removed in accordance with the City of London Invasive Plant Management Strategy.

Where appropriate, targeted invasive species management and restoration extending into the feature itself should also be considered.

Other Structural Enhancements

Creation and installation of site and feature-appropriate habitat enhancements such as: addition of woody debris piles, pits and mounds, bird and bat structures, reptile nesting areas and hibernacula. Note that

Buffer Enhancement Measure

dead wood is important habitat and food resources for many birds, insects and lower plant species where woody biomass should be retained.

5.4 Prohibited and Permitted Uses within a Buffer

Buffers are to be zoned ~~Buffers are generally to generally~~ be kept in a predominantly naturalized state ~~and with no permanent structures or parts of a development is to occur within a buffer.~~ However, **The London Plan** does support the inclusion of both pathways and trails in the NHS, including in buffers adjacent to NHS features and areas, as long as they support the protection of the natural features and their functions, and also broadly supports the incorporation of low impact development measures and green infrastructure.

1389 The following uses may be permitted in the Green Space Place Type: ... 2. Recreational uses associated with the passive enjoyment of natural features including pathways and trails provided that such uses are designed, constructed and managed to protect the natural heritage features and their ecological functions.

475 Promote innovation by encouraging green infrastructure, stormwater attenuation, re-use, and low-impact development.

In the City of London, “pathways” typically refers to paved multi-use trails intended to support community health, mobility, connectivity and the active transportation network. These pathways consist of a maximum of 3 m of paved width with 0.5 m to 1.0 m of mown grass for clearance on either side, for a maximum total width of 5 m. “Trails” in the City of London refers to a range of unpaved but still formal connections intended to support passive activities such as hiking and nature enjoyment. Trails range in widths but are typically narrower than pathways and surfaced with different materials such as crushed limestone or woodchips, and may incorporate sections of raised boardwalk or other structural works where needed to help protect sensitive ecological areas.

From a natural heritage planning perspective, formal pathways and trails in buffers to natural features can be considered to be tools to help manage access to public open spaces appropriately (e.g., —It is acknowledged that pathways and trails can be vectors for negative impacts (e.g., human disturbance near the feature, increasing opportunities for encroachment into the feature, inadvertent spread of invasive species) (e.g., Thompson 2015). However, there are many gaps in the science (e.g., Ballantyne and Pickering 2015) and the applied literature from urban areas (e.g., City of Toronto, 2013; TRCA 2019; IVUMC 2019) in increasingly recognizing that having formal trails and pathways that are carefully planned and designed can go a long way to balancing access and feature protection by:

- Providing access along and outside of the feature boundaries, thereby taking some of the pressure off of potential trails within the feature, and
- Where located in the interface between rear lots and buffers to features, providing a “clean break” and some intervening public space that is manicured before the naturalized portion of the buffer begins, thereby limiting the temptation of adjacent landowners to encroach (e.g., through dumping yard waste, extending their back yard by mowing, installing a tree fort or shed, etc.).

In addition, low-impact development measures are encouraged through several policies in **The London Plan** to support onsite stormwater management (e.g., water attenuation and quality control) and site drainage. Although not formalized in policy or green development standards, the City’s current practice is to allow low impact development measures within buffers that do not require regular maintenance or have engineered components to them, and that contribute to maintaining the feature-based or site-specific water balance. Permitted LID measures would not require regular disruptive maintenance or include control

structures (e.g., orifice controls, catchbasins). As such, vegetated swales and culverts may be accommodated within buffers.

It is with these directions in mind that the City is generally of the position that pathways, trails and “passive” low-impact development may be incorporated into ecological buffers, provided they are:

- designed, constructed and managed to support the natural heritage features and their ecological functions
- typically located in the outer half of the buffer (i.e., further away from the feature rather than closer)
- typically limited to a maximum of one third of the total buffer width (e.g., occupying no more than 5 m of a 15 m buffer) with the remaining buffer being naturalized, and
- are proposed within buffers that meet or exceed the minimums established in **Table 5-2**.

The Pathways, trails and / or passive low impact development measures may only be permitted where they are demonstrated to meet all the criteria above in an environmental study following exceptions that may be approved where buffers greater than the minimums have been recommended at the City’s discretion, and in consultation with the appropriate agencies, where needed: their regulated areas overlap with the features and buffers in question.

- Pedestrian pathways in the outer half of the buffer with the remaining buffer to be restored and naturalized; and
- Low impact development measures designed to support feature water balance (such as bioswales, infiltration trenches) and that are compatible with the buffer functions and the protection of the feature(s). SWM infrastructure construction or operational maintenance which may cause disturbance to the protected feature or buffer are not permitted within the buffer (e.g., ponds, channels, LIDs with underground pipes that may require flushing or replacement, control structures).

Notably, bBuffers are not to count towards feature-based compensation measures that may be required. Amenities-In addition, amenities such as gazebos and other installations that do not provide environmental enhancement could result in disturbance to and / or permanent encroachments into he naturalized portions of the buffer are not permitted in buffers. At the City’s discretion, and subject to the completion of an EIS wherein a site-specific buffer equal to, or greater than the minimum buffer (as described in **Table 5.2**) has been recommended, a pathway may be incorporated within the buffer provided the buffer remains, or is naturalized.

6. Ecological Replacement and Compensation

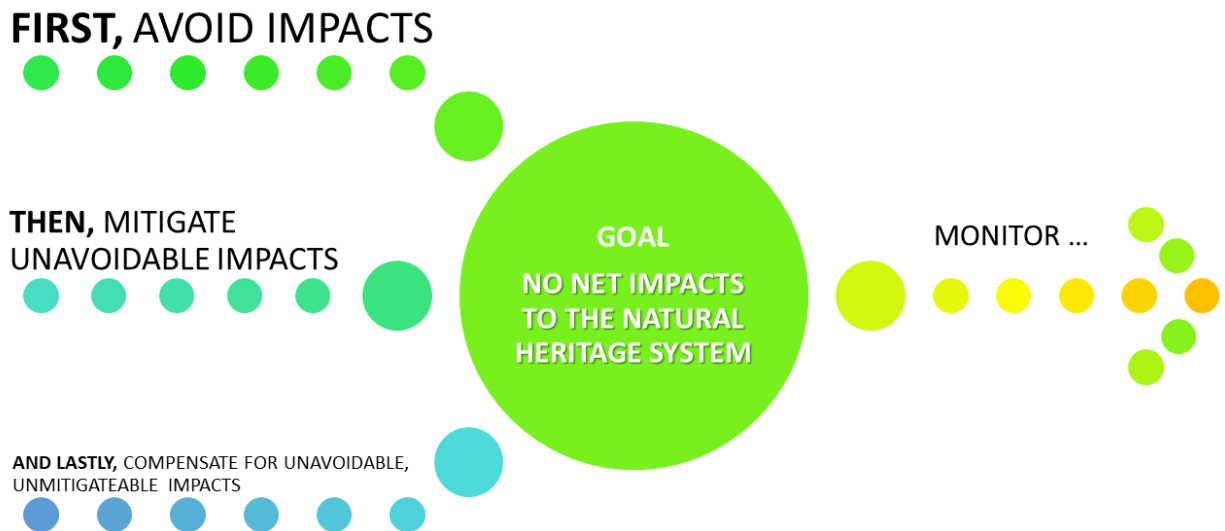
The City of London, like many urbanizing jurisdictions in southern Ontario, is expected to accommodate a certain amount of growth over the coming decades and beyond. While this presents opportunities for the City, it also means ever increasing pressures on the remaining natural heritage features and areas within its urban boundary.

The London Plan includes policies intended to help ensure what is significant and valued in London from a natural heritage perspective is sustained for the long term. The bulk of the Environmental Policies in **The London Plan** requires the outright protection of natural heritage features and areas confirmed as components of the NHS (as per **Section 3** and **Section 4**), including buffers as appropriate (as per **Section 5**) are intended to be protected in accordance with the legislative (*Planning Act*) and supporting policy (i.e., *Provincial Policy Statement* and **The London Plan**) tests. However, there are some limited cases and contexts in which removal of part, or all, of a natural heritage feature or area may be contemplated through the planning process. In these cases, replacement and / or compensation for that feature and / or area is required in the City of London with the intent of achieving no net loss or, preferably, a net environmental benefit in natural heritage area and / or ecological functions (as per **Section 2.6**). This section of the guidelines is provided to facilitate the implementation of such requirements, where applicable.

Negative impacts to natural heritage features and areas identified for protection can generally be avoided, minimized, and mitigated at the site specific scale with adequate technical knowledge, compromise and collaboration applied through the planning process. However, under some circumstances, residual damage to natural heritage features and their functions is unavoidable. After first exhausting all options for avoidance (as illustrated in **Figure 6.1**), followed by minimization and mitigation of impacts, portions of (or entire) natural heritage features may be approved for removal under the condition that ecological compensation take place to ensure that there are “no net negative impacts.”

This section has drawn on the *Guideline for Determining Ecosystem Compensation* developed by Toronto and Region Conservation Authority (TRCA, 2018), as well as other relevant and current technical and scientific sources. Although the EMGs are well established and have been applied in the City since 2007 with this version representing an update, this particular chapter is new and will be updated [during the biennial update process](#), in response to emerging science and / or findings of monitoring applicable to the City of London.

Figure 6.1: Illustration of the required approach whereby all options for avoiding and / or mitigating impacts must be explored with the City before compensation can be considered



6.1 Context and Process

This section provides the policy context, the high-level scientific and technical context and the process for developing and implementing an Ecological Replacement and Compensation Plan in the City of London.

6.1.1 Policy Context

From a natural heritage perspective, the fundamental policy “test” used as a basis for approving – or rejecting – a development proposal in Ontario is what is referred to as the “no negative impacts” test based on the language from the Provincial Policy Statement (MMAH, 2020) which states: “Development and site alteration shall not be permitted in [insert the feature(s) in question] unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions”. This language is carried forward into **The London Plan** for the various components of the NHS (i.e., Significant Woodlands, Significant Valleylands, SWH, Wetlands and Significant ANSIs (Policy 1391_), and further defined through these guidelines ~~as proposals that are demonstrated to be able to result in no net negative impacts~~ (as per **Section 2.6**).

Ecological replacement and compensation will be approved on a case by case basis subject to all applicable federal, provincial and municipal policies and in consultation with the local Conservation Authorities and Province in cases where they regulate all or part of the feature in question.

Replacement and compensation of natural heritage feature(s), where permitted by the City, shall be implemented on at least a one-for-one (1:1) land-area basis (as per **The London Plan** Policies 1334, 1342B, 1401 and 1402) and, at a minimum, aim to replace any ecological functions associated with the removed feature. The only exception to these requirements is for small wetlands (i.e., less than 0.5 ha) when less than 1:1 may be considered if the proposed compensation will provide a net gain or net environmental benefit to the NHS (as per **The London Plan** Policies 1334_1 and 1334_2).

These guidelines do not supersede and are to be implemented in conjunction with other applicable restoration, rehabilitation and / or replacement compensation policies and regulations including:

- **The London Plan** Management, Restoration and Rehabilitation Priorities Policies (1417 a through j)
- **The London Plan** tree replacement Policies (399_4, a through e, 401_13) and
- Overall Benefit Permits issued under the *Endangered Species Act* and / or the *Fisheries Act*.

There may be cases where a portion of the impact to a feature or function is compensated through one mechanism while the remaining impact is compensated through a different mechanism. For example, compensation required through the *Endangered Species Act* may address impacts to one particular species but may not compensate for all of the ecological structures and functions that will be lost. In such cases, determining the additional compensation required can be accomplished through these guidelines and in consultation with the City.

Furthermore, in cases where replacement and compensation has been approved in principle by the City but cannot be fully accommodated on the subject lands, **The London Plan** Management, Restoration and Rehabilitation Priorities Policies 1418 through 1420 may help guide the identification of alternative areas for such works.

6.1.2 Scientific and Technical Context

Ecological replacement and compensation are approaches that can be adopted to achieve no net loss and net environmental benefit through the creation, restoration and / or enhancement of natural heritage features and functions to compensate for those which will be removed or disturbed elsewhere (Brown *et al.*, 2013; Morrison-Saunders and Pope, 2013). No net loss and net environmental benefit are outcomes of compensation for unavoidable losses of biodiversity and / or habitat which are considered neutral or positive, respectively (Bull and Brownlie, 2017). There has been an important shift in replacement and compensation policies away from focussing on replacement and towards focussing on net environmental benefit to improve the short and long-term outcomes of biodiversity offsetting (Bull and Brownlie, 2017; Maron *et al.*, 2018) and, also, to incorporate something of a safety net for situations where the proposed replacement takes longer than anticipated to function as planned. Thus, the goal of replacement and compensation in City of London is to obtain a net environmental benefit, wherever feasible.

Ecological features and systems are highly complex, and although some of the simpler feature types that occur in London and southern Ontario can be replicated reasonably well, it requires a good technical understanding of the feature's key requirements, applied experience implementing the habitat creation, enhancement or restoration works, and a commitment to post-installation management and monitoring (also see **Section 6.6.2**). Consequently, although most ecological replacement and compensation projects have the objective of no net loss, in reality achieving no net loss of biodiversity and ecological functions can be very challenging (Bekessy *et al.*, 2010; Gibbons *et al.*, 2015; Simmonds *et al.*, 2019). Therefore, area compensation ratios of greater than 1:1 can be necessary to help ensure full replacement of ecological structure and functions (zu Ermgassen *et al.*, 2019).

In addition, replacement and compensation projects require long-term monitoring to assess progress towards no net loss or, preferably net environmental benefit (or net positive effects, as per **Section 2.6.6.7**), and may require additional adaptive management actions to achieve the established ecological objectives.

6.2 Approval Process

Natural Heritage Features and Areas for Consideration

Through the planning and development process, certain natural features and areas confirmed for inclusion within the City's NHS that are not protected by other provincial or federal regulations may be permitted to be impacted by the planning approval authority (in this case, the City of London), but only in cases where avoidance of negative impacts is not possible and options for mitigation of negative unavoidable impacts are limited or not feasible. In all cases, compensation is to be explored as a last resort, as illustrated in **Figure 6.1**, and will generally only be contemplated if the replacement or compensation is expected to fully replicate the extent and functions of the existing feature, or to provide an enhancement as compared to the existing feature.

As summarized in **Table 2-1**, the City is responsible for confirming the following natural heritage features and areas within its NHS, in consultation with the local Conservaiton Authority where the features are within their regulaterd areas:

- Wetlands (excluding Provincially Significant Wetlands)
- Environmentally Significant Areas
- Significant Woodlands and Woodlands
- Significant Valleylands and Valleylands
- Significant Wildlife Habitat (SWH)
- Environmentally Significant Areas (ESAs), and
- Upland Corridors.

The following guidance is intended to help implement ecological replacement and / or compensation, where the policies permit and where City agrees to consider it, for the above features.

Notably, these guidelines do **not** apply to or provide guidance related to replacement, compensation or rehabilitation of watercourses or Fish Habitat. Natural heritage features that are confirmed by other provincial or federal authorities (i.e., Fish Habitat, Habitat of Endangered Species and Threatened Species, Provincially Significant Wetland and Areas of Natural and Scientific Interest) may also be impacted in accordance with the applicable provincial or federal regulations, in part or in whole. In these cases, compensation or comparable activities may be permitted, with the specifics (not addressed in to be in conformance with the applicable provincial or federal regulations) and in consultation with the applicable regulatory authority.

Approval Process for Feature Replacement / Compensation

Ecological compensation may be permitted and approved as part of an EIS under the *Planning Act*, or through an EIS or comparable Environmental Study completed in support of the installation or expansion of public infrastructure through the *Environmental Assessment* process. In all cases, ecological compensation for NHS components under the City's jurisdiction will not be approved as the 'default' and will only be considered if unavoidable loss remains once the protection hierarchy has been exhausted (as illustrated in **Figure 6.1**).

Prior to the approval of an application containing proposed ecological replacement and / or compensation, the proponent shall demonstrate the following:

- Compliance with all applicable policies and legislation;
- That the proposed compensation achieves "no negative impacts" as outlined in the *Provincial Policy Statement*;
- That all efforts to avoid, minimize, and mitigate have been taken and why impacts are unavoidable;
- No negative impacts, no net loss, and / or net environmental benefit;

- That the proposed ecological compensation is within the same subwatershed in close proximity to the original feature (preferred), or in an area that will provide a net environmental benefit to the NHS to maximize connectivity and linkages; and,
- That a proposed Ecological Replacement and Compensation Plan is included within or as an Appendix to an EMP (as described in **Section 2.6, 6.3, and 7.2**).

In instances where ecosystem replacement or compensation has been approved in principle by City Staff (and the applicable Conservation Authority where the feature falls within their regulated areas), the proponent must retain a Consulting Ecologist, potentially with one or more experts from other related disciplines (e.g., Landscape Architect, Arborist, Registered Professional Forester, Engineer, Hydrogeologist, Geotechnical Consultant) to develop and oversee the implementation and monitoring of the Replacement and Compensation Plan.

It is strongly recommended that once the City agrees in principle to replacement and compensation, that the proponent develop and get in principle approval of a Concept Plan before moving forward with any detailed plans or designs.

No removals of part or all of a natural heritage feature and / or area may proceed prior to approval of the Replacement and Compensation Plan. This plan shall outline an approach and provide detailed plans that attempt to replicate, to the extent possible and without significant delay or lag time, the same ecosystem structure and associated level of ecosystem functions that are to be lost, in both the private land development process (under the *Planning Act*) and the public infrastructure process (under the *Environmental Assessment Act*) (TRCA, 2018).

Ecological Buffers and Feature Replacement / Compensation

Ecological buffers required for NHS components identified and requiring protection on the subject lands (as per **Section 5**) are not to be counted towards fulfilling any agreed-to replacement or compensation of other NHS features, or parts of features approved for removal.

In addition, replacement and compensation features will require buffers wherever the feature is to be abutting a non-natural land use (e.g, road, parking lot, residential yard, etc.). Buffer widths are to be determined based on the guidance provided in **Section 5** and in consultation with the City. Notably, buffer width determinations are to be based on the NHS component for the replacement (restored) area.

6.3 Guiding Principles for Ecological Compensation

The following are objectives of replacement and ecological compensation:

- To restore, replace, and preferably, enhance the ecological structure and function of the affected NHS by achieving no net loss of ecological features or functions, and where possible, achieve a net environmental benefit (i.e., a net gain of ecological features and / or functions);
- To implement compensation within the same subwatershed, and preferably in as close proximity to the original feature as possible;
- To locate replacement and compensation works within or adjacent to the NHS so that system connectivity is maintained and, preferably, enhanced;
- To complete compensation projects promptly so that ecosystem functions are re-established before losses occur, or as soon as possible after;
- To ensure transparency and accountability throughout the process of planning, implementing, monitoring and evaluating the effectiveness of the replacement and / or compensation; and,
- To incorporate adaptive management and climate resiliency into compensation based on the scientific literature and the results of effectiveness monitoring.,

Furthermore, ecological replacement and compensation shall be informed by current knowledge of the City ecosystems, applicable watershed studies, relevant studies by related disciplines (e.g., hydrogeological, hydrological and / or geotechnical) and any applicable Conservation Authority and be carried out in a transparent and timely manner.

6.4 Ecological Replacement and Compensation Plan

The Ecological Replacement and Compensation Plan will be reviewed by City staff and in consultation with applicable agencies where required. The Plan is to be aligned with the principles outlined in **Section 6.3** and include, but may not be limited to, the following:

- Rationale for ecological compensation (i.e., explanation of why residual impacts are unavoidable) and feasibility of the compensation;
- Description of the feature type, ecological structure and function(s) of the natural heritage feature (or portion thereof) to be removed or disturbed, including the size of area proposed for removal;
- Specific ecological objectives for the replacement and compensation, with specific targets where appropriate;
- Rationale for the proposed compensation ratio ($\geq 1:1$ land-area basis) and the area of proposed compensation;
- Description of the proposed compensation location (refer to **Section 2.6.6.8** and **6.3**);
- Construction schedule (e.g., phasing) and completion timeline;
- A Concept Plan, including the size and location of the replacement / compensation in relation to the NHS;
- Implementation plans and detailed design drawings, including any required grading plans (stamped by a Landscape Architect and / or Engineer), ESC plans to ensure protection of other NHS components, and planting plans;
- Plantings should specify native species appropriate for the site and feature type, with consideration for climate change resiliency (e.g., inclusion of a small proportion of species native to southern Ontario with ranges just south of London);
- Post-installation maintenance requirements, including provisions for supplemental invasive species removal and native plantings where appropriate, particularly for woodland features;
- A monitoring plan specific to the replacement / compensation that evaluates the extent to which the established objectives and targets are being met (refer to **Section 7.2.5.2**); and,
- Potential additional measures (e.g., adaptive management) to be undertaken by the proponent if the replacement / compensation objectives and targets are not being met.

6.5 Determining Appropriate Measures

The ability to successfully re-establish ecological structure and function is, in part, dependent on the type of natural heritage features and the specific type of vegetation community being restored. Some vegetation community types can be readily restored in a relatively short period of time (e.g., meadows), while others take longer (e.g., young woodlands) and still others are very difficult or impossible to replicate with the current knowledge and techniques (e.g., treed swamps, bogs).

For example, the functions of some vegetation community such as cultural meadows and some marshes can be established relatively quickly (e.g., within five years) as they are dominated by perennial grasses

and forbs which can reach maturity over the course of a single season and with the right soils and hydrology can support habitats for a range of species within a few years (Solymar, 2005; TRCA, 2018). The functions of other features such as woodlands take much longer to re-establish due to their long developmental periods (McLachlan and Bazely, 2003; MNRF, 2017a). As such, there can be a substantial time-lag between the removal of an established wooded feature and the time required for the compensated area to fully replace the ecological function and services provided by original feature (e.g., 20 to 50 years).

Feature compensation considerations should consider but not be limited to:

- Topography and drainage of the existing and proposed feature;
- Community type (based on ELC);
- Wildlife habitat types and structures to be replicated or added as enhancements;
- Soil type, structure and quality of the existing and proposed feature composition and processes;
- Surface water contributions and hydroperiod; and,
- Groundwater processes and interaction.

6.5.1 Wetlands

Once the replacement and compensation is approved in principle by the City, for wetlands, the quantification of the physical area of the proposed loss is to be based on the feature delineation using ELC, OWES (as described in **Section 3**) and Critical Function Zones (CFZs) and confirmed with the City and the appropriate Conservation Authority.

6.5.2 Significant Woodlands and Woodlands

Once the replacement and compensation is approved in principle by the City, for Significant Woodlands, the quantification of the physical area of the proposed loss is to be based on the feature delineation using ELC, OWES (as described in **Section 3**) and confirmed with the City and appropriate Conservation Authority.

For Woodlands, trees approved for removal through the planning process are to be replaced in accordance with the Forest City Policies in *the London Plan*.

6.5.3 Other Features

Where approved in principle by the City, other features within the City's jurisdiction may be considered for replacement compensation on a case by case basis at a minimum of 1:1 land-area basis, or greater as required through an approved EIS.

As with Wetlands and Significant Woodlands / Woodlands, a proposed replacement and compensation concept that is aligned with the policies, principles and guidelines above should be put forward to the City before work goes into developing detailed plans and designs.

Ultimately, an approved Ecological Replacement and Compensation Plan, will guide the site preparation, construction / creation and post-construction maintenance and monitoring of the feature.

6.6 Implementating Replacement and Compensation

It is important to outline a clear implementation plan for each feature to be compensated for to maximize the likelihood of replacement or enhancement of ecological structure, function and services within the City of London's NHS.

6.6.1 Site Selection

In all cases, provision of on-site compensation is the preferred option as it will be in proximity to where the loss is proposed and avoids the logistical complexities of finding suitable lands elsewhere in the City, preferably within the same subwatershed. However, in some cases where the subject lands cannot accommodate part or all of the replacement or compensation, proponents may explore directing compensation on alternate suitable lands. The details of such an arrangement will need to be confirmed and formalized in consultation with the City, however some additional guidance is provided here.

Ecological Considerations

Appropriate site selection for ecological replacement and compensation will increase the likelihood of achieving no net loss or, preferably where possible, a net environmental benefit (or net positive effect), specifically when considering landscape-scale conservation goals and improving ecological system connectivity (Koh *et al.*, 2014).

Potential naturalization sites have been identified by the City of London (as outlined in ***The London Plan***) which are generally good candidates for restoration, enhancement, and expansion of the NHS. Some potential naturalization sites are found on Map 5 – Natural Heritage in ***The London Plan***, however not all potential sites are mapped and thus, consultation with the City of London is recommended if other potential areas are identified. Further, not all sites are created equal and consultation with experts (e.g., Ecologists, Hydrogeologists, Engineers, etc.) is typically required to help identify appropriate locations for ecological compensation. Habitat creation and restoration is generally most successful when a project understands and works with the prevailing biophysical conditions on site (e.g., climate / exposure, topography, drainage / hydrology, soils).

The following should be considered in determining the site for ecological replacement and compensation within the City of London:

- Proposed sites must be able to support the size of the compensation, the associated buffer(s), as well as the function and services provided by the feature;
- Proposed sites for compensation of a feature should ideally be outside of the current NHS to ensure no net loss, and preferably net environmental benefit. Securing or purchasing land for compensation that is already identified as part of the NHS would result in a Net Loss to the overall area of the system.
- Compensation should be planned adjacent, or in close proximity, to the NHS to maximize connectivity and linkages. The guidelines outlined in **Section 3** and **4** can help inform site selection (e.g., bay areas, connectivity, ecological function) for compensation.
- The size, shape and structure of the proposed compensation should contribute to the City of London's goals for the NHS. In general, features that are circular or squarish will be preferred over long narrow extensions.
- Newly restored ecosystems must be buffered and should also be situated to help ensure they are protected from the effects of adjacent land uses.

Planning and Mangement Considerations

Compensation should generally be directed to lands that are already or will be transferred to a public or non-profit agency, or established as a conservation easement to ensure the long-term protection of ecological function and services being compensated.

If proposed sites for replacement, compensation or enhancement are not available within the Urban Growth Boundary, the City of London and any other applicable agencies may in exceptional cases, identify lands that are within the NHS but are in need of restoration or enhancement. However, this shall be the exception to the rule, given that this could result in a Net Loss in the amount of land within the NHS. To ensure no net loss and long term protection of the NHS, lands secured for replacement and compensation should be appropriately zoned and mapped for the NHS component.

6.6.2 Replicating Ecosystem Structure and Functions

Ecosystems are complex and dynamic systems. Regardless of the approach to determining the level of compensation required, attempts to replace lost ecosystem structure and functions will fall short in many instances, at least in the short term. Understanding this limitation, the Guideline establishes an approach that attempts to replicate, to the extent possible and without significant delay or time-lag, the same ecosystem structure, and associated level of ecosystem functions that are to be lost.

To ensure that ecosystem structure and function is replaced, or preferably improved, consultation on the compensation plan and design must be undertaken with the City of London and any other applicable agencies. For robust examples of compensation project design and estimated costs, refer to **Guideline for Determining Ecosystem Compensation, Appendix A** (TRCA, 2018). Construction activities related to the implementation of compensation projects should refer to **Section B – Part 5 – Tree Planting and Protection Guidelines (TPP)** and **Part 6 – Parks and Open Spaces** in the City of London's **Standard Contract Documents for Municipal Construction** (City of London, 2020).

6.7 ~~Cash-in-Lieu~~

In exceptional cases, when a feature approved for removal cannot be compensated for on-site and another parcel of land cannot be identified and secured off-site, at the City's discretion, proponents may provide funds to the City in lieu of undertaking the compensation project themselves. The amount of [cash-in-lieu funds](#) will be based on the cost to restore the impacted ecosystem's structure and the cost of replacing its land base.

~~6.7.1~~ 6.6.3 Plant Selection

Plant selection is critical in attempting to compensate for a loss of natural features. Thus, the rationale for plant selection, with consideration for the feature being replaced and the associated ecological functions and services, must be included in the Ecological Replacement and Compensation Plan.

Plant selection will require a case-by-case assessment and consultation with the City of London and other applicable agencies. Native species diversification must be considered with respect to climate change resilience, known and emerging pest impacts and overall longevity of ecological function.

CanPlant (Dougan and Associates, 2020) is a recommended resource that can be referenced to ensure plants selected meet the environmental conditions of the proposed site. Species selection considerations may include, but are not limited to: vegetation type (e.g., woody, herbaceous), species native to the Mixedwood Plains ecozone (preferably Ecoregion 7E), light and moisture requirements, soil requirements, tolerances (e.g., pH, drought, etc.), and natural habitat type.

6-86.7 Tracking Compensation

Ecological replacement and compensation monitoring is needed to determine whether compensation has achieved no net loss (of area and ecological functions) or net environmental benefit (i.e., enhancements as compared to original conditions) of the replicated feature and ecological function(s). For example, if a wetland has a core function of providing amphibian breeding habitat for at least two species, monitoring should assess amphibian breeding in the replicated / compensated feature to ensure no net loss (i.e., at least two species of amphibians still breeding), or net environmental benefit (more than two species of amphibians still breeding).

Further guidance related to monitoring requirements are outlined in **Section 7.2**. The results of monitoring must be provided to the City of London as outlined in **Section 7.2**, to allow for the implementation of adaptive management, and for any necessary adjustments to compensation strategies moving forward.

7. Environmental Monitoring

7.1 Policy and Context

A monitoring plan is one of the requirements of an Environmental Management Plan for any EIS developed for the City of London (as outlined in **The London Plan Policy 1436_4**) as part of the approval process for development or infrastructure projects adjacent to any components of the Natural Heritage System. The monitoring plan and subsequent implementation, is critical to tracking any loss of natural heritage features or their associated functions over time (MNRF, 2010b), and to providing a basis for adaptive management or mitigative measures in the area being monitored and / or informing forthcoming developments.

Consideration for monitoring early-on in the planning process is highly recommended to ensure appropriate resources are allocated for the completion and implementation of an approved monitoring plan. In some cases it may be appropriate to establish locations and use methods for existing conditions data collection that can be replicated and also serve as baseline data for monitoring, and potentially for during and post-construction monitoring as well.

Monitoring plans must be approved by the City of London prior to the start of construction and are determined on a case-by-case basis considering the potential impacts of development and infrastructure, as well as the natural heritage features and functions identified (and evaluated) within or adjacent to the proposed development or infrastructure site. The detailed pre-construction and construction monitoring plan is to be included in the approved Environmental Monitoring Plan (EMP) (as described in **Section 2.6.6.9**) developed from the Environmental Recommendations of an EIS.

Monitoring will enable planning authorities, through development and infrastructure agreements, to require subsequent changes to site conditions if the environmental effects are found to exceed predicted effects or targets, or if there are identifiable negative effects. Monitoring the environmental effects of development and infrastructure also provides well-documented, local examples of best management practices for particular types of development or infrastructure projects and particular types of features or functions. Monitoring may encompass a number of different measures as determined through the EIS process based on the potential impacts and mitigation measures that have been approved.

Common conditions and / or mitigation measures that may require monitoring include, but are not limited to:

- hydrogeological and hydrological processes (e.g., maintenance of pre-development groundwater levels and flows to watercourses, maintenance of water balance in wetlands)
- erosion and sediment control measures (e.g., spills and sediment releases)
- tree protection measures (e.g., machinery in identified tree protection zones)
- natural heritage feature encroachments (e.g., no grading or dumping within protected features)
- ecological functions of natural heritage features (e.g., continued presence of amphibian species and / or forest bird species documented pre-development)
- successful naturalization of buffers and,
- plant survivorship from feature-based restoration and / or compensation.

Monitoring should be tailored to the local conditions and anticipated impacts, focused on measures that can be documented consistently and include indicators or triggers for adaptive management where appropriate, and indicate if the proponent, the City or another agency will be responsible for undertaking the adaptive management if required. Measures and responsibilities will ultimately be determined in consultation with the City and any other responsible agencies.

The definition of clear goals and objectives, as well as robust information on the proposed mitigation measures and potential impacts, are critical in determining which aspects of the natural heritage features (and functions) require monitoring. This will aid in ensuring that the monitoring program will not only be effective, but efficient and streamlined (e.g., targeted monitoring).

7.2 Environmental Management Plan (EMP) Requirements

As discussed in **Section 2.6.6.9** the primary deliverable of the EIS is the Environmental Management Recommendations section. The environmental management recommendations may form an Environmental Management Plan (EMP).

The typical components of an EMP include:

Natural Heritage System Components – The NHS components present within and adjacent to the subject lands in which development is generally not permitted. This may include regulated features and hazard lands. These areas should be delineated on an EMP Figure(s) to be included in this section of the EIS. Recommendations regarding the NHS Components must require that these areas are delineated on Site Plans and contract drawings with notes that identify the areas as “no development, and no entry” areas.

Ecological Buffers – Ecological buffers must be clearly delineated on the EMP Figure(s). Recommendations regarding ecological buffers must require that these areas are delineated on Site Plans and contract drawings with notes that identify “no development, and no entry” areas. Pathways, ~~trails or passive low impact development measures identified-proposed and approved for inclusion in the buffer (in accordance with the criteria and process outlined in Section 5.4) in consultation with and approved by the City~~ will be clearly delineated. Additionally, any management recommendations and planting recommendations for ecological buffers should be detailed such that the recommendations can be added to landscape drawings with clear specifications for seed mixtures, shrub and tree plantings and other measures.

Restoration, Enhancement and Compensation Measures / Areas – Areas that have been identified for restoration, enhancement or compensation should also be identified on the EMP Figure(s). Similar to the ecological buffers, management recommendations and planting recommendations for restoration, enhancement and compensation areas should be detailed such that the recommendations can be added to landscape drawings with clear specifications for seed mixtures, shrub and tree plantings and other measures.

Construction Monitoring and Inspection Plan – The requirements for mitigation measures during construction must be detailed in a Construction Monitoring and Inspection Plan. This plan must provide standard construction mitigation measures and mitigation measures specific to the project and subject lands. Components that may be included in a Construction Mitigation and Monitoring Plan include:

- *Delineation and specifications for tree protection and / or ESC fencing* – protection fencing to be installed outside of the Natural Heritage System Components including ecological buffers as applicable should be identified on maps or drawing in the EMP, site plans and contract drawings.
- *Delineation and specifications for wildlife exclusionary fencing* – Wildlife exclusionary fencing designed to prevent wildlife from entering the construction areas of a site should be identified on the EMP, Site Plans and contract drawings. * *Note that this and the above noted ESC fencing may be one and the same if the specifications for both are met.*
- *Species at Risk and Wildlife Handling Protocols* – During construction, SAR and other wildlife may enter the site putting them at risk of injury or mortality from construction equipment, vehicles or construction crews working on the site. The preparation of a Species at Risk and

Wildlife Handling Protocol document can prevent or mitigate injury or mortality. This protocol document should be tailored to the project and the species present within the subject lands and the broader study area ~~and adjacent lands~~.

- *Dewatering and temporary stormwater management* – Dewatering and temporary stormwater management measures may be required for a construction site. Mitigation measures for these measures should be detailed and specified on contract drawings for the project and clearly detailed in the EMP.
- *Dust suppression measures* – Dust suppression measures may be required for the construction works on the site. If required, dust suppression measures should be detailed and included in the specifications on contract drawings.
- *Construction Monitoring* – The monitoring of the above mitigation measures should be an integral part of the plan during construction. The frequency and details of the construction monitoring should be tailored to the specific project requirements as identified in the EMP. The environmental monitoring program should be specific to the EMP and should not be considered replication or replacement for regular site inspections for other purposes.

7.2.1 Environmental Management Plan Report Requirements

- **Goals and objectives** of the mitigation being monitored are clearly outlined to provide a baseline;
- A **timeline** of the monitoring requirements for each of the development stages (e.g., pre-, during, and post-construction) should be clearly outlined;
- **Mitigation measures** should be clearly defined (and geo-referenced), including the inclusion of measurable **thresholds** (as approved on a case-by-case basis as approved by the City of London through the EIS process) that may trigger remedial action;
- **Data collection methods**, which should be **standardized** to ensure the long-term sustainability of the monitoring program, need to be clearly defined and applicable to the goals and objectives;
 - To assess baseline conditions, monitoring should employ sampling methods that accurately assess ecological conditions using a standardized approach that can be replicated as outlined in **Appendix C**.
- Clear **monitoring programs** that include the following three types of monitoring:
 - **Baseline** to outline the existing conditions of natural heritage features and functions in accordance with established and accepted data collection standards;
 - **Compliance** with approved EIS requirements, ESC monitoring and applicable legislation; and,
 - **Post Construction** monitoring of measures implemented to mitigate potential impacts from development.
- Processes or mechanisms for **data storage / transfer, quality assurance, and analysis of results** for initiating responses to threshold triggers;
- **Roles and Responsibilities**, along with the required qualifications, of those undertaking the monitoring program;
- An outline of the **reporting** structure required for the development or infrastructure as determined through an approved EIS;
 - All **monitoring data** must be shared with the City of London as a part of each **monitoring report**.

- **Contingency** measures or strategies should mitigation not be effective in achieving no net impacts as per the approved EIS; and,
- **Amendments** may be necessary as the detailed design, proposed mitigation, or construction activities change throughout the planning process (following the approval of an EIS).
- Monitoring should be undertaken intervals appropriate to the feature. Typical intervals include the 1, 3, and 5-year points after construction and or planting is complete, in order to allow for early detection and correction of any planting or construction failures.
- Monitoring and maintenance will typically be the responsibility of those undertaking the compensation project. This responsibility will be confirmed and documented as part of the agreements outlined in **Section 6.3**. Monitoring reports will be written to document project results. Where projects are not functioning as designed and approved, investigations will be undertaken to understand why and securities may be utilized to correct and / or complete restoration works. Further, modifications may be required to ensure that the project is successful; the need for these can be stipulated in an agreement and assured through securities held by the public agencies (see also **Section 6.3**). Monitoring and maintenance often constitutes a learning process that can inform future compensation decisions and implementation plans.

City of London staff, with input from local Conservation Authorities and any other relevant review agencies, will use the details contained in the approved EIS to guide the review of proposed compensation projects to facilitate appropriate and comprehensive ecological compensation. As per the usual plan review process, all comments from the TRT will be conveyed to the proponent by the City of London staff on the file.

7.2.2 Monitoring Timeline and Responsibilities

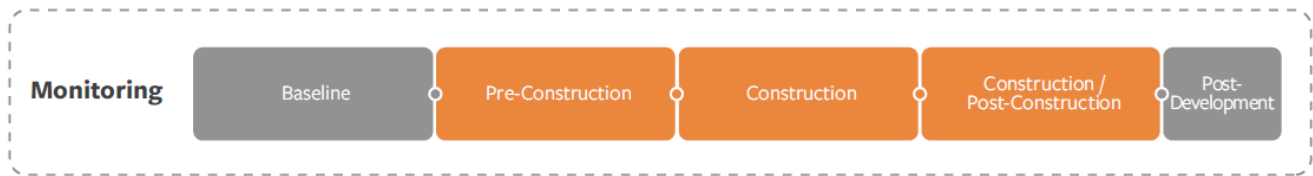
As development and infrastructure proposals, along with the subsequent implementation, can be highly dynamic, it is critical to define the roles and responsibilities of the monitoring component for the entirety of the project and into the post-development phase. It is the responsibility of the **proponent** to create a monitoring plan (to be approved through the EIS process) and to implement monitoring until the end of the Assumption Development Stage (i.e., when the developer has satisfied all parts of the development or infrastructure agreement and the assumption has been granted) or once the proponent has fulfilled the requirements outlined in the EIS.

For each project, the proponent is required to articulate timelines and responsibilities of monitoring, including that for pre-, during-, and post-construction, compensation, and up until assumption. If the feature is being transferred into City of London ownership post-assumption, long-term monitoring will be conducted by the City of London. However, if the feature is retained as private ownership, long-term monitoring will be the responsibility of the proponent.

In general, the monitoring plan should be developed with consideration for the following general phases, depicted in **Figure 7.1**, which are described in subsequent sections of these guidelines:

- **Pre-construction** – to be completed prior to the initiation of construction activities;
- **Construction** – to be conducted from initiation of construction activities until a specified build-out stage as determined in consultation with the City of London;
- **Post-construction** – to be conducted following construction monitoring until the end of the Assumption Development Stage;
 - **Post-development** – to be completed as determined in consultation with the City of London; and,
 - **Compensation** – to be initiated upon completion of compensation project and continued until requirements have been met within the Ecological Replacement and Compensation Plan (as described separately in **Section 6.4**).

Figure 7.1: Environmental Monitoring Process Stages



The City of London will require EIS monitoring reports throughout the process. The reporting timeline and structure will be otherwise determined through the approval of an EIS.

7.2.3 Pre-Construction Monitoring

Pre-construction monitoring will be approved as part of the EIS process for development and infrastructure projects. These monitoring programs and activities should align with the recommendations provided in the EIS (see **Section 2.6.6.9**) and be used to inform the EMP. Some examples of variables to be monitored pre-construction (and thus through the entirety of the project or until monitoring is handed over to the City post-development) may include, but are not limited to, the following:

- Surface and groundwater quantity, quality, and shifts in hydrologic dynamics (e.g., water balance, drainage patterns) that may be influenced by development or infrastructure activities, including grading; and,
- Encroachments to protected NHS components, buffer implementation and establishment, and effectiveness of other NHS protection measures such as fencing.

7.2.4 Construction Monitoring

Upon initiation of construction activities, construction monitoring should be initiated to assess changes to site conditions, as well as the implementation of mitigation measures (as outlined in the approved EMP). In general, the bulk of the monitoring during this phase will be focused on *compliance*. Compliance monitoring is implemented to ensure that the approved conditions of the EIS, along with those outlined in applicable legislation, are met during the construction phase. This step is critical to ensure that the natural heritage features, and their associated function(s), are protected and that impacts are mitigated as outlined in the approved EIS. Some examples of compliance monitoring include the inspection of, but are not limited to, the following mitigation measures:

- ESC;
- Tree protection;
- Boundary delineation and setbacks;
- Buffer implementation;
- Area searches for wildlife;
- Protection of water quality and quantity;
- Maintenance of hydrogeological regimes, assessed in partnership with the applicable Conservation Authority; and,
- Respect for timing windows for approved works (e.g., related to bat overwintering, breeding birds and / or fish habitat restrictions).

Should the proposed development or infrastructure project be non-compliant with the approved EIS, immediate action shall be taken to ensure the correct implementation of mitigation measures in

accordance with the EMP (refer to **Section 7.2.1**). Activities that may result in negative impacts to the NHS shall be halted as soon as the issue is identified.

7.2.5 Post-Construction Monitoring

As outlined in **Section 2.6.6.9**, the development of a post-construction monitoring plan should be initiated well before construction starts. The baseline information/data with which the post-construction monitoring information/data will be compared should be collected (ideally) in the year or two years before the start of construction.

The post-construction monitoring program should include the monitoring of the recommendations of the EMP (i.e., ecological buffers, enhancement, restoration and compensation areas specifications) as well as the monitoring of potential impacts to the NHS. Monitoring of potential impacts should be simplified and repeatable to ensure replicability and program adherence.

In general, post-construction monitoring will take place at a build-out stage or after a percentage of the construction activities have been completed. The specific timeline for the transition from construction to post-construction monitoring will be determined as part of an approved EMP in consultation with the City of London. Typical intervals include 1-, 3- or 5-years. The City will take on monitoring post assumption in intervals appropriate to the feature. Reporting of monitoring data including those for compensation sites shall be provided annually by the proponent for the duration of their responsible term.

The main focus of this phase of monitoring is to evaluate the performance and effectiveness of the mitigation implemented in the construction stage and to inform adaptive management and shifts in management and compensation strategies, if required.

Post-construction monitoring is critical to understanding if the mitigation and / or compensation measures are effective and / or if potential impacts are greater or lesser in magnitude than predicted during the impact assessment. Post-construction monitoring will also inform the need for adaptive management or amendments to the future monitoring plans based on the level of success of the mitigation measures.

Performance and effectiveness monitoring may be required based on mitigation measures for, but not limited to, the following:

- hydrogeological and hydrological processes (e.g., maintenance of pre-development groundwater levels and flows to watercourses, maintenance of water balance in wetlands)
- stormwater management measures (e.g., outlet water quality and erosion thresholds not exceeded)
- tree protection measures (e.g., protected trees remain in good health)
- natural heritage feature encroachments (e.g., no dumping or informal trail creation within protected features)
- ecological functions of natural heritage features (e.g., continued presence of amphibian species and / or forest bird species documented pre-development)
- successful naturalization of buffers, and
- successful establishment and diversification of feature-based restoration and / or compensation.

Post-construction monitoring requires the submittal of annual reports to the City of London outlining seasonal changes in the existing conditions of the NHS, as well as to show changes year-over-year. Any major issues identified during the monitoring periods (e.g., substantive die-off of plantings) must be brought to the immediate attention of the City of London and the proponent. In general, the report may include, but is not limited to, the following:

- General methodology and description (e.g., vegetation communities, taxa specific) of monitoring;
- Outline of thresholds and the associated contingencies in place should they be exceeded;
- All data collected (i.e., baseline, during construction, and up-to-date post construction);

- Analysis and comparison of data; and,
- A plan for the maintenance, and if necessary, implementation of additional mitigation measures.

Post-construction monitoring should take place until end of the Assumption Development Stage and will shift to the Post-development monitoring, as described in **Section 7.2.5.1**.

7.2.5.1 *Post-Development Monitoring*

Post-development monitoring is aimed at continuing to assess ecosystem resilience, to detect changes in the structure of natural heritage features, and to assess the long term efficacy of EIS recommendations (i.e., mitigation measures). The requirement for post-development monitoring, along with an outline of the roles and responsibilities, will be determined as part of an approved EMP (as outlined in **Section 2.6.6.9**) in consultation with the City of London. The results of post-development monitoring will be analyzed based on timelines in the EIS. The results of post-development monitoring inform if additional remedial works are necessary or if policy changes are needed.

7.2.5.2 *Compensation Monitoring*

As outlined in **Section 6.3**, ecological compensation may be permitted where it is not possible to avoid, minimize, or mitigate potential negative impacts from development or infrastructure. The aim of compensation monitoring is to determine whether the ecological compensation has achieved no net loss, or preferably a net environmental benefit, in relation to the replaced or enhanced natural heritage features and their associated function(s). The proposed compensation monitoring plan must be approved prior to the implementation of compensation measures.

Compensation monitoring should be initiated upon completion of the compensation project (e.g., planting, restoration has been completed) to ensure that baseline data is captured. It is expected that monitoring will continue until the compensation goals have been achieved and the conditions approved through the EIS process (i.e., Ecological Replacement and Compensation Plan) have been fulfilled (5-year timelines should be expected) **or** the lands have been transferred to the City of London and an agreement has been made to shift monitoring responsibilities. This close-out process for compensation monitoring must be approved in consultation with the City of London.

Although compensation monitoring plan details will vary on a case-by-case basis, the following are some general recommendations:

- Compensation monitoring should capture the baseline conditions and re-evaluate the efficacy of the compensation project at the 1, 3, and 5-year milestones. Should the compensation project not meet the goal of no net loss or, preferably net environmental benefit (or net positive effect) at the 5-year milestone, compensation monitoring will be required at 5-year intervals until no net loss at minimum is achieved. This timeline may span pre-, during, and post-construction as it is recommended that compensation projects be initiated as early as possible to minimize lag time of replacing natural features and their function(s);
- Survivorship thresholds expectations should be set, with a 70% success rate being recommended as a baseline (NVCA, 2019);
- Monitoring data should be transferred to the City of London for storage and to inform future compensation strategies (e.g., lessons learned);
- Reporting should occur at each milestone to outline the succession and survivorship within the replaced or enhanced feature to assess the project's trajectory towards no net loss or, preferably net environmental benefit (or net positive effect). Where projects are not functioning as designed and approved (e.g. expected outcomes not observed, low survivorship of plantings), as defined through the Ecological Replacement and Compensation Plan, and with consideration for the most

up-to-date research, interventions and modifications to the project will be required to ensure that the project achieves, at minimum, no net loss; and,

- ~~Contingency measures should be outlined for varying potential impacts, as well as based on survivorship.~~

The City of London will provide direction on the success of the implementation of the EIS recommendations resulting in one of three outcomes; 1) do nothing, 2) remedial works identified, or, 3) policy changes identified.

8. Glossary of Terms

Adaptive management - A planned and systematic process for continuously improving environmental management practices by learning about their outcomes. Adaptive management provides flexibility to identify and implement new mitigation measures or to modify existing ones during the life of a project (Canadian Environmental Assessment Agency, 2016).

Adjacent lands – Those lands within a set or specified distance of an individual component of the natural heritage system. Adjacent lands are defined as lands contiguous to a specific natural heritage feature or area where it is likely that development or site alteration would have a negative impact on the feature or area. The extent of the adjacent lands will be in conformity with the distances identified in Table 13 of *The London Plan* or as recommended by the Province (City of London, 2019).

Area-sensitive species - Those that require a forest to be a given size (generally a relatively extensive habitat patch) to successfully reproduce or occur in higher densities (Sandilands, 1997)

Areas of Natural and Scientific Interest (ANSI) - *Areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education* (MMAH, 2020).

Assumption Development Stage - The developer has satisfied all parts of the development or infrastructure agreement and the assumption has been granted.

Basal Area – The basal area of a stand of trees is the sum of the cross-sectional surface areas of each live tree, measured at DBH, and reported on a per unit area basis. Basal area is a measure of tree density, and widely used in forestry, wildlife, and other natural resource management professions (Bettinger *et al.*, 2016).

Baseline Conditions – Baseline conditions may also be referred to as the environmental setting, existing conditions, and other similar terms. The baseline conditions are the physical, chemical, biological, social, economic, and cultural setting in which the proposed project is to be located, and where local impacts (both positive and negative) might be expected to occur. These conditions are the standard against which are compared projected future conditions from project alternatives. Their description and characterization are necessary for decision-makers, reviewers, and others who are unfamiliar with the project site and surrounding landscape (Shepard, 2006).

Biodiversity - The variability among organisms from all sources, including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. (MNRF, 2010b).

Buffers - *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 space for 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* (MNRF, 2010b).

Carolinian Zone - The Carolinian Zone is also known as ecological site region (Ecoregion) 7E. It covers approximately 22,000 km² in extreme southern Ontario, extending northeast from the United States border to Toronto, and northwest to Grand Bend on Lake Huron. It is bounded by four major lakes (Huron, St. Clair, Erie and Ontario), and the St. Clair, Detroit and Niagara rivers. Climatically and biophysically it shares more with the “hot continental (broadleaved forests)” of the north-central United

States than with the “warm continental (mixed deciduous-coniferous forests)” division farther north. It has been described as Canada’s most endangered major ecosystem, and many of its flora and fauna are found nowhere else in the nation. This is largely because many southern species are at their northern limits here, and because most of their natural habitat has been lost to human uses over the past three centuries.” (Jalava *et al.*, 2000).

Coefficient of Conservatism (for Southern Ontario) – *A numeric value between 0 (widespread) and 10 (found only in specialized habitats) assigned to each plant species indicating the degree of faithfulness a plant displays to a specific habitat or set of environmental conditions. “Conservative” plant species, such as those that are found only in relatively pristine natural habitats like bogs or prairies, are assigned a high coefficient of conservatism; other plant species that grow in a wide variety of habitats and can tolerate high levels of cultural disturbance are assigned low values. By compiling a plant species list for a natural area and looking up the coefficients of conservatism for each species listed, one can calculate a Floristic Quality Index, which can be used to compare the quality of natural areas. The NHIC has produced a list of native plants occurring in southern Ontario, and has assigned tentative coefficients of conservatism to each (MNRF, 2010b).*

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

Compliance Monitoring – Entails monitoring of the NHS components as needed to ensure that the approved recommendations in the EIS, along with any other applicable conditions, are met during the construction phase.

Conservation Status Ranks – *Standard methods to evaluate species and plant communities and assign conservation status ranks (MNRF, 2020).*

Global Rank (GRank) - *Conservation status of a species or plant community across its entire range (MNRF, 2020).*

National Rank (NRank) - *Conservation status of a species or plant community within a particular country (MNRF, 2020).*

Subnational Rank (SRank) – *Conservation status of a species or plant community within a particular province, territory or state (MNRF, 2020).*

Critical Function Zones – *The term Critical Function Zone (CFZ) describes non-wetland areas within which biophysical functions or attributes directly related to the wetland occur. This could, for example, be adjacent upland grassland nesting habitat for waterfowl (that use the wetland to raise their broods). The CFZ could also encompass upland nesting habitat for turtles that otherwise occupy the wetland, foraging areas for frogs and dragonflies, or nesting habitat for birds that straddle the wetland-upland ecozone (e.g., Yellow Warbler). Effectively, the CFZ is a functional extension of the wetland into the upland. It is not a buffer for the wetland (Environment Canada, 2013).*

Cultural communities – Vegetation communities originating from, or maintained by, anthropogenic influences and / or culturally based disturbances (such as agricultural fields (croplands) and pastures (grazing), mowing, woodlot management or tree cutting, etc.) often containing a large proportion of introduced species (adapted from Lee *et al.* 1998), but undergoing natural succession. Cultural communities include, but are not limited to, cultural meadows, cultural thickets, cultural savannahs, cultural woodland, and cultural plantation ecosites (Lee *et al.*, 1998).

Cultural savannahs and cultural woodlands - Areas where trees have been planted, or have resulted from first generation regeneration of a site originating or maintained by anthropogenic disturbances (Lee

et al., 1998). It does not include treed areas where the main stratum is dominated by native species and tree cover is >60%. Cultural savannahs are treed areas with 11-35% scattered or clumped tree cover and dominated by graminoids and forbs. Cultural woodlands have 36-60% scattered or clumped tree cover.

Cumulative effects – *The sum of all individual effects occurring over space and time, including those that will occur in the foreseeable future (MNRF, 2010b).*

Development – *the creation of a new lot, change in land use, or the construction of buildings and structures requiring approval under the Planning Act, but does not include:*

- a) *activities that create or maintain infrastructure authorized under an environmental assessment process;*
- b) *works subject to the Drainage Act (MMAH, 2020).*

Disturbance - Any action that will cause an **effect** or **stress**; can be natural (e.g. fire, flood) or human – generated (e.g. various forms of development activity or agricultural uses).

Drip Line - *As the location on the ground beneath the theoretical line of the outer most branches of the trees at the edge of a woodland (City of London, 2018). Where an asymmetric tree canopy occurs, the drip line shall be the greatest of the drip line distances measured horizontally from the base of the trunk (City of London, 2016b).*

Ecological boundary – Is determined based on ecological principles, refined through the application of **Section 4** Boundary Delineation in these Environmental Management Guidelines, and are irrespective of property lines.

Ecological Compensation – Ecological compensation is an example of a trade-off whereby loss of natural values is remedied or offset by a corresponding compensatory action on the same site or elsewhere (Brown *et al.*, 2013). Ecological compensation is a positive conservation action that is required to counter-balance ecological values lost in the context of development or resource use and is an intentional form of trade-off (Morrison-Saunders and Pope, 2013).

Ecological function - *The natural processes, products, or services that living and non-living environments provide or perform within or between species, ecosystems and landscapes. These may include biological, physical and socio-economic interactions (MMAH, 2020).*

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 processes are intact and self-sustaining and (c) ecosystem evolution is occurring naturally. Ecological integrity includes hydrological integrity (MNRF, 2010b).*

1. The ability of a system to resist disturbance (resistance).
2. The ability of a system to recover or return to a balanced state when subject to some degree of perturbations and disturbance (resilience).
3. The ability to persist in the long-term with the minimum level of human maintenance.
4. The ability to maintain a structure of native flora and fauna.

Edge Effects – The distance from the periphery (of a given natural heritage feature) to the point where conditions (as indicated by specific criteria) do not differ from those in the interior habitat (adapted from Environmental Law Institute, 2003). *Edge effects are known to edge effects vary depending on natural feature type, position in the landscape and other factors... With respect to biological effects, 100 metres is probably a conservative estimate of the extent of edge effects. (MNRF 2010b).*

Edge microclimate - Sun and wind are the overriding controls of the edge microclimate. They determine which plants survive and thrive as well as having a major impact on soil, insects and other animals.

- Effects from south-facing edges tend to extend further into the feature than from north-

facing edges.

- Effects from windward edges tend to extend further into the feature than from leeward edges.

ELC Community Series - Is the lowest level of classification using ELC that can be identified through maps, air-photo interpretation and other remote sensing techniques. Community series are distinguished on the type of vegetation cover (open, shrub, or treed) and / or the plant form that characterizes the community (i.e., deciduous, coniferous, mixed; Lee *et al.*, 1998).

ELC Ecosite – Part of an Ecosession having a relatively uniform parent material, soil, and hydrology, and a chronosequence of vegetation. It is a mappable, landscape unit integrating a consistent set of environmental factors and vegetation characteristics (e.g., Dry-Forest Deciduous Forest Ecosite) (Lee *et al.*, 1998).

ELC Vegetation Type - Is the finest level of resolution in the ELC, identified through site and stand level research and inventory. Vegetation types are generated by grouping similar plant communities based on plant species composition and dominance, according to relative cover. The goal is to distill the natural diversity and variability of plant communities to a small number of relatively uniform vegetation units (Lee *et al.*, 1998).

Encroachment – Encroachment(s) into protected natural heritage features and areas can occur from other land uses in the adjacent lands. Common examples of encroachment include dumping garden refuse in the natural area, creating unauthorized access (e.g., an informal trail), extending lawn management and manicuring into the natural area, and building structures (such as forts or bike jumps). Encroachment is usually more pronounced where the limit between the protected natural area and the adjacent land use is not fenced.

Enhancement – From an ecological perspective, whereby the quality of ecosystem functions are improved. Enhancement can occur within or adjacent to a feature, and is a term that can apply to a natural heritage feature or to a natural heritage system as a whole. An example of ecological enhancement within a feature is removal of invasive plant species and related replacement with suitable native species. An example of an enhancement to a natural heritage system is the naturalization of a maintained lawn between two features to provide a more natural corridor or ecological linkage.

Feature Boundary – The delineated limit of one of the natural heritage features and areas that has been or may be included as a component of the City's Natural Heritage System as per ***The London Plan*** Policies 1319 and 1320. Feature boundaries are to be determined in accordance with the applicable policies from the ***The London Plan*** and in these EMGs, **Section 4**. If not already completed, all features shall be assessed for significance accordance with the applicable policies from the ***The London Plan*** and in these EMGs, **Section 3**.

Fish Habitat – *As defined in the Fisheries Act, means spawning grounds and any other areas, including nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes (MMAH, 2020).*

Forest - *A terrestrial vegetation community with at least 60% tree cover (Lee at al., 1998) of coniferous and / or deciduous trees.*

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

Fragmentation – [T]he degree to which natural habitat, once continuous, is divided into remnant isolated patches (Ontario Road Ecology Group, 2010).

Ground water feature – *Means water-related features in the earth's subsurface, including recharge/discharge areas, water tables, aquifers and unsaturated zones that can be defined by surface and subsurface hydrogeologic investigations (MMAH, 2020).*

Discharge Areas – Discharge areas are usually located in valleys and lowlands. There the hydraulic gradients are directed upward toward the land surface. Discharging groundwater re-enters the surface-water regime as inflow to lakes or baseflow to streams, or to become evapotranspiration from wetlands (Council of Canadian Academies, 2009).

Recharge Areas – Recharge usually occurs in topographically higher areas of a groundwater basin. Water-table elevations tend to be a subdued reflection of surface topography, and the differences in watertable elevation provide the driving force that moves groundwater by gravitational flow from recharge areas toward discharge areas at lower elevations. In recharge areas, the hydraulic gradient at the water table is directed downward, and recharging waters enter the groundwater-flow system to begin their slow journey through the groundwater basin (Council of Canadian Academies, 2009).

Hibernacula – (singular = hibernaculum) Underground chamber whereby snakes are able to safely overwinter. Hibernaculum can be a built structure or naturally occurring, i.e., animal burrow or fissure in the bedrock (Long Point Basin Land Trust, 2020).

High-Water Mark - The average **highest** level that a watercourse or waterbody rises to and remains at long enough to alter the riparian vegetation (DFO, 2007; DFO, 2019).

Indicator Species – Species used which offer an indication of the biological condition in an ecosystem (MNRF 2011b).

Invasive species - an organism that is not native to the place where found and tends to grow and spread aggressively, usually to the detriment of native species and ecosystems.

Interior Habitat - With respect to woodlands, interior habitat is usually determined as habitat 100 metres or more from the outer edge of the woodland. These interior habitats provide productive habitat for sensitive species that are sheltered from external influences and disturbance (MNRF, 2010b).

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

Linkage - *Linear area intended to provide connectivity (at the regional or site level), supporting a complete range of community and ecosystem processes, enabling plants and animals to move between core areas and other larger areas of habitat over a period of generations. The terms are used interchangeably for planning purposes but may need to be distinguished for ecological or biological reasons* (MNRF, 2010b). Linkages can be naturally existing or restored linear landscape connections between two or more component of the NHS. In the City of London, from an ecological perspective, linkage functions can be supported by many components of the NHS. Also see the definition for Upland Corridors.

The functions provided by ecological linkages are informed by characteristics such as their width (i.e., appropriate to the scale of the phenomenon being addressed), length (e.g., a long corridor will generally need to be wider than a short one), quality (e.g., vegetative structure and composition), species diversity (e.g., low non-native plant indices), type of corridor use (e.g., species in which individuals pass directly between two areas in discrete events of brief duration; or species that need several days to several generations to pass through), importance within the landscape (e.g., the last remaining natural connection between two features), as well as the functions being expected of the linkage. Corridor functions may include, but are not limited to avenues along which:

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

2010b, Environment Canada, 2013).

Low Impact Development (LID) – Approach to land development that mimics the natural movement of water in order to manage stormwater (rainwater and urban runoff) close to where the rain falls. LID uses small, simple design techniques and landscape features that filter, infiltrate, store, evaporate, and detain rainwater and runoffs at the lot level. (City of Hamilton, 2020).

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

Mitigation – *The prevention, modification, or alleviation of impacts or actions on the natural environment and -.... the prevention of negative impacts. Mitigation also includes any action intended to enhance beneficial effects* (MNR 2010b)..

Native species – For the City of London, usually refers to species that occurred naturally in southwestern Ontario prior to European settlement. Where the status of a species is in question, the City will defer to the Natural Heritage Information Centre.

Natural Heritage Features and Areas - In the City of London, these are those features and areas identified in accordance with the Provincial Policy Statement and listed in **The London Plan** policies 1319 and 1320..

Natural Heritage System - *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 use* (MMAH, 2020).

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

Negative Impacts – is defined in accordance with the Provincial Policy Statement and includes policy references from that document, as follows: a) *in regard to policy 1.6.6.4 and 1.6.6.5, potential risks to human health and safety and degradation to the quality and quantity of water, sensitive surface water features and sensitive ground water features, and their related hydrologic functions, due to single, multiple or successive development. Negative impacts should be assessed through environmental studies including hydrogeological or water quality impact assessments, in accordance with provincial standards;* b) *in regard to policy 2.2, degradation to the quality and quantity of water, sensitive surface water features and sensitive ground water features, and their related hydrologic functions, due to single, multiple or successive development or site alteration activities;* c) *in regard to fish habitat, any permanent alteration to, or destruction of fish habitat, except where, in conjunction with the appropriate authorities, it has been authorized under the Fisheries Act;* and d) *in regard to other natural heritage features and areas, degradation that threatens the health and integrity of the natural features or ecological functions for which an area is identified due to single, multiple or successive development or site alteration activities* (MMAH 2020).

Net effects - Those impacts that remain after mitigation has been implemented.

Non-native species - Used to refer to a species that did not originate naturally in an area. Usually refers to species that have been introduced to southwestern Ontario since European settlement. Where the status of a species is in question, the City will defer to the Natural Heritage Information Centre.

Overall Benefit Permit – Issued under the *Endangered Species Act* in which “*authorizes a person, company or organization to perform the activity, as long as an overall benefit to the species is realized*” (MECP, 2020). The person, company or organization must undertake “*actions that contribute to improving the circumstances to the species*” (MECP, 2020).

Patch clusters – Are several patches that may be connected as one Area if certain criteria for connectivity and distance are met (EPPAC, 1996). As defined in these EMGs (Section 3.1), these are vegetation patches within 250 m of each other that are not separated by major roads, highways, or urban development.

Patches – Are area of naturalized vegetation generally larger than 0.5 ha. A patch may be bisected by a utility corridor or road if the right-of-way (ROW) is less than 40 m. Patches may include one or more vegetation communities within natural feature boundaries, see Section 4.0.

Place Type (The London Plan) - Traditionally, Planners have focused on land use when setting plans for geographic areas within a city – often referred to as a “land use designation”. **The London Plan** takes a different approach by planning for the type of place that is envisioned – what this Plan refers to as a “Place Type”. It seeks to plan highly-functional, connected, and desirable places. Most place types support a range of intensities and a mix of land uses (City of London, 2019).

Environmental Review - 779_ In some cases, lands may contain natural heritage features and areas that have not been adequately assessed to determine whether they are significant and worthy of protection as part of the City’s NHS. The Environmental Review Place Type will ensure that development which may negatively impact the value of these features does not occur until such time as the required environmental studies are completed. 780_ In addition to the components of the NHS which have been evaluated and shown as Green Space on Map 1 – Place Types in conformity with the policies of this Plan, additional lands are identified on Map 5 – Natural Heritage, that may contain significant natural features and areas and important ecological functions which should be protected until environmental studies have been completed, reviewed, and accepted by the City. These potential components of the NHS, shown within the Environmental Review Place Type on Map 1, will be protected from activities that would diminish their functions pending the completion, review and acceptance of a detailed environmental study (City of London, 2019).

Green Space - 757_ The Green Space Place Type is made up of a system of public parks and recreational areas, private open spaces, and our most cherished natural areas. It encompasses a linear corridor along the Thames River, which represents the natural heritage and recreational spine of our city. It also encompasses our hazard lands, including our valleylands and ravines, and the floodplains associated with our river system. 758_ The Green Space Place Type is comprised of public and private lands; flood plain lands; lands susceptible to erosion and unstable slopes; natural heritage features and areas recognized by City Council as having city-wide, regional, or provincial significance; lands that contribute to important ecological functions; and lands containing other natural physical features which are desirable for green space use or preservation in a natural state. The components of the NHS that are included in the Green Space Place Type on Map 1 – Place Types, are identified or delineated on Map 5 - Natural Heritage. Hazard lands and natural resource lands that are included in the Green Space Place Type on Map 1 are identified or delineated on Map 6 – Hazards and Natural Resources (City of London 2019).

Plantation - A coniferous or deciduous treed community in which the majority of trees have been planted (Lee *et al.*, 1998).

Potential Naturalization Areas - Potential naturalization areas are defined as areas where the opportunity exists to enhance, restore, or where appropriate, expand the NHS. These areas may include lands suitable to create natural habitats such as wetland habitat, pollinator habitat, wildlife habitat, or to compensate for trees lost to development. (*The London Plan* Policy 1378). Potential naturalization areas are an important component of the Natural Heritage System. Potential naturalization areas can include lands adjacent to natural heritage features and areas, other natural 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. Potential naturalization areas may enhance, restore or strengthen and expand the health and viability of a natural heritage feature or area (*The London Plan* Policy 1379).

Prairie - An area of native grassland controlled by a combination of moisture deficiency and fire. Usually containing a distinctive assemblage of species. May include tallgrass prairie, tallgrass savannah or tallgrass woodland upland communities (Lee *et al.*, 1998).

Provincially Significant Wetland – Wetlands that have been “identified as provincially significant by the Ontario Ministry of Natural Resources and Forestry using evaluation procedures established by the Province, as amended from time to time” (MMAH, 2020)..

Restoration – From an ecological perspective, “is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed” (Society for Ecological Restoration website).

Savannah – A treed community with 11 to 35% cover of coniferous or deciduous trees (Lee *et al.* 1998).

Satellite Woodlands - Are small treed or forested areas located within 100 m of a larger area of significant woodland. The satellite may be part of a Patch or Patch Cluster.

Setback - A land use planning term, established through the use of zoning standards, generally providing for minimum distances from lot lines to achieve appropriate locations for buildings and structures (MNRF, 2010b; Beacon, 2012). Within the City of London “setbacks shall apply from any lands identified as an ecological buffer” (City of London, 2019).

Significant - As defined by the *Provincial Policy Statement* means:

a) in regard to wetlands, coastal wetlands and areas of natural and scientific interest, an area identified as provincially significant by the Ontario MNRF using 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 MNRF; c) in regard to other features and areas in 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 NHS; Criteria for determining significance for the resources identified in sections (c) are recommended by the Province, but municipal approaches that achieve or exceed the same objective may also be used. While some significant resources may already be identified and inventoried by official sources, the significance of others can only be determined after evaluation (MMAH, 2020).

Site Alteration – Activities, such as grading, excavation and the placement of fill that would change the landform and natural vegetative characteristics of a site (MMAH, 2020).

Successional / Seral Age - The stage in a vegetation chronosequence or succession at a given site.

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

Early successional communities - Have not undergone a series of natural thinning. Dominant plants are essentially growing as independent individuals, rather than as members of a

phytosociological community. It is floristically similar to mid-successional stands, but is juvenile in structural development (Strong *et al.*, 1990).

Mid-Aged - A seral stage of a community that has undergone natural thinning and replacement as a result of species interaction; the community often contains examples of both early successional and late successional species. Mid-successional communities have undergone natural thinning as a result of species interaction, and may show evidence of invasion by climax species, but they are still dominated by seral species. They may include stands with an over mature understorey (Strong *et al.*, 1990).

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

Older Growth Forests - relatively old and relatively undisturbed by humans. The definition of older growth considers factors other than age, including forest type, forest structure, forest development and the historical and current patterns of human disturbance. Older growth forests are self-perpetuating communities composed primarily of late seral species which show uneven stand age distribution including large old trees without open-grown characteristics (Lee *et al.*, 1998).

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

Sub-climax communities - Are successional maturing communities dominated primarily by climax species, but significant remnants of earlier seral stages may be present (Strong *et al.*, 1990).

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

Rare Plant Species – List of species that can be grouped but not limited to the following:

Provincially Rare Plants includes species with an element ranking of S1-S3 (For a complete listing of Ontario's rare plant species consult NHIC at www.mnr.gov.on.ca/MNR/nhic/nhic.html).

Regionally Rare Plants - includes species with 1 to 4 stations (records) in Middlesex County (as per the *List of the Vascular Plants of Ontario's Carolinian Zone (Ecoregion 7E)*, Oldham 2017).

Regionally Uncommon Plant - *Native in the Carolinian Zone and (a) listed as common in no more than one Carolinian Zone area; and (b) not rare or historic in more than half of the Carolinian Zone areas (≥6) in which it is native and ranked (i.e. not X (no Status))* (as per the *List of the Vascular Plants of Ontario's Carolinian Zone (Ecoregion 7E)*, Oldham 2017).

Species Richness - The number of different species within a community (Pyron, 2010).

Species-at-Risk - Used to describe species that are listed in one of the conservation categories of “endangered”, “threatened” or “vulnerable”/ “special concern”

Endangered – Any native species that on the basis of the best available scientific evidence, is at risk of extinction or extirpation throughout all or a significant portion of its (Ontario) range; a species threatened with imminent extinction or extirpation (COSEWIC).

Threatened - Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a significant portion of its (Ontario) range (COSSARO); a species likely to become endangered if the limiting factors are not reversed (COSEWIC).

Special Concern / Vulnerable - Any native species that, on the basis of the best available scientific evidence, is a species of special concern (in Ontario), but is not a threatened or endangered (COSSARO); a SAR because of low or declining numbers, small range or because of characteristics that make it particularly sensitive to human activities or to natural events (COSEWIC). COSEWIC has replaced the category of “Vulnerable” with “Special Concern”.

Stormwater Management – The plans, public works and initiatives put in place to maintain quality and quantity of stormwater runoff to pre-development levels (City of London, 2019).

Thicket Swamp - A wooded wetland area occurring on organic or mineral substrates with a water table that seasonally drops below the substrate surface; dominated by small trees and shrubs where the tree cover is <10% and the small tree or tall shrub cover (shrubs defined by Soper and Hiemburger 1982) is >25% (Lee *et al.*, 1998).

Top-of-Slope - The intersection of the physical top of a bank or valley slope with the table land. This can be different than the geotechnical or engineered stable top-of-slope. For well-defined valleys, the physical boundary is generally defined by the stable or the predicted top-of-slope while “*for a less well-defined valley or stream corridor, the physical boundary may be defined in a number of ways, including the consideration of riparian vegetation, the flooding hazard limit, the meander belt or the highest general level of seasonal inundation*” (MNR 2010b).

Tree Canopy – An almost continuous layer of foliage formed by the crowns of the larger trees. Shades the layers of vegetation below (CVC, 2011).

Treed – A community with tree cover of >10% (Lee *et al.*, 1998).

Unevaluated Wetland – Wetlands that have not undergone the OWES evaluation process.

Upland Corridors - *Vegetated areas, or potentially revegetated areas, that provide a link between natural heritage features and areas of the Natural Heritage System. Upland corridors may incorporate infrastructure (such as culverts or underpasses) to support connectivity (The London Plan Policy 1372). Upland corridors support and connect valleylands to natural heritage features and areas where the valleylands do not directly connect. Valleylands are also essential for establishing connectivity for the Natural Heritage System, and they provide corridor and linkage functions between natural heritage features and areas. Both are essential in a highly fragmented or urban landscape (The London Plan Policy 1374). Upland corridors are “to retain or create linkages between isolated natural areas” (The London Plan Policy 1417_g).*

Urban Growth Boundary - The boundary shown on Map 1 and Figure 1, beyond which urban uses will not be permitted. Generally, this map boundary separates the urban parts of our city from the rural parts of our city” (City of London, 2019).

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 (MMAH, 2020).*

Vascular Plants – Have a specialized vascular systems known as the xylem and phloem (Leslie, 2018).

Vegetation Patch – Vegetation patches are usually referred to as such in the City of London before they are assessed and screened to determine if they meet the criteria for one or more of the City’s NHS components, as listed in **The London Plan** Policy 1319. Also, see “Patches”.

Vegetation patches are considered as one unit and can be comprised of one or more “natural heritage features” inside the feature boundary (e.g., woodland, wetland, etc.).

Vernal Pool – Pool fed by either groundwater (e.g., springs), snowmelt, or surface water that may be important breeding sites for [various species], which are generally found within a woodland or in proximity to a woodland (MNRF, 2010b).

Watercourse - Is defined according to several federal and provincial Acts and Regulations and typically consists of a distinct (somewhat to well-defined) channel in which water naturally flows at some time of the year [i.e., permanent, intermittent, or ephemeral flow as defined by MNRF's Stream Permanency Handbook for South-Central Ontario (MNRF, 2013b)]. This includes anthropogenically created / maintained / altered features as well as natural features.

Watershed – *An area that is drained by a river and its tributaries* (City of London, 2019).

Subwatershed - *Area drained by a stream or group of streams within the larger watershed. A subwatershed identifies streams, wetlands, forests, groundwater recharge, and other natural areas* (GRCA, 2020).

Wetland - 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 (MMAH, 2020).

In the City of London Wetlands are those that are evaluated for significance that do not meet the criteria for designation as a PSW per OWES, as confirmed by the MNRF. Examples of wetlands include:

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

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

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

Swamp - A mineral-rich wetland community characterized by a cover of coniferous or deciduous trees (Lee *et al.*, 1998).

Wetland Plant Species – Species that are found in wetlands in Ontario. Wetland plant species range from those species that occur primarily in wetlands (“wetland indicators”) to those species that occur in both wetlands and uplands (MNRF, 2014a).

Emergent - Herbaceous plants which rise out of the water (MNRF, 2014a).

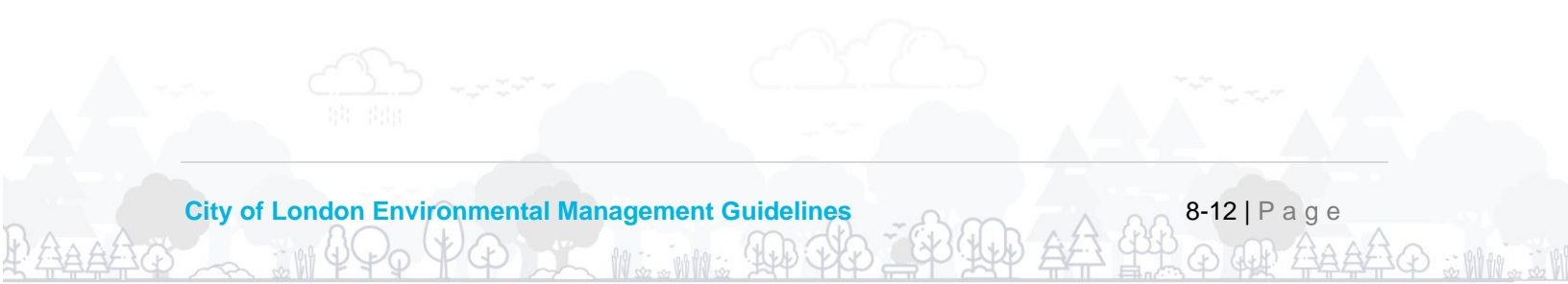
Floating - Rooted, vascular hydrophytes with leaves floating horizontally on or just above the water surface (MNRF, 2014a).

Submergent - Rooted hydrophytes with leaves entirely under the water surface (MNRF, 2014a).

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 nonmigratory species (MMAH, 2020).

Woodland – A treed community with 35 to 60% cover of coniferous or deciduous trees, (Lee *et al.*, 1998), 10% tree cover (as described in **Section 3.1.1** in these Environmental Management Guidelines) or 25% shrub cover (as described in **Section 3.1.1** in these Environmental Management Guidelines). In the *Provincial Policy Statement* woodland “means 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” (MMAH, 2020).



9. References

[Adamus, P.R. \(2007\). Best Available Science for Wetlands of Island County, Washington: Review of Published Literature. A Report Prepared in Response to Critical Areas Ordinance. Updating Requirements for Wetlands.](#)

Alani, A.M., and Lantini, L. (2020). Recent Advances in Tree Root Mapping and Assessment Using non-destructive testing methods: A focus on ground penetrating radar. *Surveys in Geophysics*: 41: 605-646

Bakowsky, W. (1997). Southern Ontario Vegetation Communities. Natural Heritage Information Centre.

Bakowsky, W., & Riley, J. L. (1993). A Survey of the Prairies and Savannas of Southern Ontario. Proceedings of the 13th North American Prairie Conference. Windsor.

[Ballantyne, M. and C. M. Pickering. \(2015\). REVIEW: The impacts of trail infrastructure on vegetation and soils: Current literature and future directions. J Environ Manage. 2015 Dec 1;164:53-64. Accessed at: https://pubmed.ncbi.nlm.nih.gov/26342267/](#)

Beacon Environmental. (2009). Restoration and Securement Strategy for Enhancing the Town of East Gwillimbury Natural Heritage System. 87 pp. East Gwillimbury, Ontario, Canada: Town of East Gwillimbury.

Beacon Environmental. (2012, December). Ecological Buffer Guideline Review. Markham, Ontario, Canada: Credit Valley Conservation Authority.

Beacon Environmental. (2014). Environmental Impact Study Compliance Monitoring. London, Ontario, Canada: City of London.

Beak Consultants Ltd. (1995). Aquatic Resources Management Reports for Vision '96 Subwatersheds. Group 1, Groups 2/3, and Groups 4/5, London.

Bekessy, S., Wintle, B., Lindenmayer, D., McCarthy, M., Colyvan, M., Burgman, M., & Possingham, H. (2010). The biodiversity bank cannot be a lending bank. *Conservation Letters*, 3, 151-158.

Bergsma, B. (2004). City of London Process to Implement Policies and Develop Guidelines to Identify Ecologically Significant Woodlands. London.

Bettinger, P., Boston, K., Siry, J.P., & Grebner, D.L.. (2016). *Forest Management and Planning*, Academic Press 2009, second edition December 2016.

Bibby, C. J., Burgess, N. D., Hill, D. A., & Mustoe, S. H. (2000). *Bird Census Techniques (2nd Ed. ed.)*. Academic Press.

Birds Canada. (2020). Birds Canada Webpage. Canada. Retrieved from <https://www.birdscanada.org/>

BSC (Bird Studies Canada). (2009a). Marsh Monitoring Program Participant's Handbook for Surveying Amphibians. Bird Studies Canada in cooperation with Environment Canada and the U.S. Environmental Protection Agency.

BSC (Bird Studies Canada). (2009b). Marsh Monitoring Program Participant's Handbook for Surveying Marsh Birds.

Boutin, C., & Jobin, B. (1998). Intensity of agricultural practices and effects on adjacent habitats. *Ecological Applications*, 14(6), 1757-1765.

Bowles, J. (2002). Regionally Rare Plants of Middlesex County.

Bowles, J. M., Draper, W. B., Heagy, A., Kanter, M., & Larson, B. (1994). City of London Sub-Watershed Studies Life Science Inventories. London: City of London, Upper Thames River Conservation Authority.

- Bowles, J., & Bergsma, B. (1999). Components of the Natural Heritage System Guidelines for the Evaluation of Patches.
- Bowman, I. (1996). Species at Risk in Ontario - Report of the Rare, Threatened, and Endangered Task Force. Toronto: Ministry of Natural Resources and Forestry.
- Bricker, B., & Reader, R. (1999). The effect of woodlot size on woody species composition richness. In G. M. Allen, P. F. Eagles, & S. D. Price, *Conserving Carolinian Canada: Conservation Biology in the Deciduous Forest Region* (pp. 75-87). Waterloo, Ontario, Canada: University of Waterloo Press.
- Brosfoske, K. D., Chen, J. Q., Naiman, R. J., & Franklin, J. F. (1997). Harvesting effects on microclimatic gradients from small streams to uplands in western Washington. *Ecological Applications*, 7, 1188-1200.
- Brown, M. A., Clarkson, B. D., Barton, B. J., & Joshi, C. (2013). Ecological compensation: an evaluation of regulatory compliance in New Zealand. *Impact Assessment and Project Appraisal*, 31(1), 34-44.
- Bull, J. W., Milner-Gulland, E. J., Suttle, K. B., & Singh, N. J. (2014). Comparing biodiversity offset calculation methods with a case study in Uzbekistan. *Biological Conservation*, 178, 2-10.
- Bull, J., & Brownlie, S. (2017). The transition from No Net Loss to a Net Gain of biodiversity is far from trivial. *Oryx*, 51(1), 53-59.
- Burke, D. M., & Nol, E. (1998). Edge and fragment size effects on the vegetation of deciduous forests in Ontario, Canada. *Natural Areas Journal*, 18, 45-53.
- Butler, P., Iverson, L., Thompson III, F. R., Brandt, L., Handler, S., Janowiak, M., . . . Zegre, N. (2015). Central Appalachians forest ecosystem vulnerability assessment and synthesis: a report from the Central Appalachians Climate Change Response Framework Project. Newton Square, Pennsylvania, USA: U.S. Department of Agriculture, Forest Service, Northern Region.
- Burke, D., and E. Nol (1998). Influence of Food Abundance, Nest-Site Habitat, and Forest Fragmentation of Breeding Ovenbirds
- Cadman, M. D., Dewar, H. J., & Welsh, D. A. (1998). The Ontario Forest Bird Monitoring Program (1987-1998): Goals, methods and species trends observed. Canadian Wildlife Service.
- Canadensys. (2020). Database of Vascular Plants of Canada.
- Canadian Environmental Assessment Agency. (2016). Report on Plans and Priorities. Pp. 36
- Castelle, A. J., & Johnson, A. W. (2000). Riparian Vegetation Effectiveness. National Council for Improvement Technical Bulletin No. 799.
- Castelle, A. J., Johnson, A. W., & Conolly, C. (1994). Wetland and stream buffer size requirements - A review. *Journal of Environmental Quality*, 23, 878-882.
- Castelle, A.J., Conolly, C., Emers, M., Metz, E.E., Meyer, S., Witter, M., Mauermann, S., Erickson, T., and Cooke, S.S. (1992). Wetland Buffers: Use and Effectiveness. Adolfson Associates, Inc., Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia, Pub. No. 92-10.
- Catling, P. (2013). Using Coefficients of Conservatism and the Floristic Quality Index to Assess the Potential for Serious and Irreversible Damage to Plant Communities. *Canadian Field Naturalist*, 127(3), 285-288.
- Chapman, L. J., & Putnam, D. F. (1984). The Physiography of Southern Ontario. Special Volume 2(OGS Map P.2715), 3rd. Ontario, Canada: Ontario Geological Survey.
- City of Cambridge. (2018). Cambridge Official Plan. Pp. 363
- City of Guelph. (2018). Envision Guelph - The City of Guelph Official Plan. Guelph, Ontario, Canada.
- City of Guelph. (2020). Guidelines for the preparation of Environmental Impact Studies. Version 2. Pp. 123

- City of Hamilton. (2020). Low Impact Development (LID) – Stormwater Management. Retrieved from: <https://www.hamilton.ca/home-property-and-development/water-sewer/low-impact-development-lid-stormwater-management>
- City of Hamilton and ESAIEG. (2015). Environmental Impact Statement (EIS) Guidelines. Hamilton, Ontario, Canada.
- City of London. (1994). Guide to Plant Selection for Natural Heritage Areas and Buffers. London, Ontario, Canada: Council Approved March 22, 1994.
- City of London. (2004). Guidelines for Determining Setbacks and Ecological Buffers. London, Ontario, Canada: Council Approved April 20, 2004.
- City of London. (2007). City of London's Environmental Management Guidelines. London.
- City of London. (2014). City of London Urban Forest Strategy. London.
- City of London. (2016a). The London Plan. Official Plan, London.
- City of London. (2016b). Tree Protection By-law. London, Ontario.
- City of London. (2017). London Invasive Plant Management Strategy. 47 pp. London, Ontario, Canada.
- City of London. (2018). Tree Planting and Protection Guidelines. In Design Specifications and Requirements Manual (p. 36 pp.). London, Ontario.
- City of London. (2019). Design Specifications and Requirements Manual – 2003, Updated August 2019. London, Ontario: City of London - Environmental and Engineering Services.
- City of London. (2020). Standard Contract Documents for Municipal Construction - 2020 Edition. London, Ontario: City of London - Environmental and Engineering Services.
- [City of Toronto. \(2013\). Natural Environment Trail Strategy. June 2013. 200 pp.](#)
- City of Waterloo. (2020). City of Waterloo Official Plan. Pp. 444
- Couturier, A. (1999). Conservation Priorities for the Birds of Southern Ontario. Port Rowan: Bird Studies Canada.
- Crins, W. J. (1996). Life Science Gap Analysis for Site District 4E-3. Ontario Ministry of Natural Resources.
- de Foresta, H., Somarriba, E., Temu, A., Boulanger, D., Feuilly, H., & Gauthier, M. (2013). Towards the Assessment of Trees Outside Forests. Resources Assessment Working Paper 183.
- DeWalle, D.R. (2010). Modeling Stream Shade: Riparian Buffer Height and Density as important as buffer width. Journal of the American Water Resources Association. Vol 46, No. 2
- Dobbyn, J. S. (1994). Atlas of the Mammals of Ontario. Don Mills: Federation of Ontario Naturalists.
- Dobson, M. (1995). Arboriculture Research and Information Note: Tree Root Systems. Arboricultural Advisory and Information Service
- Dougan and Associates. (2020). CanPlant. Canada: Evergreen. Retrieved from <https://can-plant.ca/>
- Dreimanis, A., Vagners, U. J., McKenzie, G. D., & Etherington, J. R. (1964a). Pleistocene Geology of the St. Thomas Area (West Half). (Preliminary Geological Map No. 238). St. Thomas, Ontario: Ontario Department of Mines.
- Dreimanis, A., Vagners, U., McKenzie, G. D., & Etherington, J. R. (1964b). Pleistocene Geology of the St. Thomas Area (East Half). (Preliminary Geological Map No. P.606). St. Thomas, Ontario: Ontario Department of Mines.
- Environment and Climate Change Canada. (1994). Migratory Birds Convention Act, 1994 SC. 1994, c.22. Canada.
- Environment and Climate Change Canada. (2005). Beyond Islands of Green: A Primer for Using Conservation Science to Select and Design Community-based Nature Reserves. 80 pp. Downsview, Ontario, Canada.

- Environment and Climate Change Canada. (2017). Annex A: Environment Canada Experience with Conservation Allowances. Operation Framework for Use of Conservation Allowances. Canada.
- Environment Canada. (2002). Species at Risk Act, c. 29.
- Environment Canada. (2012). Canadian Aquatic Biomonitoring Network Field Manual for Wadeable Streams. Science and Technology Branch. 51 pp. Dartmouth, NS.
- Environment Canada. (2013). How Much Habitat is Enough? 3rd, 127 pp. Toronto.
- Fahrig, L. (2020). Why do several small patches hold more species than few large patches? *Global Ecology and Biogeography*, 29, 615-628.
- Fisheries and Oceans Canada. (1985). Fisheries Act R.S.C., 1985, c. F-14. Canada.
- Fisheries and Oceans Canada. (1994). Habitat Conservation and Protection Guidelines (First ed.).
- Fisheries and Oceans Canada. (2007). Isolated or Dry Open-Cut Stream Crossings. Fisheries and Oceans Canada Ontario Operational Statement, Version 1.0, 4 pp. . Ontario, Canada.
- Fisheries and Oceans Canada. (2019). Request for Review Form and Guidance. 11 pp. Canada.
- Fisheries and Oceans Canada. (2020). Aquatic Species at Risk Map. Canada. Retrieved from <https://www.dfo-mpo.gc.ca/species-especies/sara-lep/map-carte/index-eng.html>
- Forest Breeding Bird Survey. (2008). Forest Bird Monitoring Program - Site Set-Up and Bird Survey Instructions. Guelph, Ontario: Canadian Wildlife Service.
- Forman, R. T. (1995). Land Mosaics: The Ecology of Landscapes and Regions. Island Press.
- Francis, C. M., Austen, M. J., Bowles, J. M., & Draper, W. B. (2000). Assessing Floristic Quality in Southern Ontario Woodlands. *Natural Areas Journal*, 20, 66-77.
- Freemark, K. E., & Collins, B. (1992). Landscape Ecology of Birds Breeding in Temperate Forest Fragments. In J. M. Hagan III, & D. W. Johnston, *Ecology and Management of Neotropical Landbirds* (pp. 443-454). Washington, D.C.: Manomet Bird Observatory, Smithsonian Institute Press.
- Fry, G., & Sarlov-Herlin, I. (1997). The ecological and amenity functions of woodland edges in the agricultural landscape: a basis for design and management. *Landscape and Urban Planning*, 37(1-2), 45-55.
- Geomatics International Inc. (1995). Management Options for Old-Field Sites in Southern Ontario - Guidelines and Literature Review. 17 pp. Ontario, Canada: Southern Region Science and Technology Transfer Unit.
- Gibbons, P. G., Evans, M., Maron, M., Gordon, A., Le Roux, D., von Hase, A., . . . Possingham, H. (2015). A loss-gain calculator for biodiversity offsets and the circumstances in which No Net Loss is feasible. *Conservation Letters*(Open Access), 1-11.
- Gilman, E. (2003). Branch-to-stem diameter ratio affects strength of attachment. *Journal of Arboriculture*, 29(5), 291-293.
- Government of Ontario. (2014). Tree Atlas found at: <https://www.ontario.ca/environment-and-energy/tree-atlas/>
- Grace, J. M., & Zarnoch, S. J. (2013). Influence of forest road buffer zones on sediment transport in the Southern Appalachian Region. In J. Guldin, *Proceedings of the 15th Biennial Southern Silvicultural Research Conference* (Vol. 175, pp. 387-493). Asheville, North Carolina, USA: U.S. Department of Agriculture, Forest Service, Southern Research Station.
- Grand River Conservation Authority (GRCA). (2005). Environmental Impact Study Guidelines and Submission Standards for Wetlands
- Greater Golden Horseshoe Conservation Authorities. (2006). Erosion and Sediment Control Guideline for Urban Construction.

- Gregory, R., Ohlson, D., & Arvai, J. (2006). Deconstructing adaptive management: criteria for applications to environmental management. *Ecological Applications*, 16(6), 2411-2425.
- Guzy, J. C., Halloran, K. M., Homyack, J. A., Thornton-Frost, J. E., & Willson, J. D. (2019). Differential responses of amphibian and reptile assemblages to size of riparian buffers within managed forests. *Ecological Applications*, 29(8), e01995.
- Harris, I. D., & Scheck, J. (1991). From Implications to Applications: The Dispersal Corridor Principle Applied to the Conservation of Biological Diversity. In D. A. Saunders, & R. J. Hobbs, *Nature Conservation 2: The Role of Corridors*. Surrey Beatty & Sons.
- Haspel, C., & Calhoun, R. E. (1991). Ecology and behavior of free-ranging cats in Brooklyn, New York. In L. W. Adams, & D. L. Leedy, *Wildlife Conservation in Metropolitan Environments* (pp. 27-30). Columbia, Maryland, USA: National Institute for Urban Wildlife Symposium.
- Hawkes, V. C., & Gregory, P. T. (2012). Temporal changes in the relative abundance of amphibians relative to riparian buffer width in western Washington, USA. *Forest Ecology and Management*, 274, 67-80.
- Hilditch, T. C. (1993). Use of Woodland Evaluation System in Municipal Planning. In S. Strobl (Ed.), *Significant Woodlands Workshop Proceedings* (pp. 29-34). Leslie M. Frost Natural Resources Centre.
- Hilty, J.A., Worboys, G.L., Keeley, A., Woodley, S., Lausche, B., Locke, H., Carr, M., Pulsford, I., Pittcock, J., White, J.W., Theobald, D.M., Levine, J., Reuling, Mo., Watson, J.E.M., Ament, R., & Tabor, G.M. (2020). Guidelines for Conserving Connectivity Through Ecological Networks and Corridors (Issue 30). International Union for the Conservation of Nature (IUCN). <https://portals.iucn.org/library/node/49061>
- Holmes, A. M., Hess, Q. F., Tasker, R. R., & Hanks, A. J. (1991). *The Ontario Butterfly Atlas*. (D. Friesen, Ed.) Altona.
- Houlahan, J.E., and Findlay, S.C. (2003). The effects of adjacent land use on wetland amphibian species richness and community composition. *Canadian Journal of Fisheries and Aquatic Sciences* 60: 1078-1094.
- Hounsell, S. W. (1989). *Methods for Assessing the Sensitivity of Forest Birds and their Habitats to Transmission Line Disturbances*. Toronto: Land Use and Environmental Planning Department, Ontario Hydro.
- [Interagency Visitor Use Management Council \(IUVMC\). 2019. Monitoring Guidebook: Evaluating the Effectiveness of Visot Use Management. Edition OCe, June 2019, 118 pp.](#)
- International Union for Conservation of Nature. (2016). Biodiversity Offsets. Retrieved from <https://www.iucn.org/theme/business-and-biodiversity/our-work/business-approaches-and-tools/biodiversity-offsets>
- Jalava, J. V., Sorrill, P. J., Henson, J., & Brodri, K. (2000). *The Big Picture Project: Developing a Natural Heritage Vision for Canada's Southernmost Ecological Region*. Peterborough: Natural Heritage Information Cetnre.
- Jayasuriya, M. T. (2016). *Constrasting functional-based riparian management zones with the fixed-width buffer approach and how it relates to riparian management guidelines*. 156 pp. Syracuse, New York, USA: State University of New York, College of Environmental Science and Forestry.
- Johnson, R. G., & Temple, S. A. (1986). Assessing habitat quality for birds nesting in fragmented tallgrass prairies. In T. M. Verner, M. L. Morrison, & C. J. Raphi, *Wildlife 2000: Modelling Habitat Relationships of Terrestrial Vertebrates*. Madison, Wisconsin, USA: University of Wisconsin Press.
- Jones, C., Palmer, R. M., Motkaluk, S., & Walters, M. (2002). *Watershed Health Monitoring: Emerging Technologies*. CRC Press.
- Jones, C., Somers, K. M., Craig, B., & Reynoldson, T. B. (2007). *Ontario Benthos Biomonitoring Network Protocol*. Ontario Ministry of Environment.
- Koh, N. S., Hahn, T., & Ituarte-Lima, C. (2014). *A comparative analysis of ecological compensation programs: The effect of program design on the social and ecological outcomes*. Sweden: Uppsala University.

- Kuglerova, L., Agren, A., Jansson, R., & Laudon, H. (2014). Towards optimizing riparian buffer zones: Ecological and biogeochemical implications for forest management. *Forest Ecology and Management*, 334, 74-84.
- Lake Simcoe Region Conservation Authority. (2019). *Ecological Offsetting Policy*. 19 pp. Ontario, Canada.
- Lauenroth, W. K., & Gill, R. (2003). Turnover of root systems. *Root Ecology*, 61-89.
- Lee, H., Bakowsky, W., Riley, J., Bowles, J., Puddister, M., Uhlig, P., & McMurray, S. (1998). *Ecological Land Classification for Southern Ontario: First Approximation and Its Application*. Ministry of Natural Resources and Forestry.
- Lee, P., Smyth, C., and Boutin, S. (2004). Quantitative review of riparian buffer width guidelines from Canada and the United States. *Journal of Environmental Management*. 70: 165-180
- Lemieux, Christopher J., Aerin L. Jacob, and Paul A. Gray. 2021. *Implementing Connectivity Conservation in Canada*. Canadian Council on Ecological Areas (CCEA) Occasional Paper No. 22. Canadian Council on Ecological Areas, Wilfrid Laurier University, Waterloo, Ontario, Canada. vi + 216 pp.
- Leslie, H. (2018). Value of ecosystem-based management. *Proceedings of the National Academy of Sciences of the United States of America*. Vol 115, No. 14.
- Leuty, T. (1999). *Fact Sheet: Farm Tile Drains and Tree Roots*. Ontario, Canada: Ontario Ministry of Agriculture, Food and Rural Affairs.
- Lind, L., Hasselquist, E. M., & Laudon, H. (2019). Towards ecologically functional riparian zones: A meta-analysis to develop guidelines for protecting ecosystem functions and biodiversity in agricultural landscapes. *Journal of Environmental Management*, 249, 109391.
- Little, C., Cuevas, J. G., Lara, A., Pino, M., & Schoenholtz, S. (2015). Buffer effects of streamside native forests on water provision in watersheds dominated by exotic forest plantations. *Ecohydrology*, 8(7), 1205-1217.
- Macfarlane, D. M., Bredin, I. P., Adams, J. B., Zungu, M. M., Bate, G. C., & Dickens, C. W. (2015). *Preliminary guideline for the determination of buffer zones for rivers, wetlands, and estuaries*. Water Research Commission.
- Magee, D. (1996). *Preliminary List of the Area-Sensitive Breeding Birds*. Unpublished.
- Maron, M., Brownlie, S., Bull, J. W., Evans, M. C., von Hase, A., Quetier, F., . . . Gordon, A. (2018). The many meanings of no net loss in environmental policy. *Nature Sustainability*, 1(1), 19-27.
- Marshall Macklin Monaghan Ltd., Paragon Engineering Ltd., and Aquafor Beech Ltd. (1995). *City of London Subwatershed Studies Implementation Plan*. London.
- Matlack, G. R. (1993). Sociological edge effects: Spatial distribution of human impacts in suburban forest fragments. *Environmental Management*, 17(6), 153-164.
- McLachlan, S. M., & Bazely, D. R. (2003). Outcomes of longterm deciduous forest restoration in southwestern Ontario, Canada. *Biological Conservation*, 113(2), 159-169.
- McLaren, M. A., Konze, K., & Twiss, M. (1998). *Wildlife monitoring programs and inventory techniques for Ontario*. South Porcupine: Ontario Ministry of Natural Resources - Boreal Science Section.
- McWilliam, W., Eagles, P., Seasons, M., & Brown, R. (2012). Evaluation of planning and management approaches for limiting residential encroachment impacts within forest edges: A southern Ontario case study. *Urban Ecosystems*, 15(3), 753-772.
- Milne, R. J., & Bennett, L. P. (2007). Biodiversity and ecological value of conservation lands in agricultural landscapes of southern Ontario, Canada. *Landscape Ecology*, 22, 657-670.
- MECP (Ministry of Environment, Conservation, and Parks). (1990a). *Environmental Assessment Act, R.S.O. 1990, c. E.18*. Ontario.

MECP (Ministry of Environment, Conservation, and Parks). (1990b). Ontario Water Resources Act, R.S.O. 1990, c. Ontario.

MECP (Ministry of Environment, Conservation, and Parks). (2007). Endangered Species Act, 2007, S.O. 2007, c. Ontario.

MECP (Ministry of Environment, Conservation, and Parks). (2019). Management of Excess Soil - A Guide for Best Management Practices.

MMAH (Ministry of Municipal Affairs and Housing). (2017a). The Green Belt Plan, 2017 under the Greenbelt Act, 2005. 98 pp. Ontario, Canada: Queen's Printer for Ontario.

MMAH (Ministry of Municipal Affairs and Housing). (2017b). The Oak Ridges Moraine Conservation Plan, 2017 under the Oak Ridges Moraine Conservation Act, 2001. 88 pp. Ontario, Canada: Queen's Printer for Ontario.

MMAH (Ministry of Municipal Affairs and Housing). (2020). Provincial Policy Statement, 2020 under the Planning Act. 53 pp. Ontario, Canada: Queen's Printer for Ontario.

MNRF (Ministry of Natural Resources and Forestry). (1990). Conservation Authorities Act, R.S.O. 1990, c. Ontario.

MNRF (Ministry of Natural Resources and Forestry). (1997a). Fish and Wildlife Conservation Act, 1997, S.O. 1997, c. 41.

MNRF (Ministry of Natural Resources and Forestry). (1997b). Forest Management Guidelines for the Protection of the Physical Environment.

MNRF (Ministry of Natural Resources and Forestry). (2000a). A Silvicultural Guide to Managing Southern Ontario Forests.

MNRF (Ministry of Natural Resources and Forestry). (2000b). Significant Wildlife Habitat Technical Guide. Peterborough: Queen's Printer for Ontario.

MNRF (Ministry of Natural Resources and Forestry). (2004). Ontario Tree Marking Guide, Version 1.1. Ont. Min. Nat. Resour. Queen's Printer for Ontario. Toronto. 252 p.

MNRF (Ministry of Natural Resources and Forestry). (2006). Provincial Parks and Conservation Reserves Act, 2006, S.O. 2006, C. 12 - Bill 11. Ontario.

MNRF (Ministry of Natural Resources and Forestry). (2010a). Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales. Toronto: Queen's Printer for Ontario.

MNRF (Ministry of Natural Resources and Forestry). (2010b). Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005. Toronto: Queen's Printer for Ontario.

Ministry of Natural Resources and Forestry. (2011a). Bats and Bat Habitats: Guidelines for Wind Power Projects. Queen's Printer for Ontario.

MNRF (Ministry of Natural Resources and Forestry). (2011b). Ontario's Forest Management Guides: An Introduction. 18 pp.

MNRF (Ministry of Natural Resources and Forestry). (2012). Categorizing and Protecting Habitat under the Endangered Species Act, 2007. 8 pp. Toronto, Ontario: Species at Risk Branch, Policy Division.

MNRF (Ministry of Natural Resources and Forestry). (2013a). Species at Risk Branch – Best Practices Technical Note. 11 pp. Peterborough, Ontario

MNRF (Ministry of Natural Resources and Forestry). (2013b). The Stream Permanency Handbook for South-Central Ontario, 2nd Ed, 30 pp.

MNRF (Ministry of Natural Resources and Forestry). (2014a). Ontario Wetland Evaluation System Southern Manual Third Edition, Version 3.3. Queen's Printer for Ontario.

MNRF (Ministry of Natural Resources and Forestry). (2014b). Significant Wildlife Habitat Mitigation Support Tool.

- MNRF (Ministry of Natural Resources and Forestry). (2015a). Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E. Peterborough.
- MNRF (Ministry of Natural Resources and Forestry). (2015b). Survey Protocol for Blanding's Turtle (*Emydoidea blandingii*) in Ontario. Peterborough: Queen's Printer for Ontario.
- MNRF (Ministry of Natural Resources and Forestry). (2015c). Survey Protocol for Queensnake (*Regina septemvittata*) in Ontario. Peterborough: Species at Risk Policy Branch.
- MNRF (Ministry of Natural Resources and Forestry). (2016). Survey Protocol for Ontario's Species at Risk Snakes. Peterborough: MNRF Species Conservation Policy Branch.
- MNRF (Ministry of Natural Resources and Forestry). (2017a). A Wetland Conservation Strategy for Ontario 2017-2030. 52 pp. Toronto, Ontario, Canada: Queen's Printer for Ontario.
- MNRF (Ministry of Natural Resources and Forestry). (2017b). Ontario Stream Assessment Protocol - Version 10. (L. Stanfield, Ed.) Ontario, Canada: Fisheries Policy Section.
- MNRF (Ministry of Natural Resources and Forestry). (2017c). Survey Protocol for Species at Risk Bats within Treed Habitats, Little Brown Myotis, Northern Myotis, Tricolored Bat. Ministry of Natural Resources and Forestry, Guelph District.
- MNRF (Ministry of Natural Resources and Forestry). (2020). Natural Heritage Information Centre. Ontario, Canada. Retrieved from <https://www.ontario.ca/page/natural-heritage-information-centre>
- MNRF (Ministry of Natural Resources and Forestry). (2021). Birds and bird habitats: guidelines for windpower projects. Retrieved from <https://www.ontario.ca/page/birds-and-bird-habitats-guidelines-windpower-projects>
- Mitchell, G., & Crook, G. W. (1996). An Ontario Base Map terrain analysis toolbox for resource managers. NODA - Notes, Great Lakes Forestry Centre. Ontario, Canada.
- Moilanen, A., & Kotiaho, J. S. (2018). Fifteen operationally important decisions in the planning of biodiversity offsets. *Biological Conservation*, 227, 112-120.
- Morrison-Saunders, A., & Pope, J. (2013). Conceptualising and managing trade-offs in sustainability assessment. *Environmental Impact Assessment Review*, 38, 54-63.
- Noga, W., & Adamowicz, W. L. (2014). A Study of Conservation Offset Programs: Lessons Learned from a Review of Programs, Analysis of Stakeholder Perceptions, and Investigation of Transaction Costs. 65 pp. Ottawa, Ontario, Canada: Sustainable Prosperity.
- North-South Environmental. (2009). Inventory and Evaluation of Woodlands: City of London. London: City of London.
- Nottawasaga Valley Conservation Authority. (2019). Achieving Net Gains through Ecological Offsetting: Guidelines for Preparing a Site-Specific Ecological Offsetting Plan. Draft for Discussion, 20 pp. Ontario, Canada.
- Olden, A., Selonen, V. A., Lehtonen, E., & Kotiaho, J. S. (2019). The effect of buffer strip width and selective logging on streamside plant communities. *BMC Ecology*, 19(1), 9.
- Oldham, M. J. (1994). Natural Heritage Resources of Ontario: Mosses. 23 pp. Peterborough, Ontario: Natural Heritage Information Centre.
- Oldham, M. J. (2003). Conservation Status of Ontario Amphibians. Peterborough, ON: Natural Heritage Information Centre. Ontario Ministry of Natural Resources.
- Oldham, M. J. (2017). List of the Vascular Plants of Ontario's Carolinian Zone (Ecoregion 7E). 132 pp. Peterborough, Ontario: Carolinian Canada and Ministry of Natural Resources and Forestry.
- Oldham, M. J., & Brinker, S. R. (2009). Rare Vascular Plants of Ontario. Natural Heritage Information Centre.
- Oldham, M. J., & Weller, W. F. (2000). Ontario Herpetofaunal Atlas. Ontario, Canada: Natural Heritage Information Centre.

- Oldham, M. J., Bakowsky, W. D., & Sutherland, D. A. (1995). Floristic Quality Assessment System for Southern Ontario. Peterborough: Ministry of Natural Resources and Forestry.
- Oldham, M., Bakowsky, W., & Sutherland, D. (1995). Floristic Quality Assessment System for Southern Ontario.
- Ontario American Badger Recovery Team. (2010). Recover Strategy for the American Badger (*Taxidea taxus*) in Ontario. 27 pp. Peterborough, Ontario: Ministry of Natural Resources and Forestry.
- Ontario Breeding Bird Atlas. (2001). Ontario Breeding Bird Atlas Guide for Participants. Guelph, Ontario.
- Ontario Breeding Bird Atlas. (2002). Ontario Breeding Bird Atlas - Standardized Owl Surveys. Guelph: Bird Studies Canada, Federation of Ontario Naturalists, Canadian Wildlife Service, Ontario Field Ornithologists, and Ministry of Natural Resources and Forestry.
- Ontario Breeding Bird Atlas. (2007). The Atlas of the Breeding Birds of Ontario, 2001-2005. (M. D. Cadman, D. A. Sutherland, G. G. Beck, D. Lepage, & A. R. Couturier, Eds.) Toronto, Ontario, Canada: Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ministry of Natural Resources and Forestry, and Ontario Nature.
- Ontario Centre for Soil Resource Evaluation. (1993). Field Manual for Describing Soils in Ontario (4th ed.). Ontario, Canada: Publication No. 93-1.
- Ontario Institute of Pedology. (1985). Field Manual for Describing Soils (Third ed.). Guelph: Ontario Institute of Pedology, Guelph Agriculture Centre, and University of Guelph.
- Ontario Nature. (2019). Ontario Reptile and Amphibian Atlas. Ontario, Canada: Toronto Entomologists' Association. Retrieved from <https://www.ontarioinsects.org/herp/>
- Ontario Road Ecology Group. (2010). A Guide to Road Ecology in Ontario. 72 pp. Scarborough, Ontario
- Ontario (2009). Lake Simcoe Protection Plan
- Ouin, A., Cabanettes, A., Andrieu, E., Deconchat, M., Roume, A., Vigan, M., & Larrieu, L. (2015). Comparison of tree microhabitat abundance and diversity in the edges and interior of small temperate woodlands. *Forest Ecology and Management*, 340, 31-39.
- Palone, R. S., & Todd, A. H. (1997). Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers. Radnor, Pennsylvania, USA: USDA Forest Service.
- Partners in Flight (PIF). (2020). Avian Conservation Assessment Database. Retrieved from Available at: <https://www.partnersinflight.org/wp-content/uploads/2016/07/SPECIES-OF-CONT-CONCERN-from-pif-continental-plan-final-spread-2.pdf>
- Poulton, D., & Bell, A. (2017). Navigating the Swamp: Lessons on Wetland Offsetting for Ontario. Ontario, Canada.
- Powell, J. S., & Babbitt, K. J. (2016). Buffer-mediated effects of clearcutting on in-pool amphibian productivity: Can aquatic processes compensate for terrestrial habitat disturbance? *Forests*, 8(1), 10.
- Powell, J. S., & Babbitt, K. J. (2015). An experimental test of buffer utility as a technique for pool-breeding amphibians. *PloS one*, 10(7).
- Powell, J. S., & Babbitt, K. J. (2015). Despite buffers, experimental clearcuts impact amphibian body size and biomass. *PloS one*, 10(11).
- Powney, G., Broaders, L., & Oliver, T. (2012). Towards a measure of functional connectivity: Local synchrony matches small scale movements in a woodland edge butterfly. *Landscape Ecology*, 27, 1109-1120.
- Pratt, W.A., and Fox, T.R. (2009). Streamside Management Zones Effectiveness for Protecting Water Quality after Forestland Application of Biosolids. *Journal of Environmental Quality*. 38:2106-2120
- Pyron, M. (2010). Characterizing Communities. *Nature Education Knowledge*, 3(10):39.
- Province of Ontario. (2020). *Public Lands Act*, R.S.O. 1990, c.P.43. Ontario.

Renwick, W.H. (2009). Lakes and Reservoirs of North America in Encyclopedia of Inland Waters. 2250 pp. Millbrook, NY, USA.

Region of Waterloo. (2016). Region of Waterloo Greenlands Network Implementation Guideline. Ontario, Canada.

Richardson, J. S., Naiman, R. J., & Bisson, P. A. (2012). How did fixed-width buffers become standard practice for protecting freshwaters and their riparian areas from forest harvest practices? *Freshwater Science*, 31(1), 232-238.

Riley, J. L. (1995). Distribution and Status of the Vascular Plants of the Central Region. Richmond Hill: Ontario Ministry of Natural Resources and Forestry.

Riley, J. R., & Mohr, P. (1994). The Natural Heritage of Southern Ontario's Settled Landscapes: a Review of Conservation and Restoration Ecology for Land-Use and Landscape Planning. Aurora: Ministry of Natural Resources and Forestry.

Sandilands, A. (1997). Memo to London ESA Committee April 9 1997 on Freemark and Collins (1992). London, Ontario.

Sawatzky, M. E., & Fahrig, L. (2019). Wetland buffers are no substitute for landscape-scale conservation. *Ecosphere*, 10(4), e02661.

Semlitsch, R. D., & Newbold, J. D. (2003). Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. *Conservation Biology*, 17, 1219-1228.

Simmonds, J. S., Sonter, L. J., Watson, J. E., Bennun, L., Costa, H. M., Dutson, G., . . . Maron, M. (2019). Moving from biodiversity offsets to a target-based approach for ecological compensation. *Conservation Letters*(Open Access), 1-11.

Smith, P. G., & Theberge, J. B. (1987). Evaluating natural areas using multiple criteria: Theory and practice. *Environmental Management*, 11, 447-460.

Soil Classification Working Group. (1998). The Canadian System of Soil Classification (Third ed.). Agriculture and Agri-Food Canada.

Solyman, B. (2005). A Stewardship Guide to Grasslands in Southern Ontario: An Introduction for Farmers and Rural Landowners. 34 pp. Ontario, Canada: Ontario Barn Owl Recovery Project.

Strong, W. L., Oswald, E. T., & Downing, D. J. (1990). The Canadian Vegetation Classification System: First Approximation (Vol. 25). (Canada Committee on Ecological Land Classification, & National Vegetation Working Group, Eds.) Ottawa, Ontario, Canada.

Sweeney, B. W., & Newbold, J. D. (2014). Streamside forest buffer width needed to protect stream water quality, habitat, and organisms: A literature review. *Journal of the American Water Resources Association*, 50(3), 560-584.

[Thompson, B. \(2015\). Recreational trails reduce the density of ground-dwelling birds in protected areas. *Environmental Management*. 2015 May; 55\(5\):1181-90. Accessed at: <https://pubmed.ncbi.nlm.nih.gov/25813628/>](#)

Teply, M., McGreer, D., & Ceder, K. (2014). Using simulation models to develop riparian buffer strip prescriptions. *Journal of Forestry*, 112(3), 302-311.

Terra Geographical Studies Inc. (1994). Draft Terrestrial Resource Strategy. Ontario.

Toronto and Region Conservation Authority. (2018). Guideline for Determining Ecosystem Compensation. 46 pp. Ontario, Canada.

Toronto and Region Conservation Authority (TRCA). (2019a). Erosion and Sediment Control Guide for Urban Construction. 235pp. Ontario, Canada.

[Toronto and Region Conservation Authority \(TRCA\). \(2019b\). Trails Strategy for the Greater Toronto Region. September 2019, 63 pp.](#)

Toronto Entomologists' Association. (2018). Ontario Butterfly Atlas. Ontario, Canada. Retrieved from <https://www.ontarioinsects.org/atlas/>

Troy, A., & Bagstad, K. (2009). Estimating Ecosystem Services in Southern Ontario. Ontario Ministry of Natural Resources and Forestry.

UTRCA (Upper Thames River Conservation Authority). (1997). Oxford County Terrestrial Ecosystems Study: A Natural Heritage Study for Oxford County. London.

UTRCA (Upper Thames River Conservation Authority). (2003). Middlesex County Natural Heritage Systems Study. London.

UTRCA (Upper Thames River Conservation Authority). (2014). Middlesex Natural Heritage Systems Study: A Study to Identify Natural Heritage Systems in Middlesex County. London.

UTRCA (Upper Thames River Conservation Authority). (2017). Environmental Planning Policy Manual for the Upper Thames River Conservation Authority.

Valdes, A., Lenoir, J., De Frenne, P., Andrieu, E., Brunet, J., Chabrierie, O., . . . Decocq, G. (2020). High ecosystem service delivery potential of small woodlands in agricultural landscapes. *Journal of Applied Ecology*, 57(1), 4-16.

Vanneste, T., Govaert, S., Spicher, F., Brunet, J., Cousins, S. A., Decocq, G., . . . De Frenne, P. (2020). Contrasting microclimates among hedgerows and woodlands across temperate Europe. *Agricultural and Forest Meteorology*, 281, 107818.

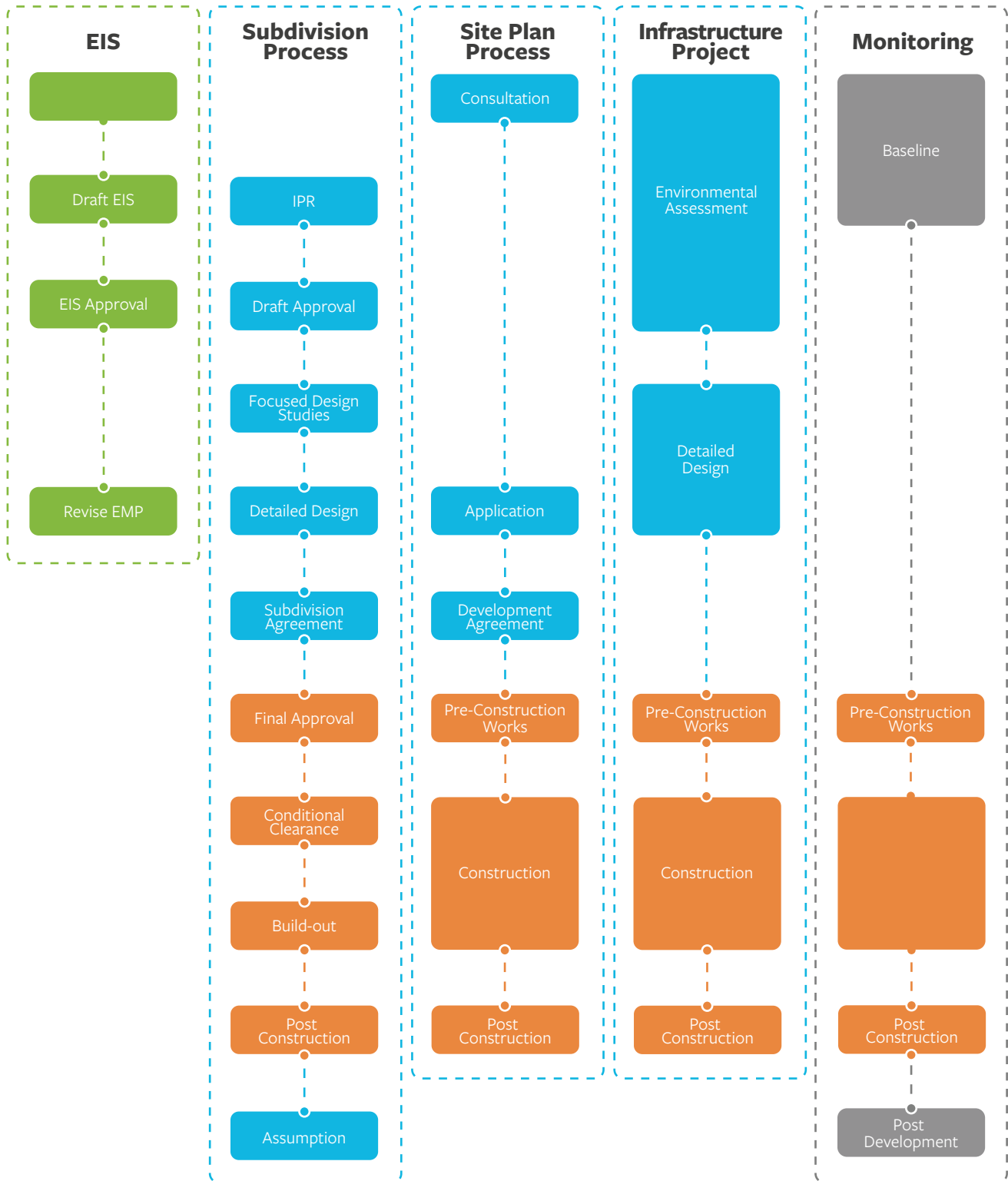
Woodard, S. E., & Rock, C. A. (1995). Control of residential stormwater by natural buffer strips. *Lake and Reservoir Mangement*, 11(1), 37-45.

zu Ermgassen, S. O., Baker, J., Griffiths, R. A., Strange, N., Struebig, M. J., & Bull, J. W. (2019). The ecological outcomes of biodiversity offsets under "no net loss" policies: A global review. *Conservation Letters*, 12(6), e12664.

Appendix A

EMG Process Flowchart

Environmental and Development/ Infrastructure Process Timeline



Appendix B

Environmental Scoping Checklist

APPENDIX B - Environmental Study Scoping Checklist

Application/Project Name: _____
Proponent: _____ Date: _____
Proposed Project Works: _____
Study Type: _____
Lead Consultant: _____
Key Contact: _____
Subconsultants: _____

Technical Review Team:

- Ecologist Planner: _____ MNRFP Province – Species at Risk:

- Planner for the File: _____ MECPP Province - Other:

- Conservation Authority: _____ Contact: _____
- EEPAC: _____ Other: _____
- Project Manager, Environmental Assessment: _____

Subject Lands and Study Area:

Location/Address and Size (ha) of Subject Lands:

Study Area Size (approximate ha): _____ Map (attached): _____

Position of Site in Subwatershed: _____

Tributary Fact Sheet: _____

Is the proposed location within the vicinity of the Thames River (<120 m)? Yes No

If Yes, initiate engagement with local First Nation communities. Consultation activity to be provided at Application Review stage.

Policy:

- Study must demonstrate how it conforms to the Provincial Policy Statement
- Study must demonstrate how it conforms to *The London Plan*

Map 1 Place Types:

- Green Space Environmental Review

Other Place Types: _____

Map 4 Active Mobility Network:

Pathway placement and future trail accesses shall be considered as part of this study.

Map 5 Natural Heritage System:

(Subject Lands and Study Area delineated on the current aerial photographs, including a 5—10 km radius of Subject Area)

- | | |
|--|---|
| <input type="checkbox"/> Provincially Significant Wetland | Name: _____ |
| <input type="checkbox"/> Wetlands | <input type="checkbox"/> Unevaluated Wetlands* |
| <input type="checkbox"/> Area of Natural & Scientific Interest | Name: _____ |
| <input type="checkbox"/> Environmentally Significant Area | Name: _____ |
| <input type="checkbox"/> Potential ESAs | <input type="checkbox"/> Upland Corridors |
| <input type="checkbox"/> Significant Woodlands | <input type="checkbox"/> Woodlands |
| <input type="checkbox"/> Significant Valleylands | <input type="checkbox"/> Valleylands |
| <input type="checkbox"/> Unevaluated Vegetation Patches | <input type="checkbox"/> Potential Naturalization Areas |

Patch No. _____

** ELC (air photo interpretation and / or previous studies) may identify potential wetlands or other potential features not captured on Map 5.*

Map 6 Hazards and Natural Resources:

Maximum Hazard Line Conservation Authority Regulation Limit (and text based regulatory limit) – Project falls under *Conservation Authority Act* Section 28

Required Field Investigations:

Aquatic:

- Aquatic Habitat Assessment: _____
- Fish Community (Collection): _____
- Spawning Surveys: _____
- Benthic Invertebrate Survey: _____
- Mussels: _____
- Other: _____

Wetlands:

- Wetland Delineation: _____
- Wetland Evaluation (OWES): _____
- Other: _____

Terrestrial (Wetland, Upland and Lowland):

- Vegetation Communities (ELC): _____
- Botanical Inventories Winter Spring Summer Fall
- Breeding Bird Surveys (type & frequency): _____
- Raptor Surveys: _____ Shoreline Birds: _____
- Crepuscular Surveys: _____ Grassland Surveys: _____
- Amphibian Surveys (type & frequency): _____
- Reptile Surveys:
 - Turtle (type & frequency): _____
 - Snake (type & frequency): _____
 - Other (type & frequency): _____
- Bat Habitat, Cavity & Acoustic Surveys: _____
- Mammal Surveys: _____
 - Winter Wildlife Surveys: _____
- Butterflies (Lepidoptera): _____
- Dragonflies / Damselflies (Odonata): _____
- Species at Risk Specific Surveys: _____
- Species of Conservation Concern Surveys: _____
- Significant Wildlife Habitat Surveys: _____
- Other field investigations: _____

Supporting Concurrent Studies/Investigations:

- Hydrogeological/Groundwater: _____
- Surface Water/Hydrology: _____
- Water Balance: _____
- Fluvial Geomorphological: _____
- Geotechnical: _____
- Tree Inventory: _____
- Other: _____

Evaluation of Significance:

Federal:

- Fish Habitat Other Federal: _____
- Species at Risk (SARA)

Provincial:

- Provincially Significant Wetlands
- Significant Woodlands
- Significant Valleylands
- Significant Wildlife Habitat Ecoregion 7E
- Areas of Natural & Scientific Interest
- Fish Habitat
- Water Resource Systems
- Species at Risk (ESA): _____

Municipal/London:

- Environmentally Significant Areas (ESAs), Potential ESAs
- Significant Woodlands, Woodlands
- Significant Valleylands, Valleylands
- Wetlands, Unevaluated Wetlands
- Significant Wildlife Habitat
- Unevaluated Vegetation Patches
- Other Vegetation Patches >0.5 ha
- Potential Naturalization Area
- Other: _____

Impact Assessment:

- Impact Assessment Required
- Net Effects Table Required

Environmental Management Recommendations:

- Environmental Management Plan: _____
- Specifications & Conditions of Approval: _____
- Other: _____

Environmental Monitoring:

- Baseline Monitoring: _____
- Construction Monitoring: _____
- Post-Construction Monitoring: _____

Appendix C

Data Collection Standards

APPENDIX C – Data Collection Standards

Understanding the features and functions of natural areas is considered central to the assessment of significance and to the evaluation of potential impacts of development and recommendations of environmental management strategies. The following sections provide insight into the methodologies and standards required for data collection for informing natural heritage studies within the City of London.

Background

The identification and evaluation of natural features and ecological functions form the basis for assessing the effects of a proposed development on an area and its adjacent lands. It is critical to obtain sufficient, accurate information on the existing conditions of natural heritage features and their functions to ensure an informed impact assessment for a proposed development or infrastructure project (MNR, 2010a). Inventory protocols (as outlined below) provide a standard for effectively evaluating the existing abiotic and biotic elements of natural heritage features and provide strong field data to inform impact assessment, mitigation, and monitoring for proposed development or infrastructure projects. It may be necessary to use multiple assessment methodologies to capture all data (e.g., Marsh Monitoring auditory surveys and SWH visual assessment).

Further, the intention of Data Collection Standards is to ensure that all new information collected for various studies, including EIS, uses a similar approach and format so that it may be entered into regional databases and compared with existing information. The size of the study area should not affect the ability to make comparative evaluations. Watershed and sub-watershed studies establish a robust baseline of information from which comparative evaluations can be made.

For some natural heritage features and areas, the level of effort required to determine significance may be made at a landscape level (e.g., Significant Woodlands), without conducting a detailed site inventory. However, it is important to collect all levels of information required at the landscape, community, and species levels to address the potential for impacts. The specific elements required for the natural heritage inventory and analysis component of an EIS will vary depending on the size, type, location of the development, and the natural feature that may experience negative impacts. Important elements of study for any given EIS will be selected from a detailed list, however not all elements will need to be included in every EIS (refer to **Section 2.6**).

Guidelines for Data Collection

An Environmental Study must be based on data that is considered current and collected using established protocols and standards, including data collected by the proponent as it informs the analysis, recommendations, and conclusions that are provided within the EIS. Field data reflects the site conditions at the time of collection, however over time conditions on site can change due to a variety of reasons (e.g., vegetation growth, disturbances, and shifts in vegetation community composition). These changes in conditions can affect the accuracy and applicability of the field data. The “shelf life” of field data can vary depending on the type of data, the site, or the surrounding conditions.

Where relatively current data (up to 5 years) is available for the site and it meets the City of London’s Data Collection Standards (outlined in this document), it may be applied to meet some of the requirements for three- or five-season inventory (as determined through consultation with the City of London). However, a minimum of two wildlife/ecological site visits will still be required to verify and document current/existing conditions, unless otherwise specified in the ESSC. The timing of the site visits will be made to supplement information gaps, confirm significant, rare and sensitive features, delineate ecological boundaries, and to identify site specific impact, mitigation, and management requirements. Where there is older inventory information available (5 to 10 years) it must be confirmed through current

inventory studies. The existing data (assuming it meets the City of London's Data Collection Standards) may be used to supplement current field studies and provide historical context and population, species, vegetation trends, and changes over time. The use of these data to supplement or replace the need for more current inventory will be evaluated on a case-by-case basis in consultation with the City of London.

It is recommended that reputable citizen science data sources, such as iNaturalist and the Ontario Reptile & Amphibian Atlas, be reviewed when conducting a background review to supplement data obtained by the consultant team.

Inventory Protocols

Multi-season inventories must be conducted during optimal sampling conditions and with sufficient sampling effort, such that data is of sufficient quality to assess the presence and significance of natural heritage features and functions. Optimal sampling conditions and the necessary sampling effort differ among taxa and should be determined based on species-specific protocol recommendations and / or estimates of detection probability. Sampling design will be determined during pre-consultation using the protocols included in these guidelines. Typical timeframes, in accordance with seasonal timing windows, for various, inventory types include, but are not limited to, the following:

1. **Early Spring (late March/early April)**
 - Amphibians
2. **Spring (late April – May)**
 - Amphibians, Reptiles, Vascular Plants, Vegetation Communities, Breeding Birds (May)
3. **Early Summer (June)**
 - Amphibians, Breeding Birds, Mammals (including Bat acoustic surveys), Vascular Plants, Vegetation Communities, Aquatic Communities and Habitat, Butterfly and Insect Monitoring
4. **Summer (early July/early August)**
 - Vegetation Communities, Significant Wildlife Habitat, Vascular Plants, Butterflies and Insects
5. **Fall (September-October)**
 - Migratory Birds Vascular Plants, Vegetation Communities Reptiles, Mammals, Butterflies and Insects
6. **Winter (November-February)**
 - Bat Leaf off surveys, Winter wildlife surveys

An outline of the comprehensive inventory protocols for species occurring in the study area and adjacent lands must be conducted by qualified professionals in the appropriate seasons as described below. When applicable, [MECP-Provincial](#) species-specific protocols should be used to document SAR. New and emerging techniques not listed below may be considered and / or required as determined in consultation with the City of London and other applicable agencies to ensure robust and accurate inventory results.

1. **Vegetation Communities** A survey of vegetation community types should be undertaken during the main growing season, preferably over three different seasons, spring, summer and fall (generally during the period late May to early September). Community description should follow the Ecological Land Classification (ELC) for southern Ontario (Lee *et al.*, 1998) to Vegetation Community Type, or contain an equivalent or greater level of structural and floristic detail. The report should present both a description of the communities and vegetation maps superimposed on an air photo or a base map of scale 1:5 000 that shows contours and water courses.

For each community type the following technical information should be included:

- A full list of vascular plant species present and an indication of their abundance.
- An assessment of soil type(s), drainage regime and moisture regime.
- An identification of the ELC Class, Series, Ecosite, Vegetation Type (Lee *et al.*, 1998).
- The element ranking for each ELC Vegetation Type (Bakowsky, 1997).
- An annotated assessment of community condition through the calculation of the Floristic Quality Index (Oldham *et al.*, 1995) or another current, equivalent community assessment method including the number of native species, number of non-native species, number of conservative species (conservatism coefficient ≥ 7), mean conservatism coefficient of native species, and sum of weediness scores.
- A summary of tree species, with age and / or size class distribution, including basal area by size class.
- Other indications of community condition including amount of decayed coarse woody debris.

2. **Vascular Plants**

- A survey of vascular plants should be carried out during April-May for spring ephemerals, June-August to capture summer flowering periods and September-October to capture fall flower periods. Surveys should have regard to weather variability in a given year.
- Locations of globally, nationally, provincially and regionally rare vascular plant species should be mapped, and the extent of habitat for each species outlined. Recommendations should be made for additional protection of rare species.
- Nationally rare species as listed in the NHIC website; species with a global rank (G-rank) for G1 to G3 (Oldham and Brinker, 2009; NHIC website), or with a COSEWIC status of Endangered, Threatened, or Special Concern.
- Provincially rare species are those listed with a sub-national rank (S-rank) of S1 to S3 (NHIC website) and MNRF SAR in Ontario (Bowman, 1996) and COSSARO.
- Regional rarity status should be assessed using Oldham and Brinker (2009), Oldham (2017), or from the best available information.

3. **Breeding birds** – Breeding and migratory bird surveys should be conducted as follows:

- Main breeding season surveys as outlined by Cadman *et al.* (1998): a minimum of two surveys, at least a ten days apart, between May 24-July 10. The first survey should take place May 24 – June 17, and the second June 15 – July 10.
 - Surveys to occur 5:00 to 10:00 a.m. for breeding bird survey (Cadman *et al.*, 1998)
 - Time of day and weather conditions consistent with the Ontario Breeding Bird Atlas participant's guide (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 survey for crepuscular species (e.g., American Woodcock, Common Nighthawk) in accordance with standardized protocols as outlined in OBBA (2001).
- Nocturnal owl surveys usually consist of two surveys in the spring and should be conducted in accordance with the OBBA Standardized Owl Survey Protocol (OBBA, 2002).
- Where suitable, marsh breeding bird surveys should be conducted in accordance with Marsh Breeding Bird Program standard survey techniques (BSC, 2009b).

- Where candidate Raptor Wintering Areas are identified, winter raptor surveys should be conducted to confirm SWH in accordance with the Bird and Bird Habitats: Guidelines for Windpower Projects (MNR, 2015a; MNR, 2021).
- Field data (such as breeding evidence, behaviours, SAR occurrences) should be collected and documented in accordance with standard protocols as above, included in mapping (i.e., aerial photography), and following standard terminology (e.g., codes, symbols; OBBA, 2001; Forest Breeding Bird Survey, 2008).

4. Herpetofauna

- Surveys for newts and mole salamanders, where required, should be conducted during seasonal migration (mid March – late April) and may include a combination of minnow traps, visual surveys (e.g., carefully flipping suitable cover, observing vernal pool egg masses), pitfall or funnel traps, or fine mesh dip nets may be required as outlined in McLaren *et al.* (1998). Consultation with local experts and the MNR is recommended for determining the timing (as surveys are highly weather dependent to capture migration) and specific survey techniques to be used based on location, species, etc.
- Surveys to confirm presence of lungless salamanders should take place in spring or fall as outlined in the Joint EMAN / Parks Canada National Monitoring Protocol for Plethodontid Salamanders (Zorn *et al.*, 2004).
- Anuran surveys consist of documenting calls and should be conducted in accordance with the standardized Bird Studies Canada’s Marsh Monitoring Program protocol for amphibians (BSC, 2009a). Surveys should be conducted as close to suitable breeding sites as possible (and preferably directly adjacent) and surveyors should record direction, distance, and call codes (BSC, 2009a).
- Observational surveys are required during the spring (between March-June) when amphibians are concentrated around suitable breeding habitat in wetlands and woodlands. (MNR, 2000b)
- Turtle surveys may consist of nesting surveys (late May – early July) in suitable nesting habitat or along gravel shoulders of roads, as well as visual encounter surveys to detect basking turtles following Ministry of Natural Resources and Forestry protocol for Blanding’s Turtle (MNR, 2015b).
- Snake surveys may consist of the following techniques, as required:
 - Visual Encounter Surveys searches between late April and late June (Ministry of Natural Resources and Forestry Survey Protocol for Species at Risk Snakes; MNR, 2016).
 - Hibernacula searches may be required and consist of visual encounter surveys to detect basking snakes during the first sunny, warm days in early spring.
 - Cover board surveys may be conducted where appropriate.
 - Wildlife Scientific Collector’s Authorization (under the *Fish and Wildlife Conservation Act*), along with an associated Animal Care Protocol approved by the MNR Wildlife Care Committee, and may be required for any surveys that require handling of snakes.
 - Queensnake (*Regina septemvittata*) surveys along the Thames River may be required and should be conducted in accordance with the standard Survey Protocol for Queensnake in Ontario (MNR, 2015c).
- Resources for identification of herpetofauna egg and larval stages should be utilized (e.g., <http://www.torontozoo.com/adoptapond/resources>)

5. Mammals

- Bats, SAR Bats, and Bat Habitat (SWH): Criteria from the Significant Wildlife Habitat Technical Guide (2000) should be considered to determine bat related SWH. Further, the Survey Protocol for Species at Risk Bats within Treed Habitats (MNRF, 2017b) and Bat and Bat Habitats: Guideline for Wind Power Projects (MNRF, 2011b) documents provide additional information for surveying for bats and associated habitat.
 - Surveys may include bat cavity assessments, exit surveys to confirm presence, and bat acoustic monitoring to determine species composition, etc.
 - Correspondence with [MNRF, MECP, the Province](#) and the City of London may be required to determine the design and amount of surveys required.
- Other mammals (e.g., deer, badgers, moles): Surveys may be required for other mammal-related SWH or SAR mammals with appropriate methodologies determined in consultation with the [MNRF, MECP, Province](#) and / or the City of London.
- Incidental mammal observations, including scat and tracks, should be recorded and included within reports. Identification resources are useful for determining mammal species present within a study area.
 - Mammal identification and Tracking Guide: <https://www.forestsontario.ca/wp-content/uploads/2016/04/Mammal-Identification-and-Tracking-Guide.pdf>

6. Non-target wildlife

All species incidentally observed or detected during fieldwork (e.g., Lepidoptera, Odonata, mammals, birds, herpetofauna) should be identified, recorded and integrated into report findings. As much information about the incidental wildlife should be recorded as possible including, but not limited to, species, age, photographic evidence, location, habitat, and behaviour. Incidental observations can provide insight into the environmental conditions of the site and potential SWH.

7. Aquatic communities and habitats survey:

A survey of aquatic communities and habitats should be completed at the most appropriate times for sampling various species over the course of a year and should be completed to supplement data obtained during the background review, if necessary. The scope (i.e., level of detail) and need should be determined based on agency requirements and presence of current (i.e., within the last five years) data appropriate for the particular level of study. Technical data requirements will be determined in consultation with the City of London and may include, but is not limited to the following:

Fish Community Inventory

- Fish community inventories might not be necessary if current, appropriate data are available and obtained through consultation with DFO, [MNRF, MECP, the Province, CA, local Conservation Authorities and /](#) or the City of London.
- In the event that fish community inventories are required, they should be scoped with the appropriate regulatory agency (e.g., DFO, [the Province, local Conservation Authorities and / MNRF, MECP, CA, or T](#) the City of London) based on project requirements
- Assuming fish community inventories are required, presence / absence surveys should be conducted using sampling gear appropriate to the water features, time of year, and (if appropriate) species / type of fish targeted (e.g., seine, minnow traps and electrofishing)
- Dependent upon project / agency requirements, detailed data and analysis might be required, and would be identified through consultation with the appropriate regulatory agency. Data gathering and analysis might consist of the following:
 - Index of Biotic Integrity (IBI; Steedman, 1988)

- Ontario Stream Assessment Protocol (MNRF, 2017c)

Benthic Survey

- ~~Often a component of detailed water quality assessments associated with specific project types such as assimilative capacity studies~~
- Typically includes qualitative and quantitative sampling of benthic macroinvertebrates
- Scope and specific data analysis tools should be determined on a project specific basis with appropriate regulatory agencies
- For example: Ontario Benthos Biomonitoring Network Protocol Manual (Jones *et al.*, 2007), Canadian Aquatic Biomonitoring Network (Environment Canada, 2012).

Habitat Assessment and Stream Analysis

- Target Habitat Suitability Index (I) are habitat models developed for specific target species.
- Water chemistry (e.g., dissolved oxygen, temperature, pH, conductivity)
- Watercourse morphology (e.g., bankfull width, depth, stream order)
- Substrate composition
- Riparian (i.e., within 30 m of the bank or as per mandated project-specific protocol) and in-water cover
- Surrounding land uses (i.e., beyond the immediate riparian area)

8. Significant Wildlife Habitat (SWH):

- All ~~potential~~ candidate SWH criteria should be surveyed using current accepted methodologies;
- SWH surveys should be consistent with the current Significant Wildlife Habitat Technical Guide (MNRF, 2000b), Significant Wildlife Habitat Mitigation Support Tool (MNRF, 2014b), and the most current Ministry SWH Criteria Schedules for Ecoregion 7E (MNRF, 2015a);
- SWH surveys should be consistent with additional considerations outlined in ***The London Plan – Policy 1352 - 1355***; and,

9. Regionally Rare Species

Documentation of regionally rare species should include presence absence, population size, habitat, and any other pertinent information (e.g., nesting areas, dens, etc.) and be included in mapping as appropriate population size, condition, and the significance of the site for all regionally rare species. Regional status for Middlesex County should be assessed based on the best available information including, but not limited to:

- Mammals (Dobbyn, 1994)
- Breeding birds (OBBA, 2007; current atlas updates; Partners in Flight, 2020)
- Butterflies (Holmes *et al.*, 1991; Toronto Entomologists' Association, 2018)
- Damselflies and Dragonflies
- Herpetofauna (Oldham and Weller, 2000; Oldham, 2003; Ontario Nature, 2019)
- Vegetation (Oldham, 2017)

10. Species at Risk (SAR)

If potential suitable habitat for SAR (as listed in *O. Reg. 230/08: SPECIES AT RISK IN ONTARIO LIST*) is encountered and is not covered in the above inventory protocols, ~~MECP Provincial~~ species-specific protocols (<https://www.ontario.ca/page/species-risk-guides-and-resources>) should be used in consultation

with the [MECP Province](#) and the City of London (through scoping). Targeted surveys may be required, as determined through the scoping process in consultation with the City of London and the [MECP Province](#), based on the presence of suitable habitat, confirmed sightings, along with the potential impacts associated with a given development or infrastructure project.

Appendix D

Woodland Evaluation Form

Appendix D: Woodland Evaluation Criteria

The London Plan – Criterion 1341 1.

The woodland contains natural features and ecological functions that are important to the environmental quality and integrity of the NHS. These include site protection (hydrology and erosion/slope) and landscape integrity (richness, connectivity and distribution).

The London Plan – Criterion 1341 2.

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

The London Plan – Criterion 1341 4.

The Woodland provides significant habitat for endangered or threatened species.

The London Plan – Criterion 1341 5.

The Woodland contains distinctive, unusual or high-quality natural communities or landforms.

Consistent with **The London Plan** a woodland will be considered significant if it meets either of the following evaluation scores:

- If one or more criteria meet the standard for High; or
- If five or more criteria meet the standard for Medium.

London Plan Criterion					<u>SCORE</u>
Criterion 1.1. – Site Protection	A) Presence of hydrological features within or contiguous with the patch.	HIGH – one (1) or more hydrological features (as described above) located within or contiguous with the patch.	MEDIUM – within 50 m of a hydrological feature.	LOW – no hydrological features present within 50 m of the patch.	
	B) Erosion and Slope Protection	HIGH – patch present on steep slopes >25% of any soil type, OR on a remnant slope associated with other features such as moraines or remnant valley slopes no longer continuous with the river system OR	MEDIUM – patch present on moderate to steep slopes > 10% - 25% with less erodible soils (heavy clay and clay, silty clay)	LOW – Patch present on gentle slopes < 10% with any soil type.	

		on moderate to steep slopes >10% - 25% with erodible soils (silty loam, sandy loam and loam, fine to coarse sands).			
Score for Criterion 1.1 is based on the highest standard achieved between the two measures.					
Criterion 1.2 – Landscape Integrity (Richness, Connectivity and Distribution)	A) Landscape Richness	HIGH – > 10% local vegetation cover	MEDIUM – 10% local vegetation cover	LOW – < 7% local vegetation cover.	
	B) Landscape Connectivity (linkage and distance between patches not separated by permanent cultural barriers).	<p>HIGH – patches directly connected by:</p> <ul style="list-style-type: none"> i. waterways or riparian habitat (generally primary or secondary aquatic corridors and streams with bridges and/or underpasses: for example, Thames, Dingman, Medway, Stoney, Pottersburg, Kettle, Dodd, Sharon, Oxbow, Kelly, Stanton, Mud, Crumlin); ii. Contiguous or semi-contiguous habitat. 	<p>MEDIUM – patches indirectly connected by:</p> <ul style="list-style-type: none"> i. habitat gaps < 40 m; ii. areas identified as Anti-fragmentation, Terrestrial Corridor, Big Picture Corridor (https://caroliniancanada.ca/legacy/ConservationPrograms_BigPictureMaps.html) to enhance the viability of isolated woodlands by re-connection, buffering, expanding OR to infill disturbed areas or replace abandoned fields (Riley & Mohr, 1994); <ul style="list-style-type: none"> a. abandoned rails, utility rights-of-way (hydro corridors, water/gas pipeline); b. Open space greenways and golf courses; c. Active agriculture or pasture; d. Watercourses connected by culverts; and, e. First or second order streams that exhibit 	<p>LOW – patches not connected due to the presence of permanent cultural barriers:</p> <ul style="list-style-type: none"> i. major roads and highways with no culverts; ii. urban or industrial development, large parking lots; iii. infrastructure; iv. dams, buried watercourses, channelized or greater than first order watercourses; and, v. active recreational land-uses (campground, parks with major facilities – community centres, arenas). 	

			channelized morphology.		
	C) Patch Distribution (isolation & arrangement of patches / patch clusters).	HIGH – patch clusters with total area > 40 ha OR identified as a Big Picture Meta Core (Carolinian Canada, 2000).	MEDIUM – patch clusters with total area 20 – 40 ha.	LOW – patch clusters with total area < 20 ha.	
Score Criterion 1.2 based on the highest standard achieved for any one of the three standards.					
Criterion 2.1 – Age and Site Quality	A) Community Successional Stage / Seral Age	HIGH – patch contains one (1) or more mature or older growth communities	MEDIUM – patch contains one (1) or more mid-aged communities	LOW – patch contains only pioneer to young communities	
	B) Mean Coefficient of Conservatism (MCC) of communities or whole patch	HIGH – one (1) or more vegetation community with an MCC \geq 4.6; OR MCC of patch > 4.5	MEDIUM – one (1) or more vegetation community with an MCC 4.2 – 4.5; OR MCC of patch \geq 4.0 – 4.5	LOW – all vegetation communities with an MCC < 4.2; OR MCC of patch < 4.0.	
Score Criterion 2.1 based on the highest standard achieved between the two measures.					
Criterion 2.2 – Size and Shape	A) Patch Size	HIGH Patch > 9.0 ha in size OR patch contains a woodland >4 ha.	MEDIUM Patch 2.0 – 9.0 ha in size OR patch contains a woodland 2-4 ha.	LOW Patch < 2.0 ha in size.	
	B) Patch Shape and Presence of Interior	HIGH Patch contains interior habitat that is more than 100 m from the edge OR has a Perimeter: Area ratio <1.5 m/m ² .	MEDIUM Patch contains no interior habitat but has a Perimeter:Area ratio 1.5 – 3.0 m/m ² .	LOW Patch contains no interior and has a Perimeter:Area ratio > 3.0 m/m ²	
	C) Bird Species	HIGH Patch provides breeding habitat for any three (3) or more bird species of conservation concern, including provincially rare bird species (MNRF, 2015a) or species of regional concern (Partners in Flight, 2020).	MEDIUM Patch provides breeding habitat for one (1) or two (2) bird species of conservation concern, including provincially rare bird species (MNRF, 2015a) or species of regional concern (Partners in Flight, 2020).	LOW Patch does not provide breeding habitat any bird species of conservation concern, including provincially rare bird species (MNRF, 2015a) or species of regional concern (Partners in Flight, 2020).	
Score Criterion 2.2 based on the highest standard achieved for any one of the three standards.					

Criterion 2.3 Diversity of Communities, Landforms and Associated Species	A) ELC Community Diversity	HIGH – Patch contains 6 or more ELC Community Series	MEDIUM – Patch contains 3-5 ELC Community Series	LOW – Patch contains 1-2 ELC Community Series	
	B) Community and Topographic Diversity (variation and heterogeneity)	HIGH – Patch contains three (3) or more Ecosites in one (1) Community Series OR four (4) or more Vegetation Types OR three (3) or more topographic features (e.g. tableland, rolling upland, valley slope, terrace, bottomland).	MEDIUM – Patch contains two (2) or more Ecosites in one Community Series OR by three (3) Vegetation Types OR two (2) topographic features, or one (1) Vegetation Type with inclusions or complexes.	LOW – Patch relatively homogenous; one (1) Ecosite OR one (1) to two (2) Vegetation Types on one (1) topographic feature.	
	C) Diversity (species and individuals) and Critical Habitat Components for Amphibians	HIGH – three (3) or more species of amphibians present in the patch, OR one (1) species of amphibian that is abundant in one (1) or more communities; OR two (2) or more critical habitat components present in the patch.	MEDIUM – 1-2 species of amphibians present in the patch; OR one (1) species of amphibian that is occasional* in one (1) or more communities; OR one (1) critical habitat components present in the patch.	LOW – No species of amphibian present in the patch, OR no critical habitat components present in the patch.	
	D) Presence of Conifer Cover	HIGH – Patch contains one or more conifer communities that are > 4.0 ha in size.	MEDIUM – Patch contains one or more conifer communities that are between 2.0 and 4.0 ha in size.	LOW – Patch contains conifer communities < 2.0 ha in size.	
	E) Fish Habitat Quality	HIGH – Dissolved oxygen > 8.0 mg/L OR abundant instream woody debris and rocks and watercourse with a natural channel located within or contiguous with the patch.	MEDIUM – Dissolved oxygen 5.0 – 8.0 mg/L OR moderate amount of instream woody debris and rocks and portions of channelized watercourses within or contiguous with the patch.	LOW – Dissolved oxygen < 5.0 mg/L OR no instream woody debris and sparse structure and entire watercourse channelized within or contiguous with the patch.	
	Score for Criterion 2.3 based on the highest standard achieved for any one of the five standards.				
Criterion 4.1 – Significant habitat for endangered or threatened species.	A) Species At Risk Habitat	SAR habitat present or previously identified: YES or NO			
	The presence of SAR habitat will add one HIGH score to the overall assessment				
	A) ELC Community SRANK	HIGH – One (1) or more communities with an SRANK of S3	MEDIUM – No communities with an	LOW – No communities with an	

Criterion 5.1 – Distinctive, unusual or high-quality communities.		or lower.	SRANK lower than S4.	SRANK lower than S5.	
	B) Significant Wildlife Habitat	SWH habitat present or previously identified: YES or NO			
	The presence of SWH habitat will add one HIGH score to the overall assessment				
	C) Rare Plant Species Presence / Absence	HIGH – 1 Rare Plant (S1-S3) or 4 Regionally Rare plants	MEDIUM – 1-3 Regionally Rare plants	LOW – 1 Regionally Uncommon Plant	
	D) Size and distribution of trees	HIGH – trees > 50 cm dbh abundant in one or more communities within the patch.	MEDIUM – trees > 50 cm dbh rare or occasional in one or more communities within the patch.	LOW – trees > 50 cm dbh not present in any communities within the patch.	
	E) Basal Area	HIGH – Average basal area of trees for any community in the patch ≥ 16m ² /ha for trees >25 cm DBH; OR > 24 m ² /ha for trees > 10 cm DBH; OR all diameter class sizes are represented in the stand (saplings < 10 cm; polewood 10-24 cm; small sawlog 26-36; medium sawlog 38-48 cm; large sawlogs 50-60 cm; x-large or veteran trees > 62 cm.	MEDIUM – Average basal area for any community in the patch 12 – 24 m ² /ha of trees >10 cm DBH; OR missing one of polewood, small, medium, or large size classes.	LOW – Average basal area for all communities in the patch < 12 m ² /ha for trees > 10 cm DBH; OR missing two or more of polewood, small, medium, or large size classes.	
Score for Criterion 5.1 based on the highest standard achieved for any one of the five standards					
Criterion 5.2 – Distinctive, Unusual or High-Quality Landforms	A) Distinctive landform types	HIGH – Patch located on an Earth Science ANSI OR on the Beach Ridge or Sand Plain physiographic landform units.	MEDIUM – Patch located on the Till Plain or Till Moraine physiographic landform unit.	LOW – Patch is located on the Spillway physiographic landform unit.	
	Score for Criterion 5.2 based on the highest standard achieved.				
Woodland Evaluation Score					
Significant Woodlan					

Appendix E

Net Effects Table Template

APPENDIX E - Net Effects Table Template

Through the EIS, all anticipated negative impacts should be addressed through a combination of avoidance, mitigation and compensation measures as appropriate so that the net effects are either neutral (i.e., No Net Effect = no measurable impact to the NHS is anticipated) or positive (i.e., Positive Net Effect = there is a gain in the areal extent and / or improvement to the quality of one or more NHS feature / area identified for inclusion within the NHS).

Examples of direct and indirect impacts are italicized. These are only examples and do not provide the full extent of potential impacts. Each project will require consideration of project and site-specific potential impacts.

- ~~Effects are defined as:~~

- ~~○ **No Net Effect** — Indicates no measurable impact to the identified ecological features or associated functions.~~
- ~~○ **(-) Low Net Effect** — Indicates loss of habitat possessing limited potential habitat value, and/or loss of a portion of habitat, which will not result in long-term impact to the remaining habitat and/or reduction in associated key ecological functions.~~
- ~~○ **(-) Medium Net Effects** — Indicates loss of habitat possessing moderate potential habitat value, and/or loss of a portion of habitat that may result in long-term impacts to the remaining habitat, and/or loss of associated key ecological functions.~~
- ~~○ **(-) High Net Effects** — Indicates loss of habitat possessing significant potential habitat value, and/or loss of a portion of habitat that may result in long-term and potentially critical impacts to the remaining habitat, and/or significant loss of associated key ecological functions.~~
- ~~○ **(+) Net Positive Effects** — indicates a measurable benefit to the habitat/ecological feature~~

SOURCE OF IMPACT	POTENTIAL AREAS AFFECTED & POTENTIAL EFFECTS	AVOIDANCE, MITIGATION, COMPENSATION	NET EFFECTS & RATIONALE
1.0 Existing Impacts (where opportunities for net positive effects have been identified):			
1.1 <i>Loss of gravel from the roadway shoulder</i>	<i>Cultural meadow (CUM) – Increased surface water runoff to the cultural meadow causing flooding, thus, reducing the viability of the habitat for various species using the habitat.</i>	<i>Regrade the roadway shoulder replace gravel and enhance with hydroseeding of a native seed mix to stabilize edge and encourage infiltration.</i>	<u><i>(+) NET POSITIVE EFFECT</i></u> <i>Regrading the roadway shoulder will reduce surface runoff and promote infiltration and minimize flooding into the cultural meadow.</i>
1.2 <i>Invasive weed (buckthorn) growth in forest understorey –</i>	<i>Deciduous forest (FOD) - Reduced plant species diversity due to competition from invasive weeds</i>	<i>Prepare and implement an Invasive Weed Management Plan to selectively remove buckthorn</i>	<u><i>(+) NET POSITIVE EFFECT</i></u> <i>Removal of invasive plants allows for native plants to colonize and increase diversity</i>
1.3 ...			

SOURCE OF IMPACT	POTENTIAL AREAS AFFECTED & POTENTIAL EFFECTS	AVOIDANCE, MITIGATION, COMPENSATION	NET EFFECTS & RATIONALE
2.0 Direct Impacts:			
Planning & Engineering Design			
2.1 Housing development lots encroaching on forest community	Deciduous forest (FOD) - Removal of native vegetation within a small portion of deciduous forest along edge of the study area resulting in loss of habitat for forest birds and other wildlife.	1) Re-design development plan to avoid loss of forest; and establish a buffer with native plantings 2) Compensate for loss of forest habitat by filling in bays and other areas adjacent to the forest, increasing core habitat; and establish a buffer with native plantings. 3) Proposed rear lot fencing to include no gates.	1) <u>(+) NET POSITIVE EFFECT</u> The planting of native plant species within the buffer will provide additional wildlife habitat 2) <u>NO NET EFFECT, OR (+) NET POSITIVE EFFECT</u> Compensation may only provide equal habitat or it may provide a net environmental benefit.
2.2 Widening of an existing roadway (additional lanes & services)	Cultural meadow (CUM) – Loss of breeding and foraging habitat for Bobolink	Consult with <u>MECP-the Province</u> to determine permitting requirements. Identify and secure additional lands to provide for compensation of habitat loss. Plant compensation areas with native meadow seed mix. Develop plan for long-term management.	<u>(+) NET POSITIVE EFFECT</u> The planting of native plant species within the buffer will provide additional wildlife habitat
2.3 ...			
Construction			
2.4 Construction vehicle traffic	Wildlife from adjacent wetland, meadow marsh (MAM) and open aquatic (OAO) habitat – Injury or mortality to wildlife	Avoid injury and mortality by preparing and implementing a Wildlife Handling Protocol, providing wildlife posters for construction trailer, and training construction crews.	<u>NO NET EFFECT</u> Potential impacts to wildlife can be avoided with appropriate protocols and training.
2.5 ...			

SOURCE OF IMPACT	POTENTIAL AREAS AFFECTED & POTENTIAL EFFECTS	AVOIDANCE, MITIGATION, COMPENSATION	NET EFFECTS & RATIONALE
3.0 Indirect Impacts:			
Planning & Engineering Design			
3.1 Development plan increase in impervious surfaces; Stormwater management system	Moist deciduous forest (FOD) and skunk cabbage population – Reduction in groundwater discharge due to loss of infiltration. Die-back and reduction of groundwater dependent skunk cabbage population.	Re-design development plan to reduce impervious surfaces. Provide greater infiltration through use of best management practises, infiltration trenches, etc.	<u>NO NET EFFECT</u> Potential impacts to groundwater dependent plant populations (i.e. skunk cabbage) can be mitigated through the use of appropriate stormwater management measures.
3.2 ...			
Construction			
3.3 Construction related runoff	Adjacent watercourse and swamp thicket (SWT) – Sedimentation in watercourse covering spawning habitat and or fish eggs. Habitat loss and / or reduction of fish population.	Installation of sediment control fencing. Regular monitoring of fencing and other protection measures.	<u>NO NET EFFECT</u> Proper installation of sediment control fencing can prevent deposition of fill and sedimentation. No changes to site drainage.
3.4 ...			