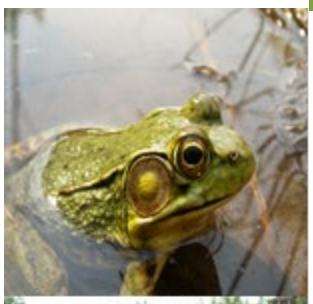
Comprehensive Environmental Impact Study





Hidden Valley, City of Kitchener

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November 2024
LGL FILE TA9168

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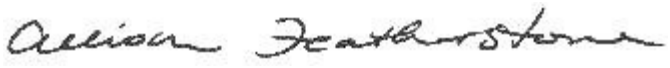

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Version History:

Date	Version
December 2022	Version 1, draft
May 11, 2023	Version 2, updated draft, AODA format
December 8, 2023	Version 3, minor updates – DRAFT
June 21, 2024	Version 4, major updates - DRAFT
September 16, 2024	Version 5, major updates - DRAFT
November 19, 2024	Version 6, minor updates - FINAL

November 2024
LGL File TA9168

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1.0 Introduction

The City of Kitchener retained LGL Limited to complete a Comprehensive Environmental Impact Study (EIS) to support the review and replacement of the existing Residential Hidden Valley Community Plan and the Industrial Hidden Valley Community Plan (see Figure 1). These Community Plans will be formally repealed and replaced with new policies and schedules (herein referred to as "the Secondary Plan") via amendment to the City's Official Plan. The subject lands (herein referred to as "the Study Area") are approximately 200 hectares in size (Community Plans combined) and are generally bounded by Highway 8, the Grand River, Wabanaki Drive and Fairway Road.

On June 24, 2019 Council approved a new land use master plan for the Hidden Valley area. The City is now working towards preparing the draft Secondary Plan that would be incorporated into the Official Plan. A range of technical studies were commissioned to inform the Secondary Plan, including this Comprehensive Environmental Impact Study to formally evaluate the land uses proposed in the 2019 master plan.

A significant amount of study, data collection, and work was completed to support the Region's South Kitchener Transportation Corridor Study and Class Environmental Assessment for the River Road extension, as well as more recent studies in support of the ION Stage 2 LRT connection to Cambridge. Data collection in 2021 was completed as part of the City of Kitchener's Hidden Valley Pumping Station Class Environmental Assessment. It is understood that landowners in the study area have also collected natural heritage inventory data. This available background information was augmented through focused field surveys conducted in 2021 on April 27, May 10, June 1, June 17, and October 13 to update the most critical data sets. Data collection in 2021 was completed in part as part of the City of Kitchener's Hidden Valley Pumping Station Class Environmental Assessment (LGL 2022).

1.1 Study Area

The study area (see Figure 1) is generally bound by Highway 8, the Grand River, Wabanaki Drive and Fairway Road and covers an area of approximately 183ha. Current land uses are primarily residential in the southern half while in the northern half agricultural and natural areas are the dominant land uses. Current agricultural areas have been zoned Business Park for decades but have remained vacant and undeveloped. The inner portions of the natural areas contain a mosaic of forest, agricultural lands, creeks, and wetland pockets containing an assortment of unusual flora, as well as a diversity of wildlife habitat. Some trails exist within the natural areas, as used by hikers/runners, dog-walkers, mountain bikers, equestrian riders (less so in recent years), ATV's and off-road vehicles (more prevalent in recent years).

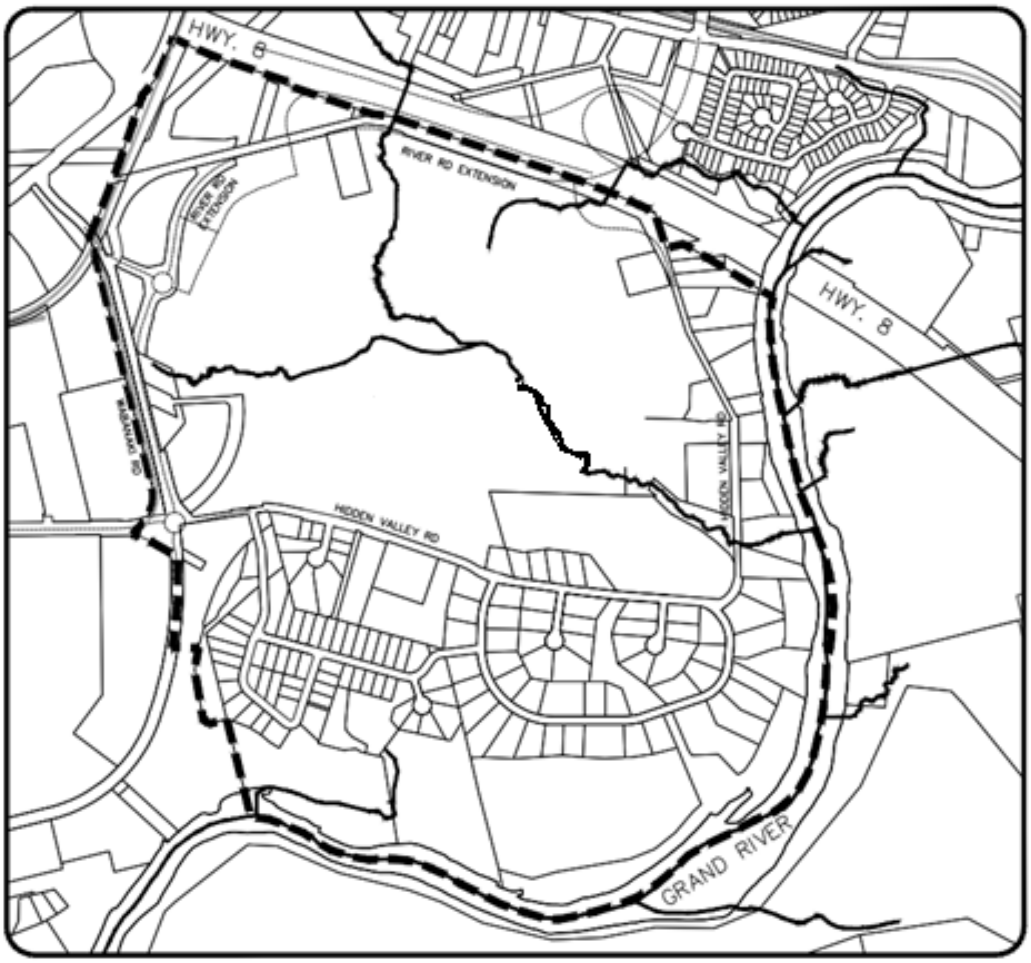

Figure 1: Study Area Hidden Valley

1.2 Terms of Reference

The project entails the following major tasks in accordance with the Terms of Reference for the Hidden Valley Community Comprehensive Environmental Impact Study issued by the City of Kitchener in March of 2021:

1. Use existing information sources, studies and augment with additional work;
2. Outline applicable environmental legislation, regulation, policies and information available for the Study Area regarding the natural environment, including Species at Risk (SAR);
3. In collaboration with the City, coordinate with all environmental agencies such as the Ministry of Environment, Conservation and Parks, Ministry of Natural Resources and Forestry, the Grand River Conservation Authority, and the Regional Municipality of Waterloo in finalizing the Comprehensive EIS and developing the Secondary Plan;
4. Integrate the vision and objectives of the City and ROP and the Kitchener Natural Heritage System (KNHS) into the plans, guidelines and recommendations for the study areas;

5. Document and characterize the natural heritage features and functions, referencing the information source (pre-existing or from this assessment).
6. Integrate information, conclusions and recommendations from the Flow Monitoring, Calibration and Hydrologic Study (available upon request) in a manner consistent with principles of subwatershed planning. Consider opportunities for surface water management to enhance quality and quantity in all receiving bodies and, ultimately, the Grand River;
7. Assess the impact (both positive and negative) of the proposed Land Use Master Plan on the features and functions of the KNHS within the Study Area. Include a determination of any opportunities to enhance features and functions of the KNHS in or adjacent to the study area;
8. Make recommendations to refine boundaries, if necessary, between the natural heritage system and proposed urban land uses;
9. Provide recommendations for appropriate buffer widths to be incorporated into the planning instruments (e.g. zoning);
10. Consider opportunities to provide ecological linkages and an enhanced experience of nature in the city;
11. In collaboration with the City, recommend matters to potentially be included within Secondary Plan policies and Urban Design Guidelines with respect to how any future development within the Study Area should have a positive net effect on the natural heritage system;
12. In collaboration with the City, provide input into the preparation of the Natural Heritage System and Water Management schedules of the Secondary Plan and the proposed zoning for those areas;
13. Deliver a Comprehensive Environmental Impact Study document that will be appended to the Secondary Plan; and,
14. Wetland boundaries are to be delineated by a trained wetland evaluator, as approved by the Ministry of Natural Resources.

This report represents the Comprehensive EIS report and is intended to describe existing conditions, identify the extent of the KNHS within the study area, and recommend Secondary Plan schedules, potential KNHS enhancement areas, and minimum buffer widths to inform Secondary Plan mapping and policy development.

This report further includes an impact and mitigation assessment which reviews the potential impacts of the proposed land use master plan and identifies mitigation measures, including policy and design recommendations, for consideration when preparing the Secondary Plan, including technical requirements for future development proposals and developing the Urban Design Guidelines for the subject area.

1.3 Guiding Documents and Relevant Studies

The project is guided by area-specific plans, policies, guidelines, and previous ecological and hydrological studies including:

- Hidden Valley Land Use Master Plan, 2019
- Hidden Valley Residential Community Plan, 1990
- A Secondary Plan for the Hidden Valley Industrial Community, 1988
- City of Kitchener Official Plan, 2014
- City of Kitchener Zoning By-law 85-1 & 2019-051
- Region of Waterloo Official Plan, 2015
- City of Kitchener Natural Heritage Webpage
- Natural Heritage System Technical Background Report (City of Kitchener 2014)
- Flow Monitoring, Calibration and Hydrologic Study for New Secondary Plan. Hidden Valley Community (Wood 2019)
- GRCA's Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation
- A significant amount of background and technical work was completed via the Region-led River Road Municipal Class Environmental Assessment. The River Road Info Sheet includes links to the South Kitchener Transportation Corridor Study, the River Road Extension Municipal Class Environmental Assessment (EA) Study and other relevant EA documents (IBI 2014)
- River Road Extension Detailed Design Stage 1 – Manitou Drive to King Street Kitchener Ontario. Scoped Environmental Impact Study (WSP 2020)
- Stage 2 ION: Light Rail Transit from Kitchener to Cambridge. Environmental Project Report (WSP 2021)
- Stage 2 ION LRT from Kitchener to Cambridge Transit Project Assessment Process Natural Heritage Report (LGL 2020)
- Upper Hidden Valley Pumping Station and Forcemain Class EA (LGL 2022); and
- Hidden Valley Inventory of Environmental Features and Functions (Ecologistics 1979).

General data sources and concurrently completed studies that were consulted include:

- Biodiversity Explorer (Ministry of Environment, Conservation and Parks)
- E-bird, i-Naturalist databases
- Natural Heritage Information Center database including occurrence records
- Ontario Breeding Bird, Mammal, Butterfly and Reptile/Amphibian Atlases
- GRCA mapping, including groundwater recharge and regulated areas
- Regulated habitat mapping for species at risk (MECP 2018)
- Hidden Valley Stormwater Management Strategy (Matrix Solutions Inc. 2024)
- Hidden Valley Source Water Protection Assessment (Matrix Solutions Inc. 2024)

At the time of this report, data from consultants conducting field work on behalf of landowners in the study area, including the landowner of the central Hidden Valley natural area, was not available to incorporate into the characterization.

2.0 Legislative Framework

2.1 Planning Act (1990)

The Planning Act (1990) is provincial legislation in Ontario that sets out the ground rules for land use planning in Ontario. It describes how land uses may be controlled, and who may control them. The Act requires land use planning decisions integrate matters of provincial interest by requiring that all decisions be consistent with the Provincial Policy Statement and conform/not conflict with provincial plans. Policies applicable to this study under the *Planning Act* are described in Section 3.0.

2.2 Fisheries Act (1985)

The Fisheries Act (1985) provides legal framework for regulating impacts on fish and fish habitat associated with works, undertakings, operations and activities occurring in or around fresh and marine waters throughout Canada. Five habitat protection provisions to regulate impacts to fish and fish habitat are in relation to: fish passage, in-stream flow needs of fish, serious harm to fish by any means other than fishing, permanent alteration to or destruction of fish habitat, and prohibition of deposit of deleterious substances. Areas within the study area subject to the *Fisheries Act* are included in Figure 2 and discussed in Section 4.3, 5.2, and 6.6 of this report.

2.3 Ontario Endangered Species Act (2007)

The Endangered Species Act (2007) identifies species at risk based on available scientific information and information obtained from community knowledge and Indigenous traditional knowledge. It protects species at risk and their habitat as well as promoting the recovery of species at risk. This legislation provides two types of habitat protection:

- General Habitat Protection – when a species is newly listed as endangered or threatened on the Species at Risk in Ontario (SARO) list, its habitat is also protected. The general habitat applies to areas that a species currently depends on. This protection remains in place until a species-specific habitat regulation is created, unless a temporary suspension of protections is enacted by the Minister.
- Regulated Habitat Protection – when a species is added to the SARO list, the process of identifying species-specific (or regulated) habitat begins. A habitat regulation provides greater certainty of what is meant by a species habitat. It describes features or geographic boundaries. Once a species-specific habitat regulation is created, it replaces the general habitat description.

This legislation includes tools that encourage good stewardship and benefit to species at risk. Permits or agreements are useful tools to manage activities that could harm or harass species at risk or damage protected habitat. Permits may be granted when the activity is necessary for human health and safety; purpose of the activity is to help protect or recover the species at risk; activity will result in significant social or economic benefit to Ontario; or an activity will result in overall benefit to the species. It also includes monitoring requirements during construction and for a specified time after construction is completed. Species at risk habitat in the study area is discussed in Section 5.6 and 6.4 of this report.

2.4 Species at Risk Act (2002)

The Canada *Species at Risk Act* (SARA) provides a framework for actions across Canada to ensure the survival of wildlife species and the protection of our natural heritage. It sets out how to decide which species are a priority for action and what to do to protect a species. It identifies ways governments, organizations and individuals can work together, and it establishes penalties for a failure to obey the law. Regulated species are listed in Schedules 1, 2 and 3 of the Act. Species within the study area subject to SARA are discussed in Section 5.2, 5.4, and 5.6 of this report.

2.5 Migratory Birds Convention Act (1994)

Most species of birds in Canada are protected under the *Migratory Birds Convention Act* (MBCA). The MBCA prohibits the killing, capturing, injuring, taking, or disturbing of migratory birds (including eggs) or the damaging, destroying, removing, or disturbing of nests. Environment Canada provides Nesting Periods when migratory birds are most likely to be nesting, within a respective geographic zone and requires a permit for any activity that might harm migratory birds. Birds within the study area subject to the MBCA are discussed in Section 5.4 of this report.

2.6 Fish and Wildlife Conservation Act (1997)

The Ontario *Fish and Wildlife Conservation Act* (FWCA) outlines the restrictions for hunting, trapping and fishing; handling of live wildlife; sale, purchase and transport of wildlife; and licences that can be secured under the Act. Under Schedules 1 to 11 of the Act, wildlife is grouped for the purpose of regulating these species. Where there is a conflict between this Act and the *Ontario Endangered Species Act*, the provision with the most protection will prevail (s. 2 of the FWCA). Wildlife in the study area subject to the FWCA are discussed in Section 5.4 and 5.5 of this report.

2.7 Conservation Authorities Act (1990)

Under the *Conservation Authorities Act* (1990), conservation authorities are empowered to regulate development and activities in or adjacent to river or stream valleys, watercourses, and hazardous lands (including wetlands, unstable soils, floodplains, steep slopes, erosion hazards, etc.). Development taking place within regulated areas

may require permission through a permit from the conservation authority to confirm that the area is not altered in any way. Regulated areas for the study area are shown in Figure 3 and include land in or near rivers, streams, ponds, wetlands, steep slopes, and floodplains.

As discussed in Sections 5.3 and 6.1 of this report, this study identified additional wetlands within the study area. These wetlands and adjacent lands would be regulated under the *Conservation Authorities Act* beyond those areas included in Figure 3. GRCA has been circulated the ELC mapping created through this study so their own regulated area records can be updated.

3.0 Policy Context

3.1 Provincial Policy Statement

The Provincial Policy Statement (PPS) (2020) is issued under Section 3 of the *Planning Act* and provides policy direction on matters of provincial interest related to environmental, economic, and social factors in land use planning. The policy statement includes a range of policies related to three main themes: building strong communities; wise use and management of resources; and protecting public health and safety.

The PPS recognizes that land use must be carefully managed to accommodate appropriate development to meet the full range of current and future needs, while achieving efficient development patterns and avoiding significant or sensitive resources and areas which may pose risk to public health and safety. The PPS directs development away from areas of natural and human-made hazards.

Planning decisions made under the Region of Waterloo Official Plan (ROP) and the City of Kitchener Official Plan (KOP) shall conform with provincial plans and be consistent with the PPS. The natural heritage policies contained in Section 2.1 of the PPS provide direction to municipalities regarding planning policies for the protection and management of natural heritage features and areas.

Natural heritage features and areas addressed in the PPS include:

- significant wetlands, significant coastland wetlands, other coastal wetlands in Ecoregions 5E, 6E and 7E;
- fish habitat;
- significant woodlands;
- significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
- habitat of endangered species and threatened species;
- significant wildlife habitat; and,
- significant areas of natural and scientific interest, which are important for their environmental and social values as a legacy of the area natural landscapes.

3.1.1 Natural Heritage Reference Manual (2010)

The Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2010 (2nd Edition) (OMNR 2010) provides technical guidance for implementing the natural heritage policies of the PPS. This document presents the Province's recommended technical criteria and approaches to be consistent with the PPS in protecting the natural heritage features and areas.

3.1.2 Significant Wildlife Habitat Technical Guide (2000)

The Significant Wildlife Habitat Technical Guide is a detailed technical manual that informs the identification, description, and prioritization of significant wildlife habitat in response to the PPS. The Guide divides wildlife habitat into four categories:

- Seasonal concentration area
- Rare vegetation communities or specialized habitats for wildlife
- Habitats of species of conservation concern, excluding the habitats of endangered and threatened species
- Animal movements corridors

Criteria Schedules have been prepared for Ecoregions located within the Province. The study area is located within Ecoregion 6E, with the applicable criteria defined in the Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (OMNR 2015).

3.2 Region of Waterloo Official Plan (2015)

The ROP identifies several designated areas within Hidden Valley as follows:

- 'Built-Up Areas' in the southern portion and 'Urban Designated Greenfield Areas' in the northern portion (see Map 3a in the ROP, Urban Area of the ROP)
- 'Core Environmental Features' predominantly in the northern portion and 'Significant Valleys' in the southern portion adjacent to the Grand River (Map 4 in the ROP, Greenlands Network)
- 'Wellhead Protection', WPSA-8 and WPSA-7, in the west edge (Map 6a in the ROP, Urban Areas Source Water Protection Areas)
- 'Surface Water Intake Protection Zones', Zone 1 and Zone 2, in the northern portion (Map 6g in the ROP, Other Source Water Protection Areas)

According to Section 7.C.1 of the Official Plan, Core Environmental Features are those environmental features identified as being provincially significant or regionally significant. These features are the most significant elements of the regional landscape in terms of maintaining, protecting and enhancing biodiversity and important ecological functions. The Core Environmental Features designation within the study area applies to lands that meet the criteria as:

a. Significant Habitat of Endangered or Threatened Species – including but not limited to Jefferson Salamander Regulated Habitat (Draft 2018), Species at Risk

Bat Habitat (Woodlands and PSW), SAR Fish Habitat (Grand River), and SAR Plant Habitat (Butternut and Black Ash);

b. Provincially Significant Wetlands (PSWs) – Hidden Valley PSW Complex;
c. Environmentally Sensitive Policy Areas (ESPAs) – ESPA 27 (Hidden Valley / Bird Ridge) in the north-central part of the community; and ESPA 28 (Petrifying Spring) in the southwest corner of the community;
d. Regionally Significant Woodlands; or
e. Regional Environmentally Significant Valley Features – Grand River.

Significant Areas of Natural and Scientific Interest (ANSIs) are further protected as a Core Environmental Feature within the ROP, however, no ANSI's have been identified in the Study Area.

According to Section 7.A.2. of the ROP, the City of Kitchener is to designate and zone Landscape Level Systems and Core Environmental Features in its official plan and zoning by-laws respectively to regulate the use of land within these areas in conformity with the policies in Sections 7.B and 7.C.

According to Section 7.B.20 and 7.B. 21, significant valleys associated with the Grand River, Conestoga River, Nith River and Speed River are designated within the ROP, which are together nationally recognized as a Canadian Heritage River. To complement the Canadian Heritage River status of the Grand River, the Region and Area Municipalities, in collaboration with the Grand River Conservation Authority, will seek to maintain the character of Significant Valleys by identifying, conserving, interpreting and enhancing cultural heritage resources of recreational and scenic value within Significant Valleys.

Section 6.0 of this report includes an analysis of the Core Environmental Features and Significant Valley boundaries within the study area.

3.3 City of Kitchener Official Plan (2014)

The City of Kitchener Official Plan (2014) identifies the study area as a site-specific policy area which details areas for low rise residential development, natural heritage conservation/open space (reflecting the KNHS and parklands), general industrial employment, and Business Park Employment. These policies and designations are to be further refined through the Hidden Valley Land Use Master Plan (see Section 3.3.1).

Section 7.C.2 of the KOP indicates that significant woodlands, wetlands, and valleys of the Grand River and its tributaries form the KNHS. As per Section 7.C.2.2, the City is committed to protecting, conserving, restoring and enhancing the KNHS which contributes to the character of the city and the quality of life of its residents.

According to Section 7.C.2.1 and 7.C.2.8, the KNHS includes all the natural heritage features which have been identified by the City of Kitchener Natural Heritage System Technical Background Report (hereto referred to as the "KNHS Background Report") for

protection, conservation, restoration and/or enhancement (see Section 3.3.2 below for details). Section 7.C.2.8 further indicates that mapping of these features should be conducted in accordance with the KNHS Background Report. This Comprehensive EIS updates and refines the KNHS within the Hidden Valley Community.

3.3.1 City of Kitchener – Hidden Valley Land Use Master Plan (2019)

On June 24, 2019 Council approved a new Land Use Master Plan for the Hidden Valley area. Figure 4 shows the land use designations of the approved Land Use Master Plan. The City is now preparing the Secondary Plan policies and schedules that would be incorporated into the Official Plan. A range of technical studies are being completed to inform the Secondary Plan (including this study). The intent of these studies is to formally evaluate the land uses proposed in the 2019 Master Plan. The Land Use Master Plan identifies policy direction and implementation for the Hidden Valley Natural Heritage System, including:

1. Ensure that the form and function of the significant environmental features are conserved (protected and enhanced). Recommend any refinements to the proposed land use designations and zoning accordingly.
2. Undertake an EIS for the Land Use Master Plan. Utilize water management background work and modelling as an input to that assessment. Determine appropriate mitigation including development limits, and setbacks (i.e., buffers) from natural heritage system (features and functions). Recommend trailhead/trail locations.
3. Any future development should prepare a site-specific EIS and Implementation Report to support the application.
4. Management Plans should be prepared for significant natural heritage features within the Land Use Master Plan area. This may occur as a condition of a development application and/or with decisions on ownership and operation.
5. Confirm ownership and access rights to any of the KNHS, open space, parks and trails within the Land Use Master Plan area.
6. Any trail system that is identified within the Natural Heritage System of this Land Use Master Plan area should undertake further environmental study. Incorporate trail-heads and wayfinding signage.

Section 6.0 of this report includes an analysis of the extent of the KNHS. Modifications of the Land Use Master Plan are recommended within Section 6.12 of this report in consideration of the identified system.

3.3.2 City of Kitchener Natural Heritage System Technical Background Report (2011, revised 2014)

The KNHS Background Report describes applicable KNHS policies as well as identifies natural heritage features in Hidden Valley. Objectives of the KNHS, as outlined in the background report, are to:

- Ensure all features and functions of the natural heritage system are identified and protected within a comprehensive planning process.
- Provide protection, conservation, restoration or enhancement of the ecological features and functions, hydrological functions and biodiversity of the natural heritage system.
- Promote ecological restoration of natural heritage features and functions. Ensure no decrease in the quality of the natural heritage system at a minimum.
- Support ongoing monitoring and management of the City's natural heritage system.
- Promote informed stewardship and community involvement in natural heritage maintenance and enhancement.

The general policy direction is that KNHS features will be assigned appropriate land use designations and zoned to ensure their long-term conservation. Permitted land uses will be limited and will vary by the sensitivity of the environmental feature. Permitted uses will be set out in the implementing zoning by-law.

Any decision for any development application with respect to land on or within adjacent lands of a KNHS feature will be made in consultation with appropriate authorities. The exact boundaries of KNHS features are intended to be determined more precisely during the development review process in consultation with the appropriate public agencies having jurisdiction. Where lands contain two or more features of the natural heritage system, the more restrictive policies pertaining to those features will apply.

The KNHS is comprised of natural heritage features including wetlands, woodlands, valleylands, plants and wildlife, fish habitat, significant landforms, and recharge and discharge areas. It also includes ecological restoration areas, and linkages and corridors. All these elements maintain the local and regional biological, hydrological, ecological and geological diversity and function supporting viable populations of indigenous species and sustaining local ecosystems.

An assessment of each of the KNHS components, based on the methodologies discussed in the KNHS Background Report has been provided in Section 6.0. This assessment results in recommended refinements to the schedules identified within the City of Kitchener Official Plan (see Section 6.12). Natural heritage features/areas found within the Hidden Valley Community that are components of the KNHS include:

a) Core Natural Heritage Features as a Natural Heritage Conservation designation including:
    a. Provincially Significant Wetlands – Hidden Valley Wetland Complex;
    b. Locally Significant Wetlands – Unevaluated wetlands within the Grand River Valley and the Hidden Valley woodland;
    c. Regionally Significant Valleys (protected as a landscape level feature in the ROP) – river's edge to the top of bank for the Grand River Valley;
    d. Regionally Environmentally Significant Valley Features (a "no development" policy area in the ROP) – Specific vegetation communities associated with Grand River Valley;
    e. Locally Significant Valleylands – Valleylands of Hidden Valley North, West and East Creeks and Hofstetter Creek;
    f. Regional Environmentally Sensitive Policy Areas – ESPA 27 and 28;
    g. Regionally and Locally Significant Woodlands – Woodlands adjacent to Hofstetter, North, West, and East Creeks and Grand Valley;
    h. Significant Habitat of Endangered or Threatened Species (protected in accordance with provincial and federal requirements) – including but not limited to Jefferson Salamander Regulated Habitat (Version 2018), Species at Risk Bat Habitat (Woodlands and PSW), SAR Fish Habitat (Grand River), and SAR Plant (Butternut and Black Ash) Habitat; and
    i. Fish habitat (protected in accordance with provincial and federal requirements) – Hidden Valley North, West and East Creeks, Hofstetter Creek (indirect) and Grand River (direct);

b) Significant Wildlife Habitat as an overlay; and

c) Supporting Natural Heritage Features as an overlay, including:
    a. Environmentally Significant Discharge Areas – A portion of East Creek and ESPA 28;
    b. Environmentally Significant Recharge Areas – Significant Groundwater Recharge Area covering the majority of the study area;
    c. Natural Linkages and Corridors - Deer and/or wildlife corridors east/west along identified creeks and along the Grand River, as well as two north/south connections from the Hidden Valley woodland to the Grand River corridor.

4.0 Methods of Data Collection

Information was collected from background data sources, focused field surveys conducted in 2021 and 2024. Background data sources used for this investigation are described in Section 1.3 of this report. Field survey methods are presented below.

4.1 Field Surveys

In addition to the field assessments completed through past studies (see Section 1.3 and associated references), focused field surveys were carried out in 2021 and 2024 to update information on natural heritage features in the study area. Table 1 provides a summary of the field work conducted in 2021 and 2024, which includes a review of vegetation and vegetation communities, wildlife and wildlife habitat and fish and fish habitat. The 2024 site visit was to investigate site-specific public comments.

Table 1: Summary of Field Visits in 2021

Date	Details of Field Visit
April 27, 2021	Vegetation inventory and community characterization; incidental wildlife observations
May 10, 2021	Aquatic habitat characterization; incidental wildlife observations
June 1, 2021	Breeding bird surveys first visit; incidental wildlife observations
June 17, 2021	Breeding bird surveys second visit; incidental wildlife observations
October 13, 2021	Vegetation inventory and community characterization; incidental wildlife
July 10, 2024	Vegetation community characterization and drip line assessment

4.2 Terrestrial Ecology

4.2.1 Vegetation and Vegetation Communities

Vegetation communities were identified through air photo interpretation, compiling data from background studies in Hidden Valley, and field investigations done on April 27 and October 13 of 2021 and July 10, 2024. Air photos were interpreted to determine the limits and general characteristics of vegetation communities. Field investigations of natural/semi-natural vegetation as part of studies in prior years by LGL were conducted within the study area on April 29,30, May 20, June 30, July 9, 29, September 15 and 24, 2004, as well as, June 20, 2012 and May 13, 2013 to map and describe vegetation communities and to conduct a botanical survey.

Vegetation communities were classified according to the Ecological Land Classification (ELC) for Southern Ontario: First Approximation and Its Application (Lee et al. 1998). Communities were sampled using a plotless method for the purpose of determining general composition and structure of the vegetation. Vascular plant nomenclature follows Newmaster and Ragupathy (2008) with a few exceptions. Plant species status was reviewed for the Regional Municipality of Waterloo (2009, 2020 Draft) and Ontario (Oldham and Brinker 2009).

4.2.2 Wildlife and Wildlife Habitat

Wildlife habitat in the study area was characterized through background information and field work (2021), including breeding bird surveys. Wildlife habitat and incidental wildlife was documented through evidence of presence (scat, tracks, dens, etc.) during all site visits. Screening for suitable SAR habitat and SAR potential was also conducted.

4.2.2.1 Breeding Birds

To document the bird species of the project area, a review of background information and breeding bird surveys were conducted as part of field investigations in 2021.

Background information included data from field investigations completed by LGL in 2004, 2012, 2013, and 2020 for other projects in the Hidden Valley area. In 2004, breeding bird surveys were conducted using 5-minute point counts in selected habitats representative of the study area, as well as owl surveys; snag, stick nest and tree cavity searches; and incidental observations. In 2012 focused area searches were completed adjacent to road right of ways and agricultural fields in Hidden Valley to target potential habitat use by Eastern Meadowlark (Sturnella magna) and Bobolink (Dolichonyx oryzivorus), species at risk under the ESA. In 2013, point counts for breeding birds and area searches (to document all species seen and heard) were completed in Hidden Valley, with a focus in areas where road alignments were likely and feasible as part of the River Road Extension Project. In 2020, breeding bird point counts were conducted within the Hidden Valley Road right-of-way where it parallels Highway 8 as part of wildlife investigations for the Waterloo ION LRT alignment. And in 2021, field investigations focused on pumping station locations and areas of the Grand River corridor which were outside of terrestrial investigations in prior years.

4.2.2.2 Breeding Amphibians

A detailed wildlife investigation for the presence/absence of salamanders occurred in 2007 and 2008 by LGL. In 2007, all available areas of standing water were trapped, and in 2008 the main salamander breeding pond was trapped for many consecutive nights.

4.3 Aquatic Ecology

4.3.1 Fish Community

Background information on the extent of aquatic habitat and associated fish communities of watercourses and water bodies within the study area is from targeted aquatic habitat investigations on May 25, 2004, electrofishing surveys on June 10, 2004, and minnow traps set on April 15, 2004. Subsequent aquatic habitat surveys were conducted on May 29, June 6 and June 11, 2013, and May 10, 2021. These investigations included the Hidden Valley PSW complex and tributaries of the Grand River known as West, East, and North Creek.

4.3.2 Fish Habitat

Regulated watercourses and potential drainage features were assessed through a combination of visual reconnaissance and compilation of background information. Fish sampling was not part of field surveys as sufficient fisheries community information is available to characterize the Hidden Valley creeks and Grand River.

Fish habitat was characterized, and physical habitat features were surveyed in sufficient detail to enable mapping and identification of key habitat types. The physical habitat attributes assessed include:

- Water quality, temperature and water colour
- In-stream cover
- Bank stability
- Substrate characteristics
- Stream dimensions and flow
- Barriers
- Stream morphology
- Terrain characteristics
- Stream canopy cover
- Stream gradient
- Aquatic vegetation
- Groundwater seepage areas

5.0 Data Summary

5.1 Physical Characteristics

5.1.1 General Topography

The most significant landform feature is the Freeport Esker which runs from Highway 401 and the Grand River to near Highway 8 and the Grand River, with an interruption of the Grand River Valley totalling over 4 miles (6.4 kilometres) in length (Ecologistics 1979). Slopes of up to 60% are present, with the main esker ridge up to 18 meters in height, and smaller sections of 6 meters in the Hidden Valley area. Portions of the esker have been mined historically in the southwest corner of Hidden Valley. While the esker landform may not be unique within the context of the Waterloo Region, it provides a diversity of microhabitats and microclimates within Hidden Valley ESPA.

The west portion of the study area consists of relatively flat topography. The surrounding industrial lands have been modified through the remainder of the study area by previous disturbances, grading, and parking lot creation associated with existing developed properties. Additional information on the study area physiography and soils can be found in a draft report prepared for the South Kitchener Transportation Corridor Study entitled “Preliminary Geotechnical Inventory” (Naylor Engineering Associates Ltd., July 2004).

5.1.2 Physiographic Region

The site is located within the physiographic region of Southern Ontario known as the Waterloo Hills or Waterloo Moraine (Chapman and Putnam, 1984). The Waterloo

Moraine was formed by the interaction of several glacial lobes which was modified by later glaciations (Karrow 1974).

5.1.3 Surficial Geology

The region is comprised of sandy hills, some of them being ridges of fine-grained till while others are kames or kame moraines, with outwash sands occupying the hollows. Maryhill, Tavistock and Port Stanley Tills are the surficial till deposits that are part of this moraine. The till deposits are interbedded with silt and clay that were deposited in shallow glacial lakes.

5.1.4 Bedrock Geology

Bedrock below this area consists of dolostone of the Guelph formation, which generally slopes toward the southwest. Based on Ontario Ministry of Environment Well Log Records, it appears that there is approximately 30 to 40 m of glacial till overlying bedrock in this area.

5.1.5 Groundwater System

WalterFedy (2015) indicates the PSW in the study area is fed by surface and groundwater discharge, and ensuring the groundwater connections and flow are maintained may be critical to maintaining discharge to the wetland.

Stantec (2013, 2014) characterizes the Hidden Valley study area upland as predominantly a groundwater recharge area, whereas the PSW is likely a groundwater discharge area for the surrounding upland/tableland areas. Lateral groundwater flow is to the nearest streams/rivers. A groundwater divide is noted at the northeast corner of study area where Hofstetter Creek wetland arises as an isolated pocket and is considered to be a groundwater discharge area. Stantec (2013, 2014) characterizes the vernal pools in Hidden Valley PSW as controlled by surface water level in the main marsh, which is in turn is controlled by beaver dams. Limited groundwater discharge to vernal pools is expected.

Road salt impacts were observed in the deep aquifer system beneath Hidden Valley PSW near the Parkway Well Field (Stantec 2013, 2014). It is our understanding this system is not hydrologically connected to the Hidden Valley tributaries but discharges to the Grand River system.

GRCA mapping identifies the majority of the study area as a high groundwater recharge area, as shown in Figure 5. Additionally, three defined discharge areas were identified through field surveys and background review, as is also shown in Figure 5.

5.1.6 Surface Drainage

The Hidden Valley Community is within a small watershed (190ha +/-) (Wood 2019). Discharge is directly to the Grand River largely via East Creek. Some drainage is to Grand River via the Hofstetter Creek, which flows beneath Highway 8 before entering

the Grand River. There are two channels into the main Hidden Valley, North Creek and West Creek. The wetland of Hidden Valley PSW is prominent in the drainage area. It is subject to ongoing pressures of River Road extension, ION and future residential and/or industrial development.

The City retained Wood to collect additional information on surface water, establish erosion control thresholds and to update the hydrologic model for the eventual assessment of land use changes and to develop stormwater management strategies. Surface drainage is also affected by the beaver dam within the PSW, which is considered a dynamic natural feature that contributes to storage on site. The wetland and beaver dam are included as storage in the calibration work undertaken by Wood.

5.2 Fish and Fish Habitat

Fish habitat features and watercourses located in the Hidden Valley Community study area are shown in Figure 2. These areas are described in the following sections.

5.2.1 Hidden Valley Creek System

5.2.1.1 West Creek

The West Creek flow originates from stormwater drainage in the Fairview Park Mall area and discharges into the central wetland area. Discharge (via pipe) from a stormwater pond facility located immediately east of Wabanaki Drive, also appears to contribute flow to this system. The stormwater outfall channel has been reconstructed with armour stone banks and bed, with portions of bed comprised of cemented rip rap substrates. Armour stone blocks are present instream, presumably for flood/erosion control. The stream flows in between these blocks and over a one-metre high elevation drop (cemented rip rap) within approximately 15 m downstream of the channel origin. Approximately 25 m downstream of the outlet, a natural channel begins, meandering along the edge of a wooded area. This channel eventually flows through cattail marsh, where it becomes increasingly indistinct and where it eventually widens into a series of open water ponds. A smaller minor branch of this creek also meanders in a northward direction within the cattail marsh, but the channel at this location is also indistinct. In 2021, the 165 m reach upstream of the wetland reach was investigated.

Between the outfall channel section and the wetland, the bankfull channel measures 2.3 – 3.5 m wide and up to 0.6 m deep. At the time of the 2013 survey, the wetted channel measured between 0.95 - 2.3 m wide and between 6-10 cm deep (with deeper areas noted amongst woody debris jams). On May 10, 2021, wetted depths ranged between 7 cm deep (in riffles) and up to 40 cm deep in pools. And wetted channel width appears similar to 2004 surveys. The channel morphology appears to be dominated by flats (70%), with some riffles (30%) and substrates are variable, comprised of 10% boulders, 40% rubble, 10% gravel, 20% sand/silt and 20% clay. Channel dimensions and morphology appear to differ between 2004 and 2021 surveys. The 2004 surveys

documented a 1.0 - 1.5 m wide bankfull channel and 70% riffles, 20% pools, and 10% flats at this location. It appears that the presence of debris jams and all-terrain vehicles (ATVs) crossing the channel in the reach has resulted in channel widening and erosion. A backwater area/overflow channel was observed near a bend in the creek located approximately 100m downstream of the creek origin.

Cover within the channel consists of 30% undercut banks, 10% boulders and 10% woody debris. Some Reed Canary Grass grows instream, some of which has originated from banks via slumping. Bank slumping and erosion is prevalent along both banks (noted historically and in 2021); likely due to the fluctuating nature of the stormwater flows and ATV disturbance. This is prevalent in the reach immediately upstream from the wetland. Some iron staining is present in the channel, which may reflect some groundwater input.

Riparian cover is fairly open, with scattered trees/shrubs including willow, poplar trees within the vicinity of the stormwater outfall. Planted trees (White Pine (Pinus strobus), maple, cherry) are present further back from the bank within this area. Unfortunately, the tree stakes have been left on these trees, therefore many of them are now becoming girdled and in fair condition as a result. Red-osier dogwood (Cornus stolonifera), Manitoba Maple (Acer negundo), ash (Fraxinus spp.) and White Cedar (Thuja occidentalis) provide approximately 30-60% cover further downstream along the natural reach.

Intensive electrofishing and reconnaissance investigations of the West Creek in 2004 did not reveal the presence of fish, despite the presence of sufficient water flows along this reach. This creek would be considered indirect fish habitat, as it contributes allochthonous materials, nutrients and flow to fish habitat within the receiving watercourse (Grand River).

5.2.1.2 North Creek

The North Creek drains an area across Highway 8 including residential and industrial areas in the King Street area. The channel appears to originate within the vicinity of the Heffner Toyota Dealership via a drainage channel/SWM pond. The channel flows in a south-easterly direction under Highway 8 and eventually discharges to the central wetland area of the PSW. The creek flows through a high gradient section via 2 CSPs under a trail/access upstream of Highway 8 and flows through a perched 1.2 m x 1.2 m box culvert under Highway 8. Downstream of the highway, the channel is defined but becomes braided further downstream within marsh/swamp habitat. The creek eventually outlets to Hidden Valley PSW.

Downstream of the Hidden Valley Road, the channel wetted width averaged 1.4 - 1.75 m wide with average depths of 0.04 - 0.37 m deep on May 29, 2013. Bankfull width measured a maximum of 2.6 m (average of 1.7 m), with bankfull depths measuring 0.4 m deep on May 29/2013. Dimensions are slightly larger than what was previously

documented in 2004, likely due to some beaver influence in the reach (2 small dams noted). At the culvert outlet, a large plunge pool measuring approximately 4 m wide x 5 m long and 1 m deep exists, with eroding, steep (2 m high) banks. The culvert was perched approximately 90 cm above the water at the time of the May 29, 2013 survey, similar to May 10, 2021 conditions.

Generally, morphology is dominated by 85% flats, 10% pools and 5% riffles (compared to 30% riffles, 20% runs, 30% pools and 20% flats documented in 2004 field work). Creek substrate is dominated by sand and gravel, with some scattered boulders and cobble. Boulders have been placed along the banks and instream a short distance downstream of the culvert, likely to provide bank stabilization. A debris jam was present instream backing up some flow a short distance downstream of the culvert outlet in May 2021. Within the wetland downstream, the channel contains low flow conditions (flats dominant) and the channel braids approximately 65 m downstream of Hidden Valley Road.

Riparian habitat consists of cultural thicket, including Staghorn Sumac (Rhus typhina), Hawthorn (Crataegus spp.), Crack Willow (Salix fragilis), Alternate-leaved Dogwood (Cornus alternifolia) and juniper (Juniperus spp.), growing along the banks. Within approximately 40 m downstream of the road, overhead cover decreases, as the creek flows through marsh habitat comprised of mainly Reed Canary Grass and cattail.

Further downstream, the creek flows along the wooded edge of upland habitat for a portion of its length, with Common Buckthorn (Rhamnus cathartica), Eastern White Cedar and Sugar Maple (Acer saccharum ssp. Saccharum), providing cover. The channel flows through a short moderate-high gradient section in this reach. As noted further above, the main channel diffuses into the wetland. A portion of this wetland was previously considered to be coniferous swamp, however, a large beaver dam located downstream has flooded the swamp and its presence appears to be converting the swamp to a marsh, with dead standing trees present. These dams were confirmed to be present in May 2015.

Electrofishing efforts and reconnaissance investigations did not reveal the presence of fish in this tributary during the 2004 survey and further during a 2015 survey completed as part of the Waterloo ION LRT project (LGL 2020). As this creek originates a short distance upstream of Highway 8 from industrial lands; fish colonization opportunities are limited. In addition, several beaver dams and barriers are known downstream. This creek contributes indirectly to fish habitat located downstream in the Grand River.

5.2.1.3 East Creek

East Creek is the main drainage stream for the central basin and flows south-easterly and into the Grand River. Erosion has been documented during peak flows (Planck 1979). The corrugated steel pipe culvert at Hidden Valley Road is significantly perched, and along with steep gradients provides a significant barrier to fish movement. This

watercourse was only investigated at the Hidden Valley Road crossing in 2021. Descriptions and mapping details from reaches upstream are taken from the results of previous LGL investigations.

East Creek arises from the convergence of North and West Creeks and contains moderate gradients. Portions of this watercourse were investigated in 2013. In 2013, the average wetted channel width ranged from 1.5 to 1.7 m; with a mean depth of 0.15 m (bankfull width is 3.2 m and bankfull depths are 0.4 m). The creek channel morphology consisted of riffles along 75% of its reach, with pools and flats comprising the remaining 25% of its reaches. The creek was shaded for about 60% of its reach through ESPA 27 and is comprised of 85% rubble, 10% gravel, and 5% sand substrates. Instream cover is dominated by boulders and undercut banks. Creek banks are generally stable throughout the ESPA 27.

At Hidden Valley Road, the creek forms a large meander upstream of the road. Toe rock has been placed along the outer bank of this bend. Riffle morphology is dominant, measuring 2.5-3 m wide (bankfull) and water depth measuring 10-15 cm deep at the time of the May 10, 2021 survey. Seepage is abundant here, entering the channel by travelling down the road embankment. The seepage appears to originate from the private property located to the west, originating from an underground pipe.

The culvert under Hidden Valley Road is a 90 cm CSP that is encased in concrete. The crossing is comprised of two outlets (one overflow) and is steeply sloped. Armourstone lines the culvert inlet/outlet and a portion of the banks upstream and downstream of the road. Downstream of the road, large boulders have been placed perpendicular to the flow, creating a riffle pool morphology. No fish were observed in May 2021 survey and no fish were captured in East Creek during electrofishing efforts in 2004. East Creek and its riparian vegetation provide the most direct vegetated connection to the main Grand River corridor from the central Hidden Valley area. The presence of a perched culvert at Hidden Valley Road prevents the colonization by fish within this creek. This creek provides indirect contributions (i.e., allochthonous materials, nutrients and flow) to the Grand River.

5.2.1.4 Hofstetter Creek

Hofstetter Creek drains an area that has been referred to as the Hofstetter Basin, which includes a portion of the woodlot adjacent and flows from the wetland area at the northeast section of Hidden Valley underneath Highway 8. The creek empties into the Grand River on the north side of Highway 8. A spring was located at the edge of the hardwood forest that contributes flow to Hofstetter Creek and was noted to have water quality characteristics typical of groundwater in the area (Planck 1979). Hofstetter Creek lost about one third of its contributing area when Highway 8 was constructed, and River Road was re-routed (Limnoterra 1980, as cited in LGL 2014).

As noted, the creek originates from a wetland pocket located on the south side of Hidden Valley Road (shallow marsh/ mixed swamp). In 2004 and 2021 surveys, groundwater seeps were noted in the wetland. One defined channel is present within approximately 20 m upstream of the Hidden Valley Road culvert, with braided channels upstream of this point. The culvert measures 1.5 m wide (open footed) and extends under both Hidden Valley Road and Highway 8. Wetted channel widths range from 0.3 – 1 m, and channel depths of 0.05 – 0.08 m, with a substrate mix of 100% silt/organics near the wetland, with coarser substrates present within approximately 10 m of the culvert (sand 70%; cobble 20%; gravel 10%). Water conditions were clear, and water was slow flowing on all visits. Vegetation adjacent to the stream is dominated by ash and poplar, with skunk cabbage and water speedwell near the culvert and cattail dominant further upstream within the marsh. Phragmites dominates the wetland further west at roadside.

Downstream of Highway 8, the channel is ditched, with placed riprap along the banks within approximately 8 m downstream of the culvert, as recorded in previous LGL studies (LGL 2004). This channel widens into a 20 m wide cattail wetland pocket, and drainage flows through another culvert under a private driveway, and into a deciduous forest on the north side of the laneway. As this is private property, the channel could not be followed after this point, but flow is eventually directed through a 75 cm diameter plastic culvert and drains down a high gradient boulder channel (with steps) located within approximately 17 m upstream of the Highway 8 bridge at the Grand River.

No fish were observed within Hofstetter Creek during aquatic habitat surveys conducted in 2004 and no fish were captured (LGL 2014). The gradient of the slope along the Grand River is considered a barrier to upstream fish and mussel movement. DFO and MNRF databases do not identify any species at risk in Hofstetter Creek.

5.2.1.5 Hidden Valley Pond

The Hidden Valley Pond is situated at the north base of the Esker Ridge and adjacent to the marsh in the southern portion of Hidden Valley. It is located at the base of one of the steepest sloping areas of the esker and within the edge of Beech-Maple Forest with forest on three sides, and the west side that is open provides a surface water connection to the remaining marsh, although a large amount of woody debris/beaver dam acts effectively to close in the pond. The pond is approximately 100 m in length and 40 m wide, with a depth ranging from 1.0 m at a distance of 0.3 m from the shore to unknown depths in the middle, as identified in 2013 investigations.

5.2.1.6 Hidden Valley Marsh

The Hidden Valley Marsh is designated as a Provincially Significant Wetland. The marsh was known in previous studies as the “Central Wetland Area’ because of its location within the central portion of Hidden Valley ESPA. The marsh consists of a shallow marsh with an open water component, notably along the southern edges of the

marsh, as well as in the form of wetland channels through cattail-dominant vegetation. North of this community, an equally large adjacent coniferous swamp is present. Subsequent visits in 2012 and 2013 indicate the coniferous swamp has become flooded out presumably due to beaver activity, and most of the trees are now dead as the area has also converted, or is in the process of converting, to marsh. There also exists coniferous and deciduous swamp in the south easterly area of Hidden Valley in the vicinity of East Creek. Since 2004-2008 field investigations, this area is also flooded out presumably due to beaver activity and is now a large open water feature (Stantec 2013). In 2021, air photo interpretation continues to show shallow water habitat.

No fish were observed or captured in the main marsh during prior electrofishing or during salamander/minnow trapping from 2004 to 2008. Previous reports indicated that fish habitat within this unit was limited by the high summer temperatures and low dissolved oxygen levels, as well as limited opportunity to gain access to this area through the receiving and discharging watercourses (Ecologistics 1979) and as confirmed through LGL habitat assessment.

5.2.1.7 Frog Pond

The ‘frog pond’ is situated east of the main area of Hidden Valley and is a depressional area adjacent to a residence and Hidden Valley Road, it is complexed in with the Hidden Valley PSW. The pond is comprised of swamp thicket with dense shrubs within the wetted basin area. Edges consist of scattered trees and shrubs with pioneering vegetation beneath. No inflow or outflow channel is noted for this feature. Stantec (2013) indicates that surface water at this location is perched and not connected with groundwater levels in the shallow aquifer, that water in the pond is sourced from local runoff. The pond is well utilized by breeding amphibians as documented through anuran calling.

No evidence of fish use has been noted by LGL through trapping in 2007 and 2008, and Stantec (2013) did indicate the pond dries up completely at times. Stantec (2013) indicated that in 2012 monitoring, the pond contained water from April until late June, but was dry on July 4, 2012, as confirmed through direct observation.

5.2.1.8 Grand River

The Grand River corridor lies within the study area on the eastern and southern boundary. It is the largest watershed in southern Ontario at 6,8000 square kilometers. The Grand River Conservation Authority reports over 90 species of fish are found in the river system (GRCA 2023). It is a water supply to several communities and receives treated water from multiple wastewater treatment plants, and about 1 million people live in the watershed (GRCA 2023). The Grand River is designated a Canadian Heritage River recognized for outstanding natural, cultural and recreational heritage.

Based on field assessments of the study area, as completed on May 10, 2021, the Grand River corridor is comprised of open floodplain meadow habitat, forested slopes, golf course and residential homes. Closest to the Highway 8, the top of bank is bordered by multiple homes. Within the wider floodplain vegetation is predominantly cultural meadow with scattered trees. South of the River is the Deer Ridge Golf Course and forested slopes occur toward the western end of the study area. Within the floodplain are constructed ponds. A Region of Waterloo weir occurs approximately 850m downstream of the Highway 8 bridge. The wetted width of between Highway 8 and the weir ranges from 60 to 100m. The channel is slow moving and represents flat/pool morphology through this reach. The majority of the reach is not wadeable, particularly along the north side of the river. Along the north bank, water depths measured approximately 70 cm deep along the bank edge near the downstream most pier edge with shallower conditions at the upstream end of the northbound bridge (25-50 cm). Water depth drops off within 3 m of the bank. Water levels extended beyond the northern most (pier at the time of survey as evidenced by the debris washed up on the bank. Boulders (placed) dominate the shoreline upstream of the bridge.

Along the south bank of the river, a wider littoral zone exists and is vegetated with milfoil, pond lily, sedges, bur-marigold and floating algae, extending mostly within approximately 10 m of the shore. Channel depth measures approximately 35 cm deep within 5 m of the shoreline. Channel substrates appear comprised of cobble, gravel and sand under the southbound bridge with finer substrates at the upstream end (silt, muck, gravel). Cobble is prominent along the downstream bank, with herbaceous species growing throughout the cobble (Reed Canary Grass, Purple Loosestrife, Baneberry). Downstream of the weir the channel braids and exhibits flats and riffle morphology.

Fish sampling was not conducted within the Grand River due to the abundance of existing fisheries data which was collected from the OMNRF, 2015 and LGL, 2009 and 2012). The Grand River is host to a wide variety of warm/coolwater fish species and supports a warmwater thermal regime in the study area (LIO 2019) with over 90 species recorded in the watershed (GRCA 2023) as shown in Table 2. These records include sampling by LGL on behalf of the Region of Waterloo in 2009, 2012, and 2015.

5.3 Vegetation and Vegetation Communities

5.3.1 Vegetation Communities

Land use within the study area comprises residential, commercial, agricultural and industrial developments. Natural vegetation communities include remnant woodlands near Highway 8, the Hidden Valley core, and the vegetation associated with the Grand River corridor. Anthropogenic vegetation communities such as ornamental plantings, agricultural fields, hedgerows and old fields surround these natural vegetation communities.

Table 2: Fish Collected in the Vicinity of the Study Area

Scientific Name	Common Name	COSSARO	COSEWIC	SARA	Grand River
Campostoma anomalum	Central Stoneroller	-	-	-	
Chrosomus eos	Northern Redbelly Dace	-	-	-	
Cyprinus carpio	Common Carp	-	-	-	x
Luxilus chrysocephalus	Striped Shiner	-	-	-	
Luxilus cornutus	Common Shiner	-	-	-	x,y
Margariscus margarita	Pearl Dace	-	-	-	
Nocomis biguttatus	Hornyhead Chub	-	-	-	y
Notropis atherinoides	Emerald Shiner	-	-	-	x,y
Notropis hudsonius	Spottail Shiner	-	-	-	
Notropis photogenis	Silver Shiner	THR	THR	Sch. 3/SC	y
Notropis rubellus	Rosyface Shiner	-	-	-	y
Pimephales notatus	Bluntnose Minnow	-	-	-	x,y
Pimephales promelas	Fathead Minnow	-	-	-	
Rhinichthys atratulus	Blacknose Dace	-	-	-	x
Rhinichthys cataractae	Longnose Dace	-	-	-	y
Semotilus atromaculatus	Creek Chub	-	-	-	x
Catostomus commersonii	White Sucker	-	-	-	x
Hypentelium nigricans	Northern Hog Sucker	-	-		x,y
Moxostoma valenciennesi	Greater Redhorse	-	-	-	x,y
Moxostoma duquesnei	Black Redhorse	THR	THR	No Sch./ Status	x,y
Moxostoma erythrurum	Golden Redhorse	-	-	-	x,y
Ameiurus nebulosus	Brown Bullhead	-	-	-	
Noturus flavus	Stonecat	-	-	-	
Umbra limi	Central Mudminnow	-	-	-	
Culaea inconstans	Brook Stickleback	-	-	-	x
Pomoxis nigromaculatus	Black Crappie	-	-	-	x
Ambloplites rupestris	Rock Bass	-	-		x,y
Lepomis cyanellus	Green Sunfish	-	-	-	x,y
Lepomis gibbosus	Pumpkinseed	-	-	-	x
Micropterus dolomieu	Smallmouth Bass	-	-	-	x
Percina maculata	Blackside Darter	-	-	-	x
Etheostoma nigrum	Johnny Darter	-	-	-	x,y
Etheostoma blennioides	Greenside Darter	-	-	-	x,y
Etheostoma caeruleum	Rainbow Darter	-	-	-	x
Etheostoma flabellare	Fantail Darter	-	-	-	y
Sander vitreus	Walleye	-	-	-	x

x: Fish collection data Grand River Water Quality LGL Sampling (2009, 2012), Electrofishing sampling May 2015

y: Secondary Source Data including personal Correspondence with MNRF, GRCA in 2014-2016.

SARA- Species at Risk Act (Federal legislation); Sch.- Schedule (listing in SARA); THR- Threatened

To date, a total of 54 ELC vegetation communities have been identified in the study area. The composition of these vegetation communities, based on field work and analysis prior to the 2024 site visit, is outlined in Appendix A and shown in Figure 6.

Within the Hidden Valley area, a mixture of upland and wetland communities is present. Dry-Fresh Sugar Maple Deciduous Forest (FOD5) is the dominant community type in upland locations. In these communities, Sugar Maple (Acer saccharum saccharum) grows in pure stands or in association with American beech (Fagus grandifolia), basswood (Tilia americana) and white ash (Fraxinus americana). In 2012, a severe storm toppled the trees and opened a portion of the canopy near Highway 8 and in 2021 forest management further opened the canopy of these communities. Isolated groves of mixed and coniferous forests exist within the forested units, including a Fresh-Moist Hemlock Coniferous Forest (FOC3-1), a Fresh-Moist Sugar Maple-Hemlock Mixed Forest (FOM6-1), both dominated by eastern hemlock (Tsuga canadensis), and a Fresh-Moist White Cedar Coniferous Forests (FOC4-1), dominated by eastern white cedar (Thuja occidentalis).

Forested communities located along the fringe of these extensively wooded areas include Fresh-Moist White Cedar-Hardwood Mixed Forests (FOM7), Dry-Fresh Poplar Deciduous Forests (FOD3-1), Dry-Fresh White Ash Deciduous Forests (FOD4-2) and Fresh-Moist Poplar Deciduous Forests (FOD8-1). These communities are typically comprised of younger stands of trembling aspen (Populus tremuloides), large-tooth aspen (P. grandidentata), white ash, basswood, yellow birch (Betula alleghaniensis) and white birch (B. papyrifera).

Forested communities located along the bank of the Grand River include Dry-Fresh Sugar Maple Deciduous Forest (FOD5), Mix Forest (FOM), Dry-Fresh Deciduous Forest (FOD4), Fresh-Moist White Cedar Coniferous Forest (FOC3), and Fresh-Moist Lowland Willow Deciduous Forest (FOD7). These communities have varying degrees of disturbance due to the steep slope and influence from the adjacent residential community.

A large Cattail Mineral Shallow Marsh (MAS2-1) dominated by common cattail (Typha latifolia) is situated at the base of the esker slope in the central portion of the study area. An extensive Mixed Swamp (SWM) dominated by yellow birch, black ash (Fraxinus nigra), eastern white cedar, tamarack (Larix laricina) lies to the north and a Deciduous Swamp (SWD) extends along the creek to the southwest of the MAS2-1 community. Wetland boundaries and community dominance has changed since 2005. The tamarack coniferous swamp (SWC3-2) along the creek had transitioned into a cattail dominated community, noted during the 2012 field investigation. Dead standing conifers remain in this swamp community in 2021.

Another wetland adjacent to Hidden Valley Road at Hofstetter Creek (at the northeast corner of the study area) is dominated by Narrow-leaved Sedge Mineral Meadow Marsh

(MAM2-5) and White Cedar-Hardwood Mineral Mixed Swamp (SWM1-1). Additionally, wetland communities occur along the bank and an outfall to the Grand River in the southern portion of the study area, Willow and Manitoba Maple Deciduous Swamp (SWD4 and SWD4-1) are found throughout. Small pockets of Cattail Mineral Shallow Marsh (MAS2-1) and Meadow Marsh (MAM2-10) communities line the bank of the river.

Cultural communities persist in areas around the periphery of the woodlands, natural areas and dominate the southern portion of the study area. Cultural community types include Dry-Moist Old Field Meadows (CUM1-1), Mineral Cultural Thickets (CUT1), Mineral Cultural Woodlands (CUW1), Mineral Cultural Savannah (CUS1) and Deciduous (CUP1) and Coniferous Plantations (CUP3). These communities are under various stages of maturity and contribute to the diversity of habitat within the intact natural vegetation communities.

Vegetation communities south of Hidden Valley Road and River Birch Street consist of cultural communities that have established following agricultural land use. These communities consist of Dry-Moist Old Field Meadows (CUM1-1), Willow Mineral Deciduous Swamp (SWD4-1), Dry-Fresh Poplar Deciduous Forest (FOD3), White Pine Cultural Plantation (CUP3-2), Cultural Thicket (CUT1), Reed-canary Grass Mineral Meadow (MAM2-2), and Common Reed Mineral Meadow (MAM2). This area contains three storm water management ponds.

Vegetation community status was reviewed for Ontario (OMNR 2021a). All but one of the vegetation communities identified within the study area are considered widespread and common in Ontario and secure globally (OMNR 2021).

The one community with status is the Open Tallgrass Prairie (TPO1) habitat noted along the roadsides and berms surrounding the newer housing developments south of Hidden Valley Road, between River Valley Drive and Wabanaki Drive. This is established as result of applied seed mix, as opposed to establishing from native seed bank at site given the extent of site alteration during development. This community type is ranked S1 provincially, however, given its anthropogenic origin it’s not considered rare in the context of this assessment.

5.3.2 Flora

To date, a total of 407 vascular plant taxa have been recorded within the study area. One hundred and fourteen (114) taxa, (28 % of the recorded flora) are considered introduced and non-native to Ontario. Southern species include James’ Sedge (Carex jamesii), purple joe-pye-weed (Eupatorium purpureum), richweed (Collinsonia canadensis) and spicebush (Lindera benzoin) which were observed during initial surveys (2004, 2012 and 2013). A master list of all flora recorded from background data, prior field investigations by LGL, and 2021 LGL field investigations in support of this study is attached in Appendix B.

5.3.3 Locally Rare Plants

Plant species status was cross referenced with The Region of Waterloo's Significant Flora List which was updated in 2020 by iNaturalist user and environmental consultant (Deacon 2020),but remains draft and has not yet been adopted by the Region of Waterloo. The 2009 Region of Waterloo list is also referenced as it is still in effect. A few locally or provincially significant species changed status for this list update, and some species have been added to the Region of Waterloo Local Status list:

- Cottonwood (Populus deltoides);
- Thin-leaved Sedge (Carex cephaloidea);
- European Beggar-ticks (Bidens tripartita);
- Tall Beggar-ticks (Bidens vulgata); and ,
- Woolly Sedge (Carex pellita).

All species listed were identified during the previous field investigations for the South Kitchener River Road Extension (2013). Records for rare or SAR plants are summarized in Table 3 and ELC vegetation communities referenced are shown in Figure 6. Where location information was available for these plant species it is discussed further below.

Table 3: Summary of Local Plant Status Observed in the Study Area

Scientific Name	Common Name	Local Status Waterloo 2006	Local Status Waterloo 2020	Previous Field Surveys	Field Visit 2021
Picea glauca	white spruce	x	x	x	x
Juniperus communis	common juniper	x	x		x
Celtis occidentalis	common hackberry	x	x	x	x
Juglans nigra	black walnut	x	x	x	x
Populus deltoides	cottonwood		x	x	x
Gentianopsis crinita	fringed gentian	x	x	x	
Collinsonia canadensis	stoneroot	x	x	x	x
Galium circaezans	white wild licorice	x	x	x	
Bidens tripartita	European beggar-ticks		x	x	
Bidens vulgata	tall beggar-ticks		x	x	
Eupatorium purpureum var. purpureum	purple joe-pye-weed	x	x	x	
Carex cephaloidea	thin-leaved sedge		x	x	x
Carex jamesii	James' sedge	x	x	x	
Carex leptalea ssp. leptalea	bristle-stalked sedge	x	x	x	
Carex pellita	woolly sedge		x	x	
Carex sparganioides	burreed sedge	x	x	x	
Carex woodii	wood's sedge	x	x	x	
Sporobolus cryptandrus	sand dropseed	x	x	x	

5.3.3.1 James' sedge

James' sedge (Carex jamesii) is rare in the Region of Waterloo (2009, 2020 Draft), is located on steeper slopes in the Dry-Fresh Sugar Maple-Basswood Deciduous Forest (FOD5-6)/Dry-Fresh Sugar Maple-White Ash Deciduous Forest (FOD5-8) located south-centrally in the Hidden Valley ESPA area. This species was noted during prior field investigations (2004, 2012 and 2013) but was not reconfirmed in 2021.

5.3.3.2 Purple Joe-pye Weed

Purple Joe-pye Weed (Eupatorium purpureum) is rare in the Region of Waterloo (2009, 2020 Draft). It occurs in the same general location as James' sedge, but it is restricted to the upper slope. This species was noted during prior field investigations (2004, 2012 and 2013) but was not reconfirmed in 2021.

5.3.3.3 Wood's sedge

Wood's sedge (Carex woodie) was found mainly on the steeper slopes in the Dry-Fresh Sugar Maple-Basswood Deciduous Forest (FOD5-6)/Dry-Fresh Sugar Maple-White Ash Deciduous Forest (FOD5-8) located south-centrally in the study area. This species is considered rare in the Region of Waterloo (2009, 2020 Draft).

5.3.3.4 Stoneroot

Stoneroot (Collinsonia canadensis) was found mainly on the steeper slopes in the Dry-Fresh Sugar Maple-Basswood Deciduous Forest (FOD5-6)/Dry-Fresh Sugar Maple-White Ash Deciduous Forest (FOD5-8) located south-centrally in the study area but has not been reconfirmed in 2021. This species is considered rare in the Region of Waterloo (2009, 2020 Draft).

5.3.3.5 Fringed Gentian

A population of Fringed Gentian (Gentianopsis crinita) (was located in the Mineral Cultural Woodland (CUW1) community located in the northeastern portion of the study area but has not been reconfirmed since 2004. This species is considered rare in the Region of Waterloo (2009, 2020 Draft).

5.3.3.6 Bristle-stalked Sedge

Bristle-stalked sedge (Carex leptalea ssp. leptalea) occurs widely in study area wetlands. This species is considered rare in the Region of Waterloo (2009, 2020 Draft).

5.3.3.7 Sand Dropseed

Sand Dropseed (Sporobolus cryptandrus) was documented in the old gravel pit at the north east corner of Wabanaki Road and Hidden Valley Road. LGL confirmed the species at the intersection of Wabanaki Road and Hidden Valley Drive in prior study years. Additional locations in the study area are identified in iNaturalist from 2018 and 2020 in recent records (these locations are not mapped). It is reported along the rail

corridor, 80m east of Wabanaki Drive. It is also reported on the north side of Hidden Valley Road as it parallels Highway 8. This species is considered rare in the Region of Waterloo (2009, 2020 Draft).

5.3.3.8 Wild Leek

Wild Leek (Allium tricoccum) was documented in FOD5 communities as shown on Figure 6 and was confirmed in 2021. Records occur in iNaturalist but point locations are not provided for this species, likely due to risk of over-harvesting. A. burdickii was not confirmed in 2021 by LGL nor shown in iNaturalist in the study area, which is the species that is considered rare. No record of A. burdickii has been confirmed.

A. tricoccum is not considered provincially or locally rare, is not carried forward as having local status, and is not mapped.

5.3.3.9 White Spruce

White Spruce (Picea glauca) occur throughout the study area, often associated with former homesteads or residential property. In this context their occurrences are not considered rare and their locations are not mapped.

5.3.3.10 Black Walnut

Black walnut (Juglans nigra) occur throughout the study area, often associated with former homesteads. In this context their occurrences are not considered rare and their locations are not mapped.

5.3.3.11 Common Juniper

Common Juniper (Juniper communis) occur throughout the study area, often associated with former homesteads. In this context their occurrences are not considered rare and their locations are not mapped. It is present in the riparian corridor of North Creek but may still be associated with a homestead in this location.

5.3.3.12 Common Hackberry

Common Hackberry (Celtis occidentalis) are recorded in the study area, often associated with former homesteads. In this context their occurrences are not considered rare and their locations are not mapped.

5.3.3.13 White Wild Licorice

White Wild Licorice (Galium circaezans) was noted within the Sugar Maple Deciduous Forest (FOD5) of the study area. A record occurs in iNaturalist for 2020 in the northern portion of the study area, just south of Hidden Valley Road where is parallels Highway 8. This species is considered rare in the Region of Waterloo (2009, 2020 Draft).

5.3.3.14 Burreed Sedge

Burreed Sedge (Carex sparganioides) was noted within the Sugar Maple Deciduous Forest (FOD5) of the study area. This species is considered rare in the Region of Waterloo (2009, 2020 Draft).

5.3.3.15 Cottonwood

Cottonwood (Populus deltoides) is recorded in FOD4 in prior years. This species is considered rare in the Region of Waterloo (2020 Draft).

5.3.3.16 European Beggar-ticks

European beggar-ticks (Bidens tripartita) was not confirmed in 2021. The species was recorded in the SWM6-1,MAM2-2 and MAM2-5 in prior years. This species is considered rare in the Region of Waterloo (2020 Draft).

5.3.3.17 Tall Beggar-ticks

Tall beggar-ticks (B. vulgata) were recorded in SWM6-1. This species is considered rare in the Region of Waterloo (2020 Draft).

5.3.3.18 Thin-leaved Sedge

Thin-leaved sedge (Carex cephaloidea) was confirmed in 2021. The species is recorded within the Sugar Maple Deciduous Forest (FOD5) of the study area. This species is considered rare in the Region of Waterloo (2020 Draft).

5.3.3.19 Woolly Sedge

Woolly Sedge (C. pellita) was noted in SWM6-1, MAM2-2, MAM2-5 and MAM2-10 wetland communities in prior years but was not confirmed in 2021. This species is considered rare in the Region of Waterloo (2020 Draft).

5.3.4 Provincially Rare Plants/Special Concern

Provincially Rare (SRank of S1, S2 or S3) or Special Concern plants are considered in the context of Significant Wildlife Habitat. Table 4 summarizes provincially rare plant species documented in the study area. While Butternut is listed as SRank S2? provincially, it is addressed as Species at Risk given its status as Endangered.

Table 4: Summary of Provincially Rare (SRank of S1-S3) Plant Status Observed in Study Area

Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC
Juglans cinerea	butternut	G3	S2?	END	END

5.4 Wildlife

Wildlife habitat in the study area is comprised of a mix of wetland, forest, riparian and field habitat bordered by the Grand River corridor to the south and east of the study area, and by the urban landscape to the north and west. Highway 8 runs parallel to Hidden Valley to the northeast of the study area, and there are small remnant woodlots on either side of highway. Prior to the construction of the highway, these woodlots would have been contiguous with the woodlots of the Hidden Valley area but Highway 8 is considered a barrier given road width and traffic volume. Culverts for Hofstetter Creek or North Creek do not afford animal movement for anything but the most urban tolerant species, given their size and length.

In Hidden Valley, specialized wildlife habitat has been noted in previous studies (Ecologistics 1979, LGL 2014, LGL 2020, LGL 2022). The open water, vernal pools and pond features of the southern woodlot are known amphibian breeding ponds for Species at Risk. Regulated habitat is identified for the project area, but not shown in mapping herein due to data sensitivity requirements.

Hidden Valley is known locally for its richness particularly in numbers of bird species, as noted by local naturalists, and previous works. Hence, it has been referred to as “Bird Ridge” in past studies (Ecologistics 1979). It continues to be a popular birding site for residents, visitors and clubs, including the former Kitchener Waterloo Field Naturalists (now Waterloo Nature). Forest interior habitat (100m interior) is present in the deciduous forests, supporting both interior species (Ovenbird (Seiurus aurocapilla)) and area sensitive species (Pileated woodpecker (Dryocopus pileatus)). In addition, the Hidden Valley PSW is documented as supporting Sora (Porzana carolina) and Virginia Rail (Rallus limicola).

A total of 48 wildlife species were documented during 2021 field investigations, including one amphibian species, 40 bird species, 6 mammal species and one reptile species (Appendix C). The following subsections summarize the wildlife habitat and features within the study area. The location and type of survey is presented in Figure 7.

5.4.1 Breeding Birds

5.4.1.1 Background Information

Breeding bird surveys using 10-minute point counts were completed in the study area on June 1 and 17, 2021. Weather conditions were optimal on both days, with low wind, 60% cloud cover and a temperature of 15°C on June 1; and no wind, clear skies and a temperature of 9°C on June 17. In addition to the bird survey, incidental wildlife observations were completed through visual and auditory observations as well as indirect incidental observations (i.e., tracks, scat, and scents). A running wildlife list is provided in Appendix C.

5.4.1.2 Findings

As of December 2023, a total of 114 bird species have been recorded for the Hidden Valley area from available records and reports dating back to 1979 up to, and including, 2021 breeding bird surveys by LGL. We also acknowledge that as of 2023, there are checklists available through eBird that reflect 141 species on the Hidden Valley list, and 75 species on the Walter Bean Trail by Deer Ridge Golf Club hot spot lists, and these lists include significant contributions by local and knowledgeable birders. Additional species have potential to be added or confirmed in the Hidden Valley study area.

A detailed running list of species documented in the project area is provided in Appendix C. There are five bird species that were documented in 1979 and have not been documented since, these include Blue-winged Teal, Bobolink, Eastern Towhee, Ruffed Grouse and Veery.

The following sections provide a summary of the 2021 investigations.

5.4.1.2.1 Breeding Evidence

The breeding bird surveys found breeding bird evidence (BBE) for 40 species of birds (Table 5). Breeding evidence was confirmed for four species, determined as probable for 16 species, and possible for 18 species (Table 8). Note that species tallied under confirmed were excluded from probable and possible tallies, and species tallied under probable were excluded from possible tallies as only the highest degree of breeding evidence was considered for each species. Confirmed BBE was demonstrated by a nest containing eggs for Killdeer, and by fledged or downy young for American Goose, Downy Woodpecker, and Mallard. Species classified as probable breeders were recorded through evidence such as a permanent breeding territory, and a pair observed in their breeding season in suitable nesting habitat. Species classified as possible breeders were recorded through evidence such as observations of a male singing or an individual recorded in suitable breeding habitat.

Table 5: Results of Breeding Bird Surveys Conducted in the Study Area in 2021

Common Name	Scientific Name	SARA/ ESA	Legal Status	BBE
American Crow	*Corvus brachyhrynchos*		-	Possible (H)
American Goldfinch	*Spinus tristis*		MBCA	Probable (P)
American Robin	*Turdus migratorius*		MBCA	Probable (P)
Baltimore Oriole	*Icterus galbula*		FWCA(P)	Probable (T)
Barn Swallow	*Hirundo rustica*	THR	MBCA	Possible (H)
Belted Kingfisher	*Megaceryle alcyon*		FWCA(P)	Possible (H)
Black-capped Chickadee	*Poecile atricapillus*		MBCA	Probable (T)
Blue Jay	*Cyanocitta cristata*		FWCA(P)	Probable (T)
Canada Goose	*Branta canadensis*		MBCA	Confirmed (FY)
Chipping Sparrow	*Spizella passerina*		MBCA	Possible (S)
Common Grackle	*Quiscalus quiscula*		-	Possible (H)
Common Merganser	*Mergus merganser*		MBCA	Possible (H)
Common Yellowthroat	*Geothlypis trichas*		MBCA	Probable (T)

Common Name	Scientific Name	SARA/ ESA	Legal Status	BBE
Downy Woodpecker	*Picoides pubescens*		MBCA	Confirmed (FY)
Eastern Kingbird	*Tyrannus tyrannus*		MBCA	Possible (H)
Eastern Wood-Pewee	*Contopus virens*	SC	MBCA	Possible (S)
European Starling	*Sturnus vulgaris*		-	Possible (H)
Field Sparrow	*Spizella pusilla*		MBCA	Possible (S)
Gray Catbird	*Dumetella carolinensis*		MBCA	Probable (P)
Great Crested Flycatcher	*Myiarchus crinitus*		MBCA	Possible (H)
Hairy Woodpecker	*Picoides villosus*		MBCA	Possible (S)
House Sparrow	*Passer domesticus*		-	Possible (H)
House Wren	*Troglodytes aedon*		MBCA	Probable (T)
Indigo Bunting	*Passerina cyanea*		MBCA	Possible (S)
Killdeer	*Charadrius vociferus*		MBCA	Confirmed (NE)
Mallard	*Anas platyrhynchos*		MBCA	Confirmed (FY)
Mourning Dove	*Zenaida macroura*		MBCA	Possible (H)
Northern Cardinal	*Cardinalis*		MBCA	Probable (T)
Northern Flicker	*Colaptes auratus*		MBCA	Possible (S)
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		MBCA	Probable (T)
Pied-billed Grebe	*Podilymbus podiceps*		MBCA	Possible (H)
Red-eyed Vireo	*Vireo olivaceus*		MBCA	Probable (T)
Red-tailed Hawk	*Buteo jamaicensis*		FWCA(P)	Probable (T)
Red-winged Blackbird	*Agelaius phoeniceus*		-	Probable (T)
Ring-billed Gull	*Larus delawarensis*		MBCA	Observed (X)
Song Sparrow	*Melospiza melodia*		MBCA	Probable (T)
Tree Swallow	*Tachycineta bicolor*		MBCA	Possible (H)
Turkey Vulture	*Cathartes aura*		FWCA(P)	Observed (X)
Wild Turkey	*Meleagris gallopavo*		FWCA(G)	Probable (P)
Yellow Warbler	*Setophaga petechia*		MBCA	Probable (T)

Legend:

Abbreviation	**Description**
SARA/ESA	
THR	Designated Threatened under Ontario *Endangered Species Act* and Canada *Species at Risk Act*
SC	Designated Special Concern under Ontario *Endangered Species Act* and Canada *Species at Risk Act*
Legal Status:	
-	*Not protected*
MBCA	*Migratory Bird Convention Act*
FWCA(P)	*Fish and Wildlife Conservation Act* Protected Species
FWCA(G)	*Fish and Wildlife Conservation Act* Game Species
BBE:	Breeding Bird Evidence
Observed:	
X	Species observed in its breeding season (no evidence of breeding).
Possible Breeding:	
H	Species observed in its breeding season in suitable nesting habitat.
S	Singing male present in its breeding season in suitable nesting habitat.
Probable Breeding:	
T	Permanent territory presumed through registration of territorial song on at least two days, a week apart, at the same place.
P	Pair observed in their breeding season in suitable nesting habitat.
Confirmed Breeding:	
FY	Fledged young or downy young, including young incapable of sustained flight.
NE	Nest containing eggs.

5.4.1.2.2 Species Subject to Migratory Birds Convention Act/Fish and Wildlife Conservation Act

A total of 40 bird species were observed during 2021 breeding bird surveys, 32 of the bird species observed are regulated under the Migratory Birds Convention Act (MBCA) (Table 5). Four of the bird species, Belted Kingfisher (Megaceryle alcyon), Blue Jay (Cyanocitta cristata), Red-tailed Hawk (Buteo jamaicensis), and Turkey Vulture (Cathartes aura) are protected under the Fish and Wildlife Conservation Act (FWCA) and Wild Turkey (Meleagris gallopavo) is a game species under FWCA.

Some of the observed species are not under any legislative protection and these include American Crow (Corvus brachyhrynchos), Common Grackle (Quiscalus quiscula), European Starling (Sturnus vulgaris), House Sparrow (Passer domesticus), and Red-winged Blackbird (Agelaius phoeniceus).

5.4.1.2.3 Area Sensitive Birds

Of these records, 25 species are considered area sensitive when reviewed against criteria outlined in the MNRF (2000) Significant Wildlife Habitat Technical Guide, and 15 are considered interior forest species.

5.4.1.2.4 Region of Waterloo Breeding Bird Status

The Region of Waterloo is in the process of updating the Breeding Bird Status List for Waterloo Region. When assessed against the 1996 list, 39 of the recorded species are considered Regionally Significant. When assessed against the draft 2022 list, 24 are considered Regionally Significant. There is some overlap in the lists, and 11 species would carry over to the new list.

5.4.1.2.5 Species at Risk Birds

Species at risk (SAR) encountered during the 2021 field surveys include Barn Swallows (Hirundo rustica) seen foraging over point count location BBS6 on June 1, 2021. The Barn Swallow is listed as Threatened on Schedule 1 of the Species at Risk Act (SARA), and Special Concern provincially. The other SAR bird encountered during field surveys was Eastern Wood-pewee, heard singing at point count locations BBS1 and BBS5 on June 1, 2021. Eastern Wood-pewee is listed as provincial and federal Special Concern.

5.4.2 Herpetofauna

5.4.2.1 Background Information

Previous work by Ecologistics (1979) documented an extensive list of herpetofauna species, including Jefferson salamander complex (Ambystoma jeffersonianum and associated jeffersonianium-laterale polyploids), Five-lined skink (Eumeces fasciatus) and American bullfrog (Lithobates catesbeianus) in addition to other more common amphibian species. Five-lined skink and American bullfrog have not been confirmed for the project area by LGL at any time.

Field efforts in 2004 were directed towards determining the presence/absence and extent of habitat use by reptile and amphibian species in Hidden Valley. Spotted salamanders (Ambystoma maculatum) were noted in the main pond at the base of the esker ridge and were the only species of mole salamander noted during nighttime surveys in 2004. Subsequently, additional intensive sampling completed in 2007 and 2008 confirmed the presence of Jefferson salamander and Jefferson dominated polyploids. The data from 2007 and 2008 detailed investigations were provided to the province, who then determined the extent of regulated habitat in Hidden Valley. Since that time, the map of regulated habitat provided in City records (dated 2018) indicate an update to the regulated habitat for the species in the study area and are the most current lines under consideration. During 2021 field investigations, drift fences and closed pitfall traps were noted in locations in the study area, indicating that ongoing surveys for salamanders are being conducted for the landowner. Those results were not available for review.

Targeted skink surveys (area searches) were conducted within the forested areas with a focus on the esker ridge in 2004. No five-lined skinks were observed during these efforts, or in any of the other field work conducted in the area between 2004 and 2021.

Surveys in spring 2013 specifically targeted reptile (basking) and amphibians, and observations were also completed as part of observations during bird and aquatic habitat work. Snapping turtle (Chelydra serpentine) was confirmed in 2013 for the list of reptile species. This species is listed as Special Concern both provincially and federally. There were two separate observations of Snapping turtle, including one female actively laying eggs within an agricultural field. The second observation was of one individual Snapping turtle basking in the pond that is about 100 m southeast of the agricultural fields that border residential properties along Hidden Valley Road.

5.4.2.2 Findings

One amphibian and one reptile species were observed in the study area during daytime site investigations in 2021 as incidental observations: Green Frog (Lithobates clamitans) and Midland Painted Turtle (Chrysemys picta marginata). Painted turtles have previously been seen within the ponds and marsh of Hidden Valley, including within the storm water management pond along Wabanaki Drive.

A complete summary of species documented in the study area is provided in the running wildlife list in Appendix C. To date, a total of 13 amphibian and 6 reptile species have been documented through a review of background resources and field investigations by LGL (Table 6).

Table 6: Reptile and Amphibian Species Documented in Hidden Valley

Common Name	Scientific Name	SARA/ ESA	Documented during surveys prior to 2021	Documented during 2021 surveys
American Bullfrog	*Lithobates catesbeianus*		X*	
American Toad	*Anaxyrus americanus*		X	
Blue-spotted Salamander	*Ambystoma laterale*		X	
Eastern (Red-spotted) Newt	*Notophthalmus viridescens*		X	
Eastern Red-backed Salamander	*Plethodon cinereus*		X	
Gray Treefrog	*Hyla versicolor*		X	
Green Frog	*Lithobates clamitans*		X	X
Jefferson Salamander	*Ambystoma jeffersonianum*	END	X	
Jefferson Salamander x Blue-spotted Salamander, Jefferson genome dominates	*Ambystoma hybrid pop. 1*		X	
Northern Leopard Frog	*Lithobates pipiens*		X	
Spotted Salamander	*Ambystoma maculatum*		X	
Spring Peeper	*Pseudacris crucifer*		X	
Wood Frog	*Lithobates sylvatica*		X	
Dekay's Brown Snake	*Storeria dekayi*		X	
Eastern Gartersnake	*Thamnophis sirtalis sirtalis*		X	
Five-lined Skink (Gr.Lakes/St.Lawr. pop'n)	*Plestiodon fasciatus*	SC	X*	
Milksnake	*Lampropeltis triangulum*	SC/-	X	
Midland Painted Turtle	*Chrysemys picta marginata*	SC/-	X	X
Snapping Turtle	*Chelydra serpentina*	SC/-	X	

Legend:

Abbreviation	Description
SARA/ESA	
END	Designated Endangered under Ontario *Endangered Species Act* and Canada *Species at Risk Act*
SC	Designated Special Concern under Ontario *Endangered Species Act* and Canada *Species at Risk Act*
*	Species only documented during 1979 surveys

5.4.3 Mammals

Mammals can be difficult to sample, as they are secretive by nature and mainly nocturnal or crepuscular. For the purposes of this study, mammal surveys were limited to incidental observations and background review from previous studies. A total of 23 mammal species have been documented in the study area during previous studies done prior to 2021, and 6 of these species were documented in 2021 (Table 7). Species at Risk bats have been added to the species list through WSP (2020) work in the study area. Many of the mammal species documented are protected under the Fish and Wildlife Conservation Act (FWCA), as protected, game or furbearing species (Table 7).

Table 7: Mammal Species Documented in Hidden Valley

Common Name	Scientific Name	FWCA	Surveys prior to 2021	2021 surveys
American Mink	*Mustela vison*	F	X	X
Beaver	*Castor canadensis*	F	X	
Coyote	*Canis latrans*	F	X	
Deer Mouse	*Peromyscus maniculatus*	-	X	
Eastern Chipmunk	*Tamias striatus*	P	X	X
Eastern Cottontail	*Sylvilagus floridanus*	G	X	X
Eastern Gray Squirrel	*Sciurus carolinensis*	G	X	X
Ermine	*Mustela ermina*	-	X	
European Hare	*Lepus europaeus*	G	X	
Groundhog	*Marmota monax*	-	X	
Least Weasel	*Mustela rixosa (nivalis)*	F	X	
Long-tailed Weasel	*Mustela frenata*	F	X	
Meadow Jumping Mouse	*Zapus hudsonius*	-	X	
Meadow Vole	*Microtus pennsylvanicus*	-	X	
Muskrat	*Ondatra zibethica*	F	X	X
Northern Flying Squirrel	*Glaucomys sabrinus*	P	X	
Northern Raccoon	*Procyon lotor*	F	X	
Northern Short-tailed Shrew	*Blarina brevicauda*	P	X	
Red Fox	*Vulpes vulpes*	F	X	
Red Squirrel	*Tamiasciurus hudsonicus*	F	X	
Striped Skunk	*Mephitis mephitis*	F	X	
White-footed Mouse	*Peromyscus leucopus*	-	X	
White-tailed Deer	*Odocoileus virginianus*	G	X	X

Legend:

Abbreviation	Description
FWCA:	**Fish and Wildlife Conservation Act**
-	Not protected
F	Furbearing Species
P	Protected Species
G	Game Species

The six mammal species documented in the study area as incidental observations during site investigations in 2021 are regulated under the FWCA: eastern chipmunk is a protected species; eastern cottontail, eastern gray squirrel, and white-tailed deer are game species; muskrat and mink are furbearing species. SAR bats are the only SAR mammal identified in the study area, Endangered both federally and provincially.

Hidden Valley provides habitat for a variety of mammal species. Many species documented are tolerant of human activities such as coyotes, raccoons, eastern cottontail, and skunks. The most prominent mammal species in Hidden Valley is white-tailed deer (Odocoileus virginianus). Both fawning and wintering areas were noted within Hidden Valley area bounded by Hidden Valley Road, with numerous trails through the interior. Agricultural areas in the northwestern portion and browse are significant food sources for the herd. A corridor of travel was noted in the vicinity of the southeast corner, where the deer herd was noted several times, which would be a short route to the ESPAs associated with the Grand River corridor, most notably ESPA 28

Petrifying Spring and ESPA 31 Homer Watson Park. The East Creek is the most prominent aquatic corridor connecting the Hidden Valley interior to the Grand River, and one deer carcass was found in this area during aquatic investigations (prior to 2021).

5.4.4 Insects

Targeted insect surveys were not part of prior natural heritage investigations in the study area. WSP (2020) documented Ebony Jewelwing (Calopteryx maculata) (a damselfly) and Mourning Cloak (Nymphalis antiopa) (butterfly) in the study area through incidental observations. The only insect SAR recorded is Monarch.

5.5 Wildlife Habitat

The central portion of Hidden Valley bounded by Hidden Valley Road comprises the largest contiguous block of wildlife habitat in the study area. Interior forest habitat (100m) is present in this area, and a great diversity of microhabitats results in a diverse wildlife community. The outlying fragments of natural vegetation communities and woodlots across Highway 8 contain fewer observations of wildlife, and the highway itself poses a significant barrier to animal movement.

Animal movement corridors exist within the aquatic corridors within Hidden Valley where East Creek connects the larger contiguous habitat block in the centre to the Grand River Corridor. White tailed deer were also noted to use the agricultural and old fields southwest of Hidden Valley (next to the CNR Tracks) as a corridor to access the ESPAs (ESPA 28 Petrifying Spring and ESPA 31 Homer Watson Park) associated with the Grand River corridor. The Grand River corridor within the study area provides direct habitat for wildlife and fish, and also provides a landscape level movement corridor.

5.5.1 Significant Wildlife Habitat

LGL's screened the available bio-inventory data for consideration of the occurrence significant wildlife habitat (SWH) as defined in:

- Significant Wildlife Habitat Technical Guide (MNRF 2000);
- Significant Wildlife Habitat Mitigation Support Tool (MNRF 2014); and
- Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNRF 2015).

These documents provide the information, rationale, approach, references, and criteria for determining the significance of wildlife habitat that occurs within the area of southern Ontario where the Study Area is located. LGL has screened the data collected against criteria thresholds to identify Candidate SWH, where feasible. The wildlife data was reviewed with the assistance of GIS, LGL applied the MNRF's criteria to determine whether candidate habitat meets the criteria thresholds. SWH by virtue of its definition is sensitive, therefore generally considered a constraint to site development.

Data collected to date was reviewed to identify SWH or Candidate SWH. This would not be considered a comprehensive assessment of SWH, given the high level of field effort

that may be required to confirm species habitat use/criteria thresholds for some categories of SWH. Overlap will exist in some ecosites where multiple Candidate or Confirmed SWH has been identified and where sites have already been flagged for provincial significance, such as Provincially Significant Wetland.

The following types of Candidate SWH were considered in the analysis:

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

The full set of MNRF Ecoregion Criteria Schedules were summarized in a summary matrix with the MNRF criteria included in its entirety. The table provides a summary of the data screened, and where possible candidate and confirmed SWH are mapped. This is provided in Appendix D with maps depicting SWH screening results.

The following summarized the categories that were reviewed and where information was available confirmed habitat is indicated. Where data is not available but habitat may be present based on ecosites or habitat features, Candidate SWH is identified. Where potential habitat is absent and/or other criteria are not met, the habitat type is considered ‘not identified.’

5.5.1.1 Seasonal Concentration Areas

Seasonal concentration areas include areas where wildlife will congregate at certain times of year, such as for nesting, overwintering or staging/stopover habitat. A summary of the categories (with **bold** indicating confirmed or candidate) includes:

- Waterfowl Stopover and Staging Areas (Terrestrial) – none identified
- Waterfowl Stopover and Staging Areas (Aquatic) – none identified
- Shorebird Migratory Stopover Area – none identified
- **Raptor Wintering Area** – Candidate habitat identified in the Grand River corridor for Bald Eagle wintering.
- Bat Hibernacula – none identified.
- **Bat Maternity Colonies** – Confirmed habitat for SAR Bats was identified within ELC FOD, FOM, SWD, SWM ecosites as part of Phase 2 Study Area for the River Road Extension Detailed Design (WSP 2020). Extent of confirmed habitat not shown in WSP (2020), and not mapped herein. Suitable Bat Maternity Colonies habitat is present in forested ecosites. The criteria schedules exclude FOC ecosites, whereas SAR screening typically would include it.
- Bat Migratory Stopover Area – not included in criteria schedule 6E.
- **Turtle Wintering Areas** – Confirmed in Hidden Valley PSW through observations of turtles basking during emerging periods in suitable habitat, and candidate SWH is identified within the Grand River.

- Reptile Hibernaculum – not identified.
- Colonially-Nesting Bird Breeding Habitat (Bank and Cliff) – not identified.
- Colonially-Nesting Bird Breeding Habitat Breeding Habitat (Tree/Shrubs) – not identified.
- Colonially -Nesting Bird Breeding Habitat (Ground) – not identified.
- Migratory Butterfly Stopover Areas – not identified.
- Landbird Migratory Stopover Areas – not identified.
- **Deer Yarding Areas/Deer Winter Congregation Areas** – Present since the time of the 2014 KNHS Technical Background Report, additional Deer Yarding Areas are identified in LIO background data layers. As a result, update mapping is provided for this category of habitat identified by the MNRF. The closest additional habitat added includes Statum 2 overwintering habitat in ESPA 28 Petrifying Springs, downstream of the study area.
- **Waterfowl Winter Concentration Areas** – similarly additional areas have been added or extended to this habitat since mapping in the KNHS Background Report. Updated limits of this habitat type are provided in the map set. This habitat type is not listed within the Ecoregion Criteria Schedule 6E, however, is included herein under Seasonal Concentration Areas.

5.5.1.2 Animal Movement Corridors

Where SWH is confirmed for Amphibian Woodland Breeding Habitat and Deer Yarding/Wintering, the assessment of movement corridors must occur. Evidence of animal movement corridors for these SWH types include:

- Amphibian Movement Corridors – Documented movement corridors for Ambystoma salamanders and other amphibians were investigated by LGL Limited in 2007 and 2008. There is potential for additional amphibian movement corridors to be identified or defined through drift fence studies undertaken by the consultants on behalf of the landowner as drift fence/pitfall traps were installed in 2021. With respect to other criteria for amphibian species, there is also likely some connection overland towards the Grand River along East Creek, through the residential area to the Grand River, and along the Highway 8 edge (however just outside of the study area and the proposed ION route) although use of these corridors by small animals is not confirmed.
- Deer Movement Corridors – Deer Movement Corridors are identified as parallel to Wabanaki Road towards the ESPA 28 Petrifying Springs, and an additional narrow corridor along East Creek to the Grand River based on field observations 2004-2021. The Grand River corridor itself provides a larger landscape level movement corridor at greater than 200m of width through the Study Area. Only the Grand River corridor meets the width criteria outlined of minimum 200m width. The area adjacent to Wabanaki Road narrows to 80m at it’s narrowest

between the roadway and residential lots, however most of the corridor is about 160-200m in width. It provides a connection towards other identified SWH for deer towards Homer Watson Park. Deer have been observed crossing the Grand River downstream of the weir and can access the extensive floodplain and forest across the river from the Study Area, where additional Deer Winter Area (Stratum 2) is identified.

5.5.1.3 Specialized Habitat for Wildlife

Specialized habitats for wildlife are large areas of suitable habitat that are required for breeding, and areas that support high diversity. Evidence of the habitat types (with **bold** indicating confirmed or candidate) are summarized:

- **Waterfowl Nesting Area** – Candidate habitat identified for Hidden Valley PSW, use not confirmed.
- **Bald Eagle and Osprey Nesting, Foraging and Perching Habitat** – LIO layers identified Osprey Nesting however the site is on a hydro tower and would not meet the criteria for SWH. Areas of the Grand River corridor may support this habitat type, habitat use not confirmed.
- Woodland Raptor Nesting Habitat – Not identified.
- **Turtle Nesting Areas** – Confirmed SWH in agricultural field just north of the PSW, other nesting site identified as Candidate but not confirmed as SWH.
- **Seeps and Springs** – Candidate SWH seeps identified in Hofstetter Creek headwater and East Creek at Hidden Valley Road, wildlife use not confirmed. Springs/seeps are reported for ESPA 31 Petrifying Spring.
- **Amphibian Breeding Habitat (Woodland/Wetland)** – Confirmed in the Hidden Valley PSW and adjacent upland forest and habitat mosaic. This habitat has been mapped as woodland type habitat, as all the wetlands are within 120m of woodlands.
- Woodland Area – Sensitive Bird Breeding Habitat – not identified based on not providing 200m interior habitat conditions. Area-sensitive species are present and Hidden Valley does provide 100m interior habitat in some areas.

5.5.1.4 Habitat for Species of Conservation Concern (Excludes SAR Species)

Habitat for Species of Conservation Concern includes wildlife species that are Special Concern (under the ESA or SARA), rare (SRank of S1 to S3), declining or a featured species. The following summarizes the information for this habitat (with **bold** indicating presence or candidacy):

- **Marsh Bird Breeding Habitat** – Candidate habitat identified in the Hidden Valley PSW, habitat use not confirmed.
- **Open Country Bird Breeding Habitat** – Candidate habitat present in the floodplain areas of the Grand River, habitat use not confirmed.

- Shrub/Early Successional Bird Breeding Habitat – not identified.
- Terrestrial Crayfish – not identified.
- **Special Concern and Rare Wildlife Species** – ecosite communities identified for Eastern Wood-pewee.

8.5.6 Rare Vegetation Communities

Rare vegetation communities are those that are ranked S1, S2, or S3 by the province. Rare community assessment for the area is characterized below:

- Cliffs and Talus Slopes – not identified
- Sand Barren – not identified
- Alvar – not identified
- Old Growth Forest – not identified
- Savannah – not identified
- Tallgrass Prairie – a community type of TPO1 (Figure 6) is identified but given its anthropogenic origin on a constructed berm (east side of Wabanaki Drive, west of River Valley Drive) it is not considered rare in the context of SWH.
- Other Rare Vegetation Communities – not identified.

5.6 Species at Risk

A summary of records and field investigations is provided for Species at Risk (under provincial and federal legislation) is shown in Table 8 and 9 below. It should be noted that non-detection or absence of a Species at Risk does not indicate they will never occur on site. Care should be taken in the interpretation of the presence of SAR. Changes to policy, natural environment and species listings may affect areas of SAR habitat. The natural environment is dynamic and expected to change, such as through natural succession.

No new species at risk were identified in 2021 in the study area by LGL field investigations. SAR bats were added to the SAR list through a review of other technical studies in the study area (WSP 2020).

Table 8: Endangered Species Act – Study Area Species List

Special Concern	Threatened	Endangered
Birds • Eastern Wood-Pewee • Short-eared Owl* • Wood Thrush • Barn Swallow Insects • Monarch Mussel • Rainbow Mussel Reptile • Five-lined Skink • Snapping Turtle	Birds • Bank Swallow • Bobolink • Chimney Swift • Eastern Meadowlark Fish • Silver Shiner • Black Redhorse Mussels • Wavy-rayed Lampmussel	Amphibian • Jefferson Salamander Mammals • SAR bats (species not identified) Plants • Butternut • Black Ash • Ginseng

Table 9: Species at Risk Act – Study Area Species List

Special Concern	Threatened	Endangered
Birds • Eastern Wood-Pewee Insects • Monarch Reptiles • Five-lined Skink* • Snapping Turtle • Midland Painted Turtle • Milksnake Mussels • Wavy-rayed Lampmussel • Rainbow Mussel	Amphibians • Jefferson Salamander Birds • Bank Swallow • Barn Swallow • Bobolink • Chimney Swift • Eastern Meadowlark • Wood Thrush Fish • Silver Shiner and critical habitat identified in the Grand River • Black Redhorse and critical habitat identified in the Grand River	Mammals • SAR bats (species not identified) Plants • Butternut • Black Ash • Ginseng

It should be noted that additional records from citizen science databases, such as through i-Naturalist or eBird, were not included in the analysis, although it is clear some overlap occurs in what is reported herein.

- Regulated habitat for Jefferson Salamander is identified in the study area, with the last regulation map identified as 2018.
- Fish and mussel species at risk and critical habitat in the Grand River corridor.
- Dated records include those for Five-lined Skink (SC/SC), which has not been confirmed since 2004's probable sighting and is considered unlikely to occur. Similarly, Wood Thrush, Short-eared Owl, Bobolink and Eastern Meadowlark have not been reconfirmed since 2004. For grassland species such as Short-eared Owl, Bobolink or Eastern Meadowlark, much meadow habitat has converted to row crops or has undergone development.
- In some cases, the SAR are documented but there is not evidence of breeding use in the study area, such as for Chimney Swift, Barn Swallow, and Bank Swallow.
- Reptiles and amphibians are well documented in the study area, as they have been the focus of considerable field effort.
- Butternut and Black Ash are documented in the study area, but Ginseng hasn't been confirmed since the 1979 record.
- The only insect SAR identified to date is the Monarch.

A table of potential SAR species (see Appendix E) has been compiled referencing information from sources such as background studies, NHIC, OBBA, eBird, Ontario Nature, DFO Aquatic SAR Mapping as well as LGL's surveys.

5.6.1 Plant Species at Risk

5.6.1.1 Ginseng

Ecologistics Limited (1979) reported ‘a single plant’ of Ginseng (Panax quinquefolius) occurring in the south-central portion of the study area (Ecologistics Limited 1979). Ginseng is listed as Endangered in Canada and Ontario (SRank: S3). No Ginseng was observed during the 2004- 2021 field work, despite extensive searches based on Ecologistics’ (1979) mapping. It is possible it is extirpated from the study area as it has not been reconfirmed since the 1979 reporting.

5.6.1.2 Black Ash

Black Ash (not mapped) was recorded in the study area within the swamps (SWD 2-2, SWM 1-1, SWD 2-2, SWM 6-1, FOC 2-1, FOC 3-1, FOC 4-2 and SWM 6-1). This species was listed on January 26, 2022 as Endangered in Ontario, and Threatened in Canada. Protections were established in January 2024 through O. Reg 832/21. A guideline for their assessment was further released in June 2024. Per O. Reg. 832/21, Black Ash habitat is defined as the areas within a radial distance of 30 m around each healthy Black Ash tree. Health assessments were not conducted as a part of this study.

5.6.1.3 Butternut

Butternut (Juglans cinerea) was documented in the study area in 2007, 2012 and 2013 during prior site investigations by LGL. Additionally, one Butternut was observed in 2021(LGL 2022). Eighteen (18) Butternut are recorded in the study area by LGL. This species is listed as endangered on in Ontario and in Canada. Butternut habitat is generally considered 100 metres from a healthy tree. Part V of O. Reg. 830/21, however, provides conditional exemption to habitat protections under the ESA which can be made with special authorization or subject to a review of butternut health. Butternut health assessments were not conducted for this study.

5.6.2 Fish and Aquatic Species at Risk

Department of Fisheries and Oceans (DFO) Aquatic Species at Risk mapping identifies the following Species at Risk within the study area.

- Black Redhorse (Moxostoma duquesnei), provincially Threatened, nationally Threatened, Critical Habitat identified
- Silver Shiner, provincially Threatened, nationally Threatened, Critical Habitat identified
- Wavy-rayed Lampmussel (Lampsilis fasiola), provincially Threatened, nationally Special Concern
- Rainbow Mussel (Villosa iris), provincially Special Concern, nationally Special Concern

Protected fish habitat within the Grand River (reach adjacent to Hidden Valley) is shown in Figure 8. The Grand River has high potential to support all species listed above, and critical habitat for Silver Shiner and Black Redhorse have been identified. Critical habitat is identified as the species' crucial habitat in the recovery strategy or in an action plan for the species. Wavy-rayed and Rainbow mussel federal designations have been downgraded within the last five years; however, Wavy-rayed Lampmussel remains protected under the Endangered Species Act, 2007 (ESA), as a Threatened species.

Given the barriers present within the Hidden Valley system upstream of the Grand River confluence, as well as the lack of direct evidence of fish use, Silver Shiner presence within these reaches is unlikely. In addition, this species is typically found in large streams (30-100 m wide), supporting deep pool habitats and swift currents; habitat which is not present within this system.

5.6.3 Wildlife Species at Risk

Table 8 shows the wildlife species at risk within the subject area and includes herpetofauna, birds, insects, and mammals. Each category is addressed below.

5.6.3.1 Species at Risk Herpetofauna

There are five herpetofauna species at risk documented within the Hidden Valley study area from previous studies (Table 8).

5.6.3.1.1 Snapping Turtle

Field investigations in 2013 and prior years confirmed the presence of snapping turtle (Chelydra serpentine), a species of Special Concern provincially and federally within Hidden Valley, including overwinter habitat and nesting. This species as is also known to occur in the Grand River. Snapping Turtle nesting (agricultural field next to PSW) and overwintering habitat (PSW) was documented in 2013 in the study area.

5.6.3.1.2 Five-lined Skink

Five-lined skink (Special Concern under ESA, Endangered under SARA for the Carolinian population) has not been reconfirmed for the study area since the 1979 Ecologistics report.

5.6.3.1.3 Midland Painted Turtle

Midland painted turtle, a species listed as Special Concern by SARA but not listed under ESA, was observed in 2021 and documented in multiple years in the study area.

5.6.3.1.4 Milksnake

A single Milksnake was documented as a roadkill on Hidden Valley Road in 2004. Given the habitat in the project area, it is possible this species is still present, although cryptic and rarely encountered. Milksnake is now considered Not at Risk (COSSARO 2015) and is Special Concern federally.

Table 10: Wildlife Species at Risk Documented in the Study Area

Common Name	Scientific Name	SARA/ ESA	Surveys prior to 2021	2021 surveys
Jefferson Salamander	*Ambystoma jeffersonianum*	THR/END	X	
Bank Swallow	*Riparia riparia*	THR/THR	X	
Barn Swallow	*Hirundo rustica*	THR/SC	X	X
Bobolink	*Dolichonyx oryzivorus*	THR/THR	X_4	
Chimney Swift	*Chaetura pelagica*	THR/THR	X	
Eastern Meadowlark	*Sturnella magna*	THR/THR	X	
Eastern Wood-Pewee	*Contopus virens*	SC/SC	X	X
Wood Thrush	*Hylocichla mustelina*	THR/SC	X	
Five-lined Skink (Carolinian pop'n)	*Plestiodon fasciatus*	SC/END	X_4	
Milksnake	*Lampropeltis triangulum*	SC/-	X	
Midland Painted Turtle	*Chrysemys picta marginata*	SC/-	X	X
Short-eared Owl	*Asio flammeus*	SC/SC	X_3	
Snapping Turtle	*Chelydra serpentina*	SC/SC	X	
SAR Bats	*Myotis/Perimyotis species*	END/END	X_1	
Monarch	*Danaus plexippus*	END/SC	X_2	X

1. As documented through acoustic monitoring in WSP 2020, in Phase 2 River Road Extension study area.
2. As documented in WSP 2020 for the Phase 1 River Road Extension study area.
3. Pers. comm. as reported in LGL 2004.
4. Only documented in Ecologistics 1979.

Legend:

Abbreviation SARA/ESA	Description
END	Designated Endangered under Ontario *Endangered Species Act* and/or Canada *Species at Risk Act*
THR	Designated Threatened under Ontario *Endangered Species Act* and/or Canada *Species at Risk Act*
SC	Designated Special Concern under Ontario *Endangered Species Act* and/or Canada *Species at Risk Act*
*	Species only documented during 1979 surveys

5.6.3.1.5 Jefferson Salamander

Jefferson salamander and Jefferson dominated polyploids and associated habitat occurs in Hidden Valley. Regulated habitat for the Jefferson salamander has been mapped for the project area by the MNRF in 2018.

Work by LGL in 2004-2008 confirmed the presence of Jefferson salamander and Jefferson dominated polyploids in Hidden Valley. Habitat regulations have been developed for the study area by the province and are now implemented by the MECP. A 2018 map of ESA Regulated Habitat for Jefferson Salamander was provided by the City

of Kitchener on record from the MNRF to document the extent of regulated habitat in the study area. Regulated habitat for this SAR includes most of the forested and wetland habitat types located in the centre of the Hidden Valley study area. Without explicit permission to do so from the MECP and given the sensitivity of SAR habitat, LGL has not mapped or shown the extent of regulated habitat on the figures for this project.

Salamander studies (drift fence and pitfall traps) have been undertaken since 2008 by consultants on behalf of the landowner. The results were not available for this study.

5.6.3.2 Species at Risk Birds

Species at risk (SAR) birds observed during the 2021 field surveys included Barn Swallow (Special Concern provincially and Threatened federally), and Eastern Wood-pewee (Contopus virens) (Special Concern provincially and federally) (Table 8).

Prior to 2021, several additional bird species at risk were documented during previous studies in the study area: Bank Swallow, Bobolink, Chimney Swift, Eastern Meadowlark, Wood Thrush (Hylochila mustelina), and Short-eared Owl (Asio flammeus) (Table 8).

The NHIC database lists four additional bird species at risk in the study area, with records from 1935 to 1974: Louisiana Waterthrush (Parkesia motacilla), recorded in 1953; Acadian Flycatcher (Empidonax virescens), recorded in 1974; Henslow's Sparrow (Centronyx henslowii), recorded in 1948; and Loggerhead Shrike (Lanius ludovicianus), recorded in 1935. There are no confirmed records of these species in more recent times, and records are considered historical.

5.6.3.2.1 Bank Swallow

Bank Swallow is listed as Threatened both provincially and federally and was seen foraging over the Grand River west of Highway 8 during surveys done in 2020 for the LRT ION project.

5.6.3.2.2 Bobolink

Bobolink is listed as Threatened both provincially and federally, they were reported in 1979 but were not detected in 2004, 2012, 2013 or 2021. Suitable habitat is not present in agricultural fields as fields are planted with corn/soy in recent years and remaining cultural meadow in the study area may be limited in size.

5.6.3.2.3 Chimney Swift

Chimney Swift is listed as Threatened both provincially and federally and were recorded in the project area in 2004 and 2013 foraging near hedgerows in the northwest corner of the Hidden Valley area. Chimney Swift may utilize structures like chimneys or silos. A silo was present within an old farmstead within the central study area, but no nests were observed by LGL in 2013, and no swift were observed entering the silo. Confirmed nesting or candidate chimney habitat was not confirmed for this species in the area.

5.6.3.2.4 Eastern Meadowlark

Eastern Meadowlark is listed as Threatened both provincially and federally, and was detected by LGL in 2004, but were not detected in 2012, 2013 or 2021. Suitable habitat is not present in agricultural fields as fields are planted with corn/soy in recent years and remaining cultural meadow in the study area may be limited in size.

5.6.3.2.5 Wood Thrush

Wood Thrush is listed as Threatened federally, and as Special Concern provincially; this species was reported in 1979 by Ecologistics. And although reported in LGL's 2019/2020 work in support of the ION, it was outside of the Hidden Valley project area.

5.6.3.2.6 Short-eared Owl

A reported occurrence of overwintering or winter habitat use by Short-eared Owl (Asio flammeus) was provided by a local naturalist during the EA for the River Road Extension (pers. comm., 2004). This species is listed as Special Concern provincially, and Special Concern federally. In 2021, COSEWIC assessed the species as Threatened. Limited suitable habitat occurs in the study area, mainly cultural meadow of the Grand River corridor. Agricultural fields in the study area are identified as corn/soy.

5.6.3.3 Species at Risk Insects

5.6.3.3.1 Monarch

WSP (2020) and LGL (2021) confirmed Monarch in the study area. It is a species that is Special Concern provincially and Endangered federally.

5.6.3.4 Species at Risk Mammals

5.6.3.4.1 Bats

There are currently four bat species listed as Endangered in Ontario and afforded protection under the provincial Endangered Species Act, 2007 (ESA 2007): Little Brown Myotis (Myotis lucifugus); Northern Myotis (Myotis septentrionalis); Eastern Small-footed Bat (Myotis leibii); and, Tri-colored Bat (Perimyotis subflavus). The ESA 2007 affords protection for individuals of these species (subsection 9(1)) and their habitat (subsection 10(1)). Given that species-specific habitat regulations have not yet been developed for SAR bats, habitat is protected according to the general definition provided in the Act. Specifically, according to section 2(1), the Act protects "an area on which the species depends, directly or indirectly, to carry on its life processes, including processes such as reproduction, rearing, hibernation, migration or feeding".

On May 10, 2023 the Committee on the Status of Endangered Wildlife in Canada assessed Eastern Red (Lasiurus borealis), Hoary (L. cinereus) and Silver-hair bats (Lasionycteris noctivagans) as Endangered. These species were assessed for status in Ontario by COSSARO in November 2023.

Bat surveys (habitat assessment and passive acoustic monitoring) were completed in 2018 in support of the Detailed Design of the River Road extension in Kitchener (WSP 2020). Acoustic surveys confirmed in 2018 that SAR bats (although species not identified) were present in the Stage 2 lands of Hidden Valley, whereas habitat assessment and visual exit surveys in Phase 1 confirmed potential roost trees but did not confirm use by any bats. Phase 1 ends at the intersection of Hidden Valley Road and Wabanaki Drive, whereas Stage 2 lands comprise the central features of the Hidden Valley natural areas that extend to northern part Hidden Valley Road, parallel to the future ION extension.

SAR bats (presumed Myotis or Perimyotis bats) are identified in the Study Area (WSP 2020).

6.0 Natural Heritage System Component Assessment

As discussed in Section 3.3.2 of this report, the KNHS is comprised of provincially, regionally and locally significant natural heritage features and areas. A summary of the KNHS components and the policies they are protected under are shown in Table 11. The table was derived from the KNHS Background Report in consideration of the policies discussed in Section 3.0 of this report.

Table 11: Natural Heritage System Framework

Natural Heritage System	Natural Heritage Features	Wetlands	Provincially Significant Wetlands[1,2,4,6]
			Locally Significant Wetlands[2,6]
		Valleylands	Regionally Significant Valleys[1,3]
			Environmentally Significant Valley Features[1,4,6]
			Locally Significant Valleylands[1,6]
		Woodlands	Regionally Significant Woodlands [1,4,6]
			Locally Significant Woodlands[1,6]
		Fish, Plants and Wildlife	Significant Habitat of Endangered or Threatened Species[1,4,6]
			Significant Wildlife Habitat[1,7]
			Fish Habitat[1,4,6]
		Recharge Discharge Areas	Regional Recharge Areas[2,3,7]
			Environmentally Significant Discharge Areas[2,5,7]
			Environmentally Significant Recharge Areas[2,5,7]
		Landforms	Areas of Natural and Scientific Landforms[1,4,7]
	Linkages and Corridors[1,5,7]	[1]Protected under Section 2.1 of the PPS [2]Protected under Section 2.2 of the PPS [3]Identified as a Landscape Level System Feature within the ROP [4]Identified as a Core Environmental Feature designation within the ROP [5]Identified as a Supporting Environmental Feature (unmapped) within the ROP [6]Identified as a Core Natural Heritage Feature designation within the KOP [7]Identified as an overlay within the KOP	
	Ecological Restoration Areas[7]		

This section assesses the extent of each of KNHS component and discusses Environmentally Sensitive Policy Areas identified in the ROP for the study area. The assessment is based on the data presented in Section 5.0 of this report and considers the landowner-initiated 2024 site visit to confirm component boundaries. The criteria discussed in this report are based on the Provincial Policy Statement (MMAH 2020), the ROP, and the KOP, including the KNHS Background Report. The Hidden Valley Residential Community Plan (1990) and the Hidden Valley Industrial Community Plan (1988) are out of date and are therefore not relevant for this exercise, which is base on a substantially altered NHS for the study area.

6.1 Wetlands

Wetlands are defined in the PPS as 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 wetlands being used for agricultural purposes which no longer exhibit wetland characteristics are not considered to be wetlands for the purposes of this definition.

Both provincially and locally significant wetlands exist in the study area. These lands are considered part of the KNHS and are represented in Figure 9.

6.1.1 Significant Wetlands

6.1.1.1 Definition/Evaluation Criteria

Significant Wetlands are defined as an area 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. The Ontario Wetland Evaluation System (OWES) is a science-based ranking system that is used to determine significance. The OWES 4th Edition was updated in 2022 (MNRF 2022).

The four principal components that are considered in a wetland evaluation are the biological, social, hydrological and special features. Based on scoring, a wetland can fall into one of two classes – Provincially Significant and Locally Significant. It takes 600 or more total points or 200 or more points in either the Biological or the Special Features component of the OWES for a wetland to be classed as PSW (MNRF 2022).

6.1.1.2 Presence/Absence

The Hidden Valley Wetland Complex located in the central Hidden Valley Community, is identified by the City of Kitchener and by provincial mapping as a PSW. Provincial mapping was last updated in 2005, according to the LIO metadata. The PSW boundary was updated through aerial interpretation of 2000 orthophotos and field verification conducted by City of Kitchener in 2023. No additional OWES evaluation was completed.

6.1.2 Locally Significant Wetlands

6.1.2.1 Definition/Evaluation Criteria

According to the City of Kitchener Official Plan and KNHS Background report, a wetland is defined as Locally Significant if it is not evaluated as provincially significant and is either greater than 0.5 hectares in size or (for any size up to 0.5 ha):

- Part of a Provincially Significant Wetland, a bog, or a fen;
- Located within a floodplain or riparian community;
- Part of a Provincially or municipally designated natural heritage feature, a significant woodland, or hazard land;
- Fish habitat or significant wildlife habitat;
- Confirmed habitat for a provincially or regionally significant species as determined by the MNRF or as determined by the Region of Waterloo;
- Part of an ecologically functional corridor or linkage between larger wetlands or natural areas;
- Part of a groundwater recharge area; or
- Part of a groundwater discharge area associated with any of the above.

6.1.2.2 Presence/Absence

ELC mapping (Figure 6) prepared for this study, as discussed in Section 5.3 of this report, identified several unevaluated wetlands which occur within the study area. These wetland polygons largely occur in the floodplain, with the exception of a small wetland inclusion (MAM2-10) in FOD5-2/FOD5-6 south forest community of central Hidden Valley. Constructed ponds in the floodplain or Grand River corridor have been excluded.

All of these identified wetlands meet criteria for Locally Significant Wetlands under the KNHS as they are presumed to be naturally occurring and are confirmed as within a river channel or floodplain, SWH or habitat of an endangered species, and/or within a groundwater recharge area. It should be noted that the boundaries of these wetlands were not delineated via field verification given their location within floodplains or other protected features. Should site alteration be proposed in these areas, however, further wetland boundary delineation would be required.

6.2 Valleylands and Associated Features

Valleylands are defined in the PPS as 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. The KNHS includes Regionally Significant Valleys, Regional Environmentally Significant Valley Features, and Locally Significant Valleylands. Each are discussed below and shown in Figure 10.

6.2.1 Regionally Significant Valleys

6.2.1.1 Definition/Evaluation Criteria

The PPS defines “significant valleylands” as features that are ecologically important in terms of features, functions, representation, or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system.

Provincial criteria, or municipal approaches that achieve or exceed the same objective, may be used for determining significance of valleylands. The ROP defers to the Natural Heritage Manual (2005) to define the extent of a valley system. This document states that the physical boundaries of valleys should be first identified and are generally determined as follows:

- For well-defined valleys, the physical boundary is generally defined by the stable top-of-bank or the predicted top-of-bank (also known as “top of slope” or “top of valley”).
- 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.

6.2.1.2 Presence/Absence

The ROP identifies the Grand River as a Significant Valley and drew the extent of the valleyland in accordance with the Grand River Floodplain (i.e., based on criteria applicable to an undefined valley system). It was determined through this study and in consultation with City of Kitchener and Region of Waterloo staff, that the Grand River Valley is a well-defined valley within the study area and therefore must be delineated via stable top of slope.

The top of slope for the Grand River Valley within the study area was derived in consideration of provincial elevation contour mapping (5 metre contours), shade mapping, and available geotechnical assessments for the area and is shown in Figure 11. The floodplain has been included for reference.

It should be noted that the valley extent was not delineated through ground investigation. As such, it is anticipated the stable top of slope will need to be identified on a site-by-site basis if development is proposed in proximity the valley area.

6.2.2 Environmentally Significant Valley Features

6.2.2.1 Definition/Evaluation Criteria

The Grand River Valley System, identified as significant within the ROP, contains significant valley features which are designated as Core Environmental Features. According to Policy 7.C.7 of the Official Plan, Environmentally Significant Valley Features (ESVF) are natural features within a Significant Valley that consist of

a. at least one of the following:
    i. river channel; or
    ii. Environmentally Significant Discharge Areas or Environmentally Significant Recharge Areas; or
b. both of the following ecological features:
    i. habitat of regionally significant species of flora or fauna;
    ii. natural area, such as a woodland of one to four hectares in extent, floodplain meadow or wetland, which consists primarily of native species; or;
c. any one of Policy 7.C.7 (b) above plus any one of the following Earth Science features:
    i. river terrace;
    ii. esker;
    iii. cliff or steep slopes;
    iv. oxbow;
    v. confluence with significant watercourse draining a watershed greater than five square kilometres;
    vi. regionally significant Earth Science Area of Natural and Scientific Interest; or
    vii. fossil bed.

6.2.2.2 Presence/Absence

The ELC communities (Figure 6) located within the Regional Valley Boundary are all located within a river channel and/or an Environmentally Significant Discharge or Recharge Area (Figure 5), as discussed in Section 5.1.5 and 6.7 of this report. As such, these communities were assessed to determine if they were a woodland greater than one hectare, a meadow within a floodplain, or a wetland. This investigation resulted in the identification of several ESVFs associated with the Grand River Regional Valley as shown in Figure 10.

It should be noted that species composition was not assessed by LGL for the identified ESVF communities. As such, it is anticipated that these communities will require assessment on a site-by-site basis to determine if significant fauna and/or primarily native species are present if site alteration is proposed in these areas.

6.2.3 Locally Significant Valleylands (KNHS)

6.2.3.1 Definition/Evaluation Criteria

The City of Kitchener Official Plan is consistent with the PPS in its definition of locally significant valleylands as *"…*important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system." The City of Kitchener Official Plan further defers to the KNHS Background Report for delineation/evaluation criteria.

The KNHS Background Report states that valley and stream corridors in Kitchener include the main branches and tributaries to the Grand River and that both physical and ecological boundaries will be considered in the delineation. The features used to identify the Locally Significant Valleylands (LSVs) within the KNHS Background Report were:

- Floodplain as regulated by the GRCA;
- Slope erosion hazard as regulated by the GRCA;
- Wetland as regulated by the GRCA (where ecologically related);
- Fish habitat within the Province's recommended setback (30m); and,
- Any other ecologically related natural features (e.g., contiguous tableland forest).

The KNHS Background Report goes on to note, however, that in the event that valleylands are less well-defined, the following features, functions, and values should be considered:

- Surface water functions;
- Groundwater functions;
- Landform prominence;
- Degree of naturalness;
- Distinctive geomorphic landforms;
- Community and species diversity;
- Unique communities and species;
- Habitat value;
- Linkage function; and
- Restoration potential and value.

The method used to identify/map LSVs is specifically described in Section 3.4 of the KNHS Background Report.

6.2.3.2 Presence/Absence

There are four creeks considered tributaries to the Grand River within the study area, including West, East, and North Creek, and Hofstetter Creek. Publicly available elevation data and GRCA mapping indicates that this valley is "less well-defined". As such, the following criteria was used define the physical and ecological boundaries of the valleyland, as shown in Figure 10:

- Stream line mapping of the four creeks plus a 30-metre buffer
- GRCA floodplain and slope erosion hazard mapping, where available;
- ELC mapping (Figure 5) of woodlands (including cultural woodlands – subject to modifications based on the 2024 site visit) and wetlands which were adjacent to the four creeks and/or ecologically related to adjacent communities; and
- Discharge area mapping.

It should be noted that the majority of the identified LSV is also located within a groundwater recharge area identified by GRCA (see Figure 5) and/or Significant Wildlife habitat (see Appendix D). Furthermore, the LSV includes identified locally significant and rare flora and identified species at risk, as discussed in Section 5.3 and 5.6 of this report.

6.3 Woodlands

Woodlands are defined in the PPS 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. Woodlands include treed areas, woodlots, or forested areas and vary in their level of significance at the local, regional, and provincial levels. Woodlands may be delineated according to the *Forestry Act* definition or the Province's ELC system definition for "forest."

In City of Kitchener, there are regionally significant woodlands, locally significant woodlands, and other woodlands. Figure 12 shows where these woodlands exist in the study area. Each type of woodland is discussed below.

6.3.1 Significant Woodlands

With respect to significant woodlands, the PPS states that they are ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to their contribution to the broader landscape because of their 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. It is our understanding that both regionally and locally significant woodlands in the City of Kitchener would meet this definition.

6.3.1.1 Regionally Significant Woodland

6.3.1.1.1 Evaluation Criteria

The ROP identifies Regionally Significant Woodlands (RSWs) as woodlands that are greater than 4 ha in size (excluding hedgerows), consist primarily of native species, and meet the criteria for woodland in accordance with the provisions of the Regional Woodland Conservation By-law. These areas do not include cultivated fruit or nut orchard, or a plantation established for the purpose of producing Christmas trees. Further, the boundary of a RSW may be more precisely delineated to exclude plantations of primarily non-native species (if they are not entrenched into the woodland community), small lobes and projections, and low-quality wooded habitat on the periphery of the feature. The removal of these features are not permitted to create an adverse environmental impact on the residual woodland.

6.3.1.1.2 Presence/Absence

The Region of Waterloo provided a delineation of the RSWs for the study area as revised in 2019. This layer was amended to include connected woodlands which meet the regional criteria based on ELC mapping (Figure 6) and the 2024 site visit. No areas were removed from the Regional Woodland layer due to ongoing protections and requirements for restoration/regeneration under the regional tree by-law.

Two areas within the study area were identified as meeting the criteria for the Regionally Significant Woodlands classification. The largest of the two has an area of approximately 49 ha, on the north half of the study area between Highway 8 and Hidden Valley Road. The second area is located on the southwestern portion of the study area. This second area is part of a larger 96.76 ha woodland area located outside Hidden Valley, downstream on the Grand River towards Homer Watson Park.

It should be noted that species composition and tree density was not evaluated as a part of this study. As such, site by site analysis will be required to confirm the extent of the RSWs in consideration of all the criteria included in the ROP, if site alteration is proposed within the delineated areas.

6.3.1.2 Locally Significant Woodlands

6.3.1.2.1 Evaluation Criteria

City of Kitchener selected Ontario Nature's Conservation Guidelines for the Identification of Significant Woodlands in Southern Ontario (Ontario Nature 2004) to define Locally Significant Woodlands (LSW). The recommended guidelines for identifying woodland significance with respect to size within the study area are patch sizes of 15ha (which is above the Region of Waterloo 4 ha designation for RSW). As such, the City of Kitchener would not typically identify Locally Significant Woodlands in this area, under the assumption that they are already protected regionally.

City of Kitchener's woodland definition includes naturally occurring woodlands and tree plantations, excluding hedgerows. The definition also considers and includes woodlands experiencing changes such as harvesting, blowdown or other tree mortality.

6.3.1.2.2 Presence/Absence

The RSW's shown in Figure 12 meet the criteria for LSW based on their size (i.e., greater than 15 hectares). As they are already protected as Regionally Significant, it is our understanding they would not be identified additionally as LSW.

6.3.2 Other Woodlands

6.3.2.1 Definition

Non-significant woodlands may still constitute a valuable component of the KNHS in Hidden Valley, where they form part of other natural heritage features such as

Regionally Significant Valley Features, Locally Significant Valleylands, and/or Significant Wetlands. Non-significant woodlands in the Hidden Valley area would be defined as woodlands which do not meet the criteria for regional or locally significant woodland, as discussed above.

6.3.2.2 Presence/Absence

Based on ELC mapping, there are several non-significant woodlands within the study area. They are located on the periphery of the RSW/LSW area and along the Grand Valley and were considered in identifying ESVFs as discussed in 6.2.2 of this report.

6.4 Habitat of Endangered and Threatened Species

6.4.1 Definition

Habitat is defined in the Endangered Species Act as,

a. with respect to a species of animal, plant or other organism for which a regulation made under clause 56 (1) (a) is in force, the area prescribed by that regulation as the habitat of the species, or
b. with respect to any other species of animal, plant or other organism, an area on which the species depends, directly or indirectly, to carry on its life processes, including life processes such as reproduction, rearing, hibernation, migration or feeding,

and includes places in the area described in clause (a) or (b), whichever is applicable, that are used by members of the species as dens, nests, hibernacula or other residences (“habitat”).

6.4.2 Evaluation Criteria

When the responsibility for SAR was transitioned from the Ministry of Natural Resources and Forestry (MNRF) to the Ministry of Environment, Conservation and Parks (MECP), there was a change in direction for information and permitting requests and the process is still being resolved. Current direction is to rely on available online resources for screening purposes and to contact the MECP later in the project design process when potential impacts to SAR are better known.

An information request was submitted to the MECP for this project to confirm the current habitat mapping for species at risk in the project area. At this time, the MECP has advised that landowners should undertake their own mapping based on features in the project area.

6.4.3 Presence/Absence

Information concerning the location and habitat of Endangered and Threatened Species is generally considered sensitive information and is not included in the Official Plan mapping. Habitat for Endangered and Threatened Species, would none-the-less, be

considered part of the natural heritage system and be identified and considered at the time of an application for development or land use change based on existing information and/or through field investigation.

Several species at risk, have been identified on the subject lands as discussed in Section 5.6 of this report. There is confirmed regulated habitat mapping for Jefferson Salamander authored by the Province (2018) and available through the City of Kitchener background records for the study area. No additional mapping or staking of habitat has been undertaken for this study.

6.5 Significant Wildlife Habitat

6.5.1 Definition

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

Wildlife habitat is considered significant by the province where it is:

“Ecologically important in terms of features, functions, representation, or amount, and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System. Criteria for determining significance may be recommended by the Province, but municipal approaches that achieve the same objective may also be used.”

KNHS Significant Wildlife Habitat identified through this study is mapped in Appendix D.

6.5.2 Evaluation Criteria

Significant Wildlife Habitat is delineated using procedures described in the Significant Wildlife Habitat Technical Guide (MNRF 2000) and the appropriate Ecoregion Criteria Schedule (Ecoregion 6E). Significant Wildlife Habitat generally consists of habitats of seasonal concentrations of animals, rare vegetation communities or specialized habitats for wildlife, habitat for species of conservation concern, and animal movement corridors.

6.5.3 Presence/Absence

As discussed in Section 6.5 of this report and mapped in Appendix D (unless indicated otherwise below), confirmed and candidate significant wildlife habitat has been identified throughout the study area, including:

- Confirmed Significant Wildlife Habitat of:
    - Bat Maternity Colonies in forested areas (unmapped)
    - Turtle Wintering and Nesting Areas
    - Deer Yarding Areas/Deer Winter Concentration Areas and Movement Corridors (see Figure 13)

  - Waterfowl Winter Concentration Areas
  - Amphibian Breeding Habitat and Movement Corridors (unmapped)
  - Special Concern and Rare Wildlife Species Habitat – Eastern Wood-Pewee
- Candidate Significant Wildlife Habitat of:
  - Marsh Breeding Bird Habitat both generally and for Green Heron,
  - Raptor Wintering Areas for Bald Eagle, Hawk, and Owl,
  - Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat,
  - Open Country Bird Breeding Habitat (unmapped – associated with floodplain of the Grand River),
  - Amphibian Movement Corridors (unmapped),
  - Seeps and Springs Habitat (shown in Figure 5),
  - Waterfowl Nesting Area,
  - Bat Maternal Roosting Habitat, and
  - Turtle Wintering and Nesting Areas,

Impacts to the above-noted significant wildlife habitat will need to be assessed and mitigated when development is proposed within the mapped lands.

6.6 Fish Habitat

6.6.1 Definition/Evaluation Criteria

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. Fish includes fish, shellfish, crustaceans, and marine animals, at all stages of their life cycles. Fish habitat provides food, cover and conditions for successful reproduction.

Fish habitat can be delineated in several ways including: waterbody type (lentic or lotic); physical characteristics (littoral/nearshore, deepwater, run/riffle/pool); thermal characteristics (warmwater, coolwater and coldwater); and, life cycle requirements (spawning, nursery, rearing, food supply, migration routes). Fish habitat can also be classified as direct (supporting fish) or indirect (contributing to the maintenance of fish habitat).

6.6.2 Presence/Absence

The City of Kitchener has identified fish habitat and thermal regime (Figure 2) based on information provided by, and confirmed with, the MNRF and DFO (Figure 8). West Creek, North Creek, East Creek and the Grand River located within the Hidden Valley Community are all classified as warmwater fish habitat. Fish habitat characterization and the results of field surveys are in Section 5.2 of this report. No fish species have been documented in tributaries associated with the Hidden Valley PSW or Hofstetter

Creek, and they are considered to provide indirect fish habitat. Grand River has extensive documentation of direct fish habitat.

6.7 Recharge and Discharge Areas

There are three identified recharge and discharge areas which make up part of the KNHS, including Regional Recharge Areas, Environmentally Significant Recharge Areas, and Environmentally Significant Discharge Areas. Figure 5 shows these areas where they occur in the study area. Each component is discussed below.

6.7.1 Regional Recharge Areas

6.7.1.1 Definition/Evaluation Criteria

Regional Recharge Areas, which include portions of the Waterloo Moraine, are designated by the Region in the ROP and are a large environmental feature (Landscape Level System) where considerable deposits of sand and gravel allow for the infiltration of large quantities of rainfall and snowmelt deep into the ground. This important hydrological function sustains some of the richest sources of groundwater in the Grand River system.

Regional Recharge Areas are delineated on a landscape scale within watershed studies, environmental impact studies, environmental impact statements, community plans and other planning-related documents in an attempt to protect groundwater infiltration.

6.7.1.2 Presence/Absence

The ROP does not identify Regional Recharge Areas in the Hidden Valley Community. No additional analysis of regional recharge areas was conducted for this study.

6.7.2 Environmentally Significant Discharge Area

6.7.2.1 Definition/Evaluation Criteria

Environmentally Significant Discharge Areas are defined in the ROP as Supporting Environmental Features and as lands “where groundwater discharges to the surface of the soil or surface water bodies to sustain wetlands, fisheries or other specialized natural habitats.”

Environmentally Significant Discharge Areas are delineated/evaluated on a landscape scale within watershed studies, environmental impact studies, environmental impact statements, community plans and other planning-related documents in an attempt to protect groundwater discharge areas.

6.7.2.2 Presence/Absence

As discussed in Section 5.1.5 of this report and shown in Figure 5, three groundwater discharge areas have been identified in the study area. These discharge areas would be considered environmentally significant based on the definition within the ROP.

6.7.3 Environmentally Significant Recharge Area

6.7.3.1 Definition/Evaluation Criteria

Environmentally Significant Recharge Areas are defined in the ROP as Supporting Environmental Features and as lands where "*water infiltrates into the ground to replenish an aquifer that sustains, in whole or in part, environmental features*."

Environmentally Significant Recharge Areas are delineated on a landscape scale within watershed studies, environmental impact studies, environmental impact statements, community plans, and other planning documents to protect groundwater infiltration.

6.7.3.2 Presence/Absence

As discussed in Section 5.1.5 of this report, a high groundwater recharge area extends over the majority of the study area as identified by GRCA. This area would be considered an environmentally significant recharge area based on the ROP definition.

6.8 Natural Linkages and Corridors

6.8.1 Definition/Evaluation Criteria

A corridor or a linkage is an area of natural habitat that is intended to connect separated environmental features and other natural habitat features, in an ecologically functional manner. Corridors and Linkages can create a system of connected, or "to be connected" green and natural areas that provide ecological functions over a longer period of time and enable movement of species.

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

Natural Linkages and Corridors in the KNHS are delineated on a landscape scale within watershed studies, environmental impact studies, and community plans in an attempt to accommodate the natural movement patterns and dispersal of plants and animals. No specific criteria have been identified by the City; however, general principles for wildlife corridors and linkages are provided in the KNHS Background Report.

6.8.2 Presence/Absence

LGL has identified wildlife movement corridors as discussed in Section 5.5 of this report. These areas are shown in Figure 13 and include corridors which traverse:

- Along the right of way to Highway 8 from Hidden Valley centre to the Grand River corridor (unmapped as partially outside of the study area);
- Along the east creek to the Grand River Corridor;
- Along the Grand River Corridor for the entire study area;
- Southwards to the Grand River corridor along municipally owned open space lands from North of Hidden Valley Road to south of Hidden Valley Crescent;
- Southwards to the Grand River corridor along the western project area limits where it parallels Wabanaki Drive; and
- Between the Hidden Valley Woodland/PSW complex to the pond in the northeast area of the study area (amphibian movement).

In addition to the above, LGL has identified a potential future corridor from the northeastern pond to the Grand River corridor. This is further discussed in Section 8.1.3 when potential enhancements to the KNHS are discussed.

6.9 Significant Landforms (Areas of Natural and Scientific Interest)

6.9.1 Definition

Areas of natural and scientific interest (ANSI) are defined in the PPS as 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. Areas of Natural and Scientific Interest (ANSIs) are classified as Earth Science or Life Science and range through provincial, regional and local levels of significance. The MNRF identifies ANSIs based on science-based criteria within ecodistricts based on representation. The City of Kitchener has been guided by provincially identified Earth Science ANSIs in order to designate Significant Landforms located within the City.

6.9.2 Presence/Absence

No Significant Landforms have been identified by the province within the Hidden Valley Community study area by the City of Kitchener. No additional analysis has been undertaken for this study.

6.10 Ecological Restoration Areas

6.10.1 Definition/Evaluation Criteria

The City of Kitchener Official Plan identifies ecological restoration area as: "*lands and waters that have the potential to be enhanced, improved, or restored to a more natural state, contributing to the overall diversity and connectivity of the Natural Heritage System."* In the KNHS Technical Background Report it is clarified that the City will identify restoration areas in accordance with the process included in Figure 14.

6.10.2 Presence/Absence

There are no ecological restoration areas identified by City of Kitchener within the study area and the process for identifying restoration areas was not undertaken for this study.

6.11 Environmentally Sensitive Policy Areas

6.11.1 Definition/Evaluation Criteria

Under prior planning policies within the Region of Waterloo, designated natural areas were identified as Environmentally Sensitive Policy Areas or ESPAs. The criteria for identifying ESPAs are included in Policy 4.3.2. of the ROP and require:

- at least two of the following criteria:
    i) comprise ecological communities deemed unusual, of outstanding quality or particularly representative regionally, provincially or nationally;
    ii) contain critical habitats which are uncommon or remnants of once extensive habitats such as old growth forest, forest interior habitat, Carolinian forest, prairie-savanna, alvars, cliffs, bogs, fens, marl meadows, and cold water streams;
    iii) provide a large area of natural habitat of at least 20 hectares which affords habitat to species intolerant of human intrusion; or
    iv) provide habitat for organisms native to the region recognized asregionally, provincially or nationally significant; or
- fulfill one of the criteria in Policy 7.C.5 (a) and any two of the following:
    i) contain an unusual diversity of native life forms due to varied topography, microclimates, soils and/or drainage regimes;
    ii) perform a vital ecological function such as maintaining the hydrological balance over a widespread area by acting as a natural water storage, discharge or recharge area
    iii) provide a linking system of relatively undisturbed forest or other natural habitat for the movement of wildlife over a considerable distance;
    iv) serve as major migratory stop-over or significant over-wintering habitat; or
    v) contain landforms deemed unusual or particularly representative at the regional scale

6.11.2 Presence/Absence

There are two identified ESPA's within the study area as shown in Figure 15, including:

1. ESPA # 27 Hidden Valley ESPA, known locally as Hidden Valley Woods or Bird Ridge. Portions of this ESPA have also been designated as a PSW. This ESPA currently remains under private ownership.
2. ESPA # 28 Petrifying Spring which is located to the southwest of the study area. This ESPA under City of Kitchener ownership.

Updated ESPA mapping was provided from the Region to LGL for the completion of this assessment. Analysis of these boundaries was not completed as a part of this study.

6.12 Natural Heritage System Mapping Updates

The Natural Heritage System components (as described in Table 9 and throughout the remainder of Section 6.0 of this report) represent the features which intertwine to form the Natural Heritage System for the Hidden Valley Area. This system is represented in the following summary figures:

1. Core Natural Heritage Features (Figure 16) which is a compilation of:
    a. Provincially Significant Wetlands
    b. Locally Significant Wetlands
    c. Significant Valleys (protected as a landscape level feature in the ROP)
    d. Environmentally Significant Valley Features
    e. Locally Significant Valleylands
    f. Environmentally Sensitive Policy Areas
    g. Significant Woodlands
    h. Significant Habitat of Endangered or Threatened Species – unmapped
    i. Fish habitat (protected in accordance with legislative requirements)
2. Significant Wildlife Habitat, which is a compilation of:
    a. Confirmed Significant Wildlife Habitat (Figure 17)
    b. Candidate Significant Wildlife Habitat (Figure 18)
3. Supporting Natural Heritage Features, which includes:
    a. Environmentally Significant Discharge and Recharge Areas (Figure 5)
    b. Natural Linkages and Corridors (Figure 13).

In accordance with the KOP policy guidance, the Core Natural Heritage Features figure is recommended to be reflected in a Natural Heritage Conservation designation and adopted as the Natural Heritage System schedule. The remaining figures are recommended to be adopted as overlays to communicate when further studies and/or mitigation measures are required. The Natural Heritage Conservation designation shown in the Land Use Master Plan (Figure 4) does not fully reflect the identified core features and is recommended to be revised to reflect the full extent of the NHS.

7.0 Impact Analysis

The Hidden Valley NHS provides a wide range of functions including but not limited to:

- prevention of erosion, runoff, and floods;
- moderating water surface and groundwater flow;
- groundwater recharge and facilitating hydrological and nutrient cycling;
- protecting water quality/water filtration;
- providing cover, foraging, refuge, and nesting habitat as well as movement/dispersal habitat for a wide range of wildlife; and
- buffering wildlife from human interference.

The Hidden Valley NHS is currently constrained by roads and existing/ongoing development primarily in the north, east, and south of the study area, as well as ongoing stormwater inputs and runoff from these developments. The system and its features, however, currently benefit from minimal impervious surfaces and relatively open unencumbered lands directly adjacent to the core natural heritage features, particularly from the east and west.

The proposed Land Use Master Plan proposes commercial, employment, and/or residential development to be placed in all the vacant/agricultural areas abutting the core natural heritage features, as shown in Figure 19. Furthermore, planned trail systems are likely to increase core feature encroachments. Transitioning the vacant/agricultural lands to those proposed requires careful consideration of impacts to the NHS and its ecological functions. Though detailed impacts cannot be identified without specific development plans, this section identifies foreseeable impacts (direct, indirect, and cumulative) from the proposed development (including related trails and stormwater facilities) to the NHS and its functions. Recommended mitigation measures to address these impacts are discussed in Section 8.0 of this report.

It should be noted that this report focuses on development that is considered “new” (i.e., located in greenfield and/or vacant lands), as shown in Figure 19. As such, direct and indirect impacts from existing/approved development (and modifications to these areas such as redevelopment, infill, building expansions, and accessory buildings), approved pumping stations, and approved road extensions are not considered outside of the cumulative impacts assessment.

7.1 Direct Impacts

Direct impacts are generally defined as those that are directly related to the proposed development plans, such as those which occur due to vegetation removal, grading, servicing installation, and building/infrastructure construction including stormwater facilities, roads, parking areas, and buildings (where applicable). All the above activities are anticipated for the proposed land uses, excluding the proposed trails where it is anticipated only vegetation removal, grading, and minor signage/fencing installation is required. Anticipated direct impacts of the proposed activities, in the absence of mitigation, include but are not limited to:

- Loss of wildlife and SAR habitat, particularly when associated with:
  - future encroachments (legal or illegal) into the core features; and
  - potential removal of non-significant woodlands, cultural thickets, hedgerows, and agricultural crops some of which are known wildlife habitat.
- Interference with wildlife movement, particularly deer and amphibian movement;
- Acute water quality reductions/turbidity associated with erosion from site clearing and construction and/or spills (e.g., oils) after construction, particularly in areas abutting the Locally Significant Valley Features;

- Chronic water quality reductions from urban stormwater inputs particularly upstream from/adjacent to wetlands and watercourses (see Section 7.3.2);
- Changes in flow quantity from (a) stormwater exiting the development areas (see Section 7.3.1), (b) potential dewatering or runoff diversions during construction, and (c) decreased groundwater recharge due to impervious surfaces, which can impact the hydrologic profile of the PSW, specific wildlife habitat, and the Grand River (and associated SAR fish habitat); and
- Wildlife mortality from increased traffic and buildings (vehicle/window collisions).

7.2 Indirect Impacts

Indirect impacts may be caused by altered uses and activities in the study area after construction has been completed. These secondary effects are reasonably foreseeable in the absence of mitigation and may occur after the initial site clearing/construction:

- Disturbance of wildlife and impacts to locally significant plant species due to encroachments of future residents into the NHS through additional ad-hoc trails and general use of adjacent forests;
- Light pollution effects on wildlife which may affect nocturnal behaviour of some species due to increased street lighting and lighting on buildings;
- Invasion by non-native species from backyard horticulture, plantings, and/or from roaming hikers/children/pets;
- Littering by future residents, particularly along trails, both formal and ad-hoc;
- Noise effects on wildlife which may disrupt their ability to communicate, particularly associated with roads and employment (depending on what is proposed);
- Incidental wildlife conflicts, through wildlife entering the development site post-construction and possibly undergo injury or death; and
- Roaming household pets and associated predation or harassment of wildlife.

7.3 Cumulative Impacts

Cumulative impacts are the result of incremental impacts of multiple of successive developments. These would include impacts from all developments in the study area cumulatively, which may interact with each other and compound or increase the degree of environmental impact. Cumulative impacts for the proposed new development are likely in the absence of mitigation, particularly when considered in tandem with approved residential development and road extensions plus future infill/redevelopment.

Specifically, the proposed land use plan, without active efforts to prevent impacts, will effectively “surround” the Hidden Valley NHS on all sides, cutting off seed and wildlife dispersal opportunities, connectivity, and wildlife movement. Furthermore, the proposed new development, when considered collectively, could result in an accumulation of “inputs”, including stormwater, noise, light, sediments, invasive species, litter, wildlife collisions, and disturbances. As such, “minor” or even “negligible” direct or indirect impacts from any single development may still contribute to system-wide impacts.

The Stormwater Management Strategy (Matrix 2024) and Source Water Protection Report (Matrix 2024) were prepared to evaluate the cumulative impacts of the proposed new developments on water quality and quantity and propose mitigation recommendations. These reports describe the hydrologic and ecological conditions of the study area and propose a stormwater and salt management strategy based on model assumptions to meet Source Water Protection and Stormwater Management requirements. It is LGLs opinion that these reports indicate two potentially important risks to the PSW and Hidden Valley NHS, even with the mitigation measures the reports recommend. These risks are described below. Mitigation recommendations to ensure these risks are addressed are provided in Section 8.0 of this report.

7.3.1 Chloride Contamination

The Stormwater Management Strategy describes that “clean” runoff from grassed areas and rooftops will be infiltrated to offset any deficits in groundwater contributions resulting from increased imperviousness within the catchment area. This indicates that the surface water being diverted to the wetland would primarily come from paved surface runoff (typically associated with high chloride concentrations from road salts).

This risk of elevated road salt challenges is described in the Source Water Protection Assessment (Matrix 2024). Additionally, the ecological health of the PSW and receiving bodies is dependent on chloride levels remaining below specific thresholds for the protection of aquatic life, such as 120 mg/L for long-term exposure and 640m/L for short term exposure (CCME 2012). Elevated chloride levels from existing development draining to the wetland has already been identified. Additionally, it is unclear if the runoff from existing/approved road infrastructure and development is meeting/will meet this threshold. This indicates a need to consider cumulative effects and/or monitor chloride levels to determine what level of additional inputs the PSW/waterbodies can tolerate.

Neither the Stormwater Management Strategy nor the Source Water Protection reports provide adequate background to demonstrate that future development can proceed while meeting chloride levels needed for the protection of the NHS. As such, chloride inputs remain a risk of proposed new development, particularly when considered cumulatively.

7.3.2 Stormwater Volumes

The Stormwater Management Strategy predicts that, while there will not be a large difference in flow rates to the PSW after new development is in place (subject to the measures recommended), there will be a significant increase in runoff volumes (16% increase for the 25 mm event, 21% increase for the 5-year rainfall event, and 11% increase for the 100-year event). The report seeks to qualify this increase in terms of increases to the height of the PSW water levels (under 7 cm). This qualifier, however, is challenging to interpret given the variation in topography, wetland types, and conditions within the NHS. There may, for example, be local areas which are impacted by this increase (e.g., vernal pools, swamp areas).

LGL's understands that the predicted water volumes noted in the report are conservative and that the model parameters do not consider recharge rates and discharges from the PSW. In the absence of additional technical review and model adjustments, however, it is not possible to ensure no impacts to the form/function of the NHS over time (particularly at a local scale along the edges of the wetland), without further mitigation/investigation.

8.0 Mitigation

To ensure the continued protection of the NHS and its function it is imperative to take a precautionary approach to the design of proposed developments. To this end it will be crucial to address each potential impact with the understanding that they will be compounded/amplified through the implementation of the full Land Use Master Plan and currently approved development. To that end, LGL has recommended potential mitigation measures below that could be put in place to ensure no negative impact.

It should be noted that the mitigation measures included in this section are not exhaustive nor detailed enough to replace site specific EISs. Specific mitigation details must be determined through EISs at the time of development, in consideration of site-specific conditions, current best management practices, and applicable law.

8.1 Direct Loss of Features, Habitat, Linkages, and Corridors

A significant amount of the identified natural features and wildlife habitat within the study area are included within the areas recommended for protection from development (via designation) as Core Natural Heritage Feature (see Section 6.12). For these areas, the only direct loss of natural features and habitat that is anticipated would be associated with passive recreation or illegal encroachments and vegetation removal.

Recommended mitigation measures for these impacts are:

1. Continuing to require **EISs for core feature adjacent lands** to ensure core feature protections and demonstrate no negative impact;
2. Applying enhanced **minimum buffer widths** (see Section 8.1.1) which may be increased depending on site specific conditions established in an EIS;
3. Preferentially **siting parks and stormwater blocks between development and core features** to act as an additional buffer to core features where it is appropriate – this could be implemented through Site Planning, Subdivision agreements, and/or an Urban Design Guideline;
4. Continuing and enhancing enforcement to ensure the **preservation of the core natural heritage features** upon approval of development proposals. Implementation options for achieving this include:
    - Ensuring the entire NHS is designated and zoned for protection;
    - Continued and diligent enforcement of the tree cutting bylaw;

- Requiring the conveyance of core features and their buffers to the City of Kitchener upon registration of any new lots;
- Requiring the establishment of conservation easements; and/or
- Establishing Site Plan, Subdivision, and Consent Approval conditions requiring monitoring and mitigation plans be implemented with securities.

5. Continuing to enforce **core features restoration policies** in the Secondary Plan, tree-cutting bylaw, and development approvals which requires replacement and restoration of core features when encroachments are found; and
6. **Restricting new trails in the core natural features** and keeping future trail infrastructure (e.g., trash bins, signage) in proximity to existing trails/desire lines.

There are identified Significant Wildlife and SAR habitat located outside core natural heritage features (see Appendix D for individual figures) which coincide with the proposed development, including Candidate Hawk/Owl Habitat, Candidate Maternal Roosting Habitat, Candidate Waterfowl Nesting Areas, Confirmed and Candidate Turtle Nesting Areas, and Confirmed Amphibian Breeding Habitat. For these areas, the following mitigation measures are recommended, at minimum:

1. Continue to require an **EIS for lands which might affect identified Confirmed or Candidate SWH, and/or corridors/linkages** to confirm ecological value and appropriate mitigation to demonstrate no negative impact. All **EIS scopes should consider the cumulative impacts of the full Master Plan**;
2. Continue to require **review and approval under the *Endangered Species Act, Fisheries Act, and Species at Risk Act,*** where applicable;
3. Apply **minimum corridor/linkages widths** (see Section 8.1.2);
4. Preferentially **site development away from identified SWH habitat and/or corridors and linkages** (i.e., avoidance) wherever possible, with protective barriers and signage – this is particularly recommended for identified turtle nesting areas, amphibian movement corridors, and urban deer movement corridors and could be implemented through policy language, EIS scoping guidance, Site Planning, Subdivision agreements, and/or an Urban Design Guideline;
5. Require **long-term protection of SWH protection and monitoring** including for protected SWH or compensation projects and corridor/linkages. Implementation options could include:
    - Designation and zoning these areas for protection;
    - Requiring conveyance to the City of Kitchener, wherever feasible;
    - Requiring the establishment of conservation easements;
    - Where privately owned, protecting these features in common blocks which are obligated to be maintained as designed; and/or,
    - Establishing Site Plan, Subdivision, and Consent Approval conditions.

6. Continue to ensure EISs and development conditions include requirements for and enforcement of **timing windows for vegetation removals** to avoid potential SWH nesting, birthing, rearing, and roosting periods;
7. Require **EISs to address SWH compensation plantings** (shrubs and trees) for tree removal and SWH encroachments, where they can be demonstrated as sufficient to prevent impacts – this could be implemented through policy language, EIS scoping guidance, Site Planning, Subdivision agreements, and/or Urban Design Guidelines;
8. **Require NHS enhancements** for the purpose of improving the ability of the NHS to withstand cumulative impacts (see Section 8.1.3); and
9. Continue to require EISs and development conditions to include monitoring and management for **invasive species prevention/control**.

It should be noted that direct habitat and corridor/linkage losses could occur from cumulative levels of water quality and quantity impacts and/or wildlife mortality and disturbances. As such, addressing these impacts, as discussed below, are further recommended to mitigate these losses.

8.1.1 Minimum Buffer Widths

Buffers between natural features and development are key tools for ensuring protection of natural heritage features. The ROP (Policy 7.C.11) requires minimum 10-metre-wide buffers from adjacent core natural features to be maintained as self-sustaining vegetation but requires more specific evaluation of appropriate buffers at the development phase with increases being required for sensitive features. The Natural Heritage Reference Manual also provides guidance documents and resources to assist in identifying an appropriate width, stating: “As part of demonstrating that there will be no negative impacts on the natural features or their ecological functions within adjacent lands, buffers can be identified once the nature of the development is known and the extent of potential impacts can be determined.”

As discussed extensively in in the Significant Wildlife Habitat Decision Support tool, the Natural Heritage Reference Manual, and a variety of other literature (Beacon Environmental, 2012), buffers and setbacks for wildlife protection vary widely by species and site conditions. As such, for both SAR and SWH features within the Hidden Valley Study Area, minimum setbacks are recommended to be identified on a case-by-case basis through an EIS early in any approval process for future development.

With respect to other types of features, Beacon Environmental prepared a buffer width literature review for Credit Valley Conservation in 2012 which provides a good summary of literature to that date on the topic. The document includes a table which assesses the reduction of risks to environmental features, based on buffer width. This table indicates:

- for watercourses, waterbodies, and wetlands, a minimum buffer of 30 metres or higher is needed to reduce risk of impacts from human disturbances to “low” and 60 metres is required to equally reduce risk of impacts to water quality;
- for upland forests, a buffer of 20 metres or higher is needed to ensure “low” risks from human disturbance, though this may be lowered to 10 metres if fencing or other physical barriers are used to prevent encroachment/indirect impacts; and
- for meadows, such as those protected as ESVFs, there is insufficient data to identify any specific buffer width.

LGL reviewed this document and well-established industry standards to identify what width of buffer should be applied as a minimum to the KNHS and its components. Based on this, LGL recommends an **increased minimum 30-metre buffer policy be applied to wetlands and watercourses** within the study area. The regional **minimum 10 metre buffer for all other features** is recommended to be applied within the KNHS (excluding Significant Wildlife and SAR habitat and the regional valley) when fencing/physical barriers are proposed. **Where there are no physical barriers, a minimum buffer of 20 metres should be applied**. All buffers, shown in Figure 20, are:

1. Recommended to be required via policy language in the Secondary Plan/zoning by-law and/or by adding these additional lands to the designation/zoning mapping as Natural Heritage Conservation; and
2. Considered minimum widths only - the final width must be identified on a site-by-site basis in an EIS, in consideration of the role the buffer is intended for. There are no limitations on buffer widths greater than the minimum, where warranted.

8.1.2 Minimum Linkage/Corridor Widths

With regards to wildlife movement corridors and linkages identified in Section 6.8, the Greenland Network Implementation Guide provides guidance on linkage design and notes that there is no standard width requirement, though it does note that “…the Canadian Wildlife Service (2004) has provided guidelines to the effect that linkages to facilitate species movement should be a minimum of 50 to 100 metres wide.” Furthermore, the guideline notes that “Corridors along watercourses are recommended to be a minimum of 30 metres of naturally vegetated habitat on either side.”

Given the above, a minimum 30 metres on either side of the watercourse is recommended for watercourses which also serve as linkages/corridors (this recommendation is reflected in the previously made buffer recommendations detailed in Section 7.1). Additionally, for terrestrial linkages, a minimum width of 50 metres should be accommodated wherever possible to allow for continued wildlife movement and plant dispersal, though it is recognized smaller widths may only be feasible in areas with existing development. The design of these corridors should mimic or enhance existing conditions, where open movement is currently possible. Alternatively, site design should be informed by the specific role of the corridor/linkage.

8.1.3 Opportunities for Enhancement

Though formal ecological restoration areas have not been identified within the study area (as discussed in Section 6.10 of this report), there are a variety of lands within the study area which could be restored or enhanced to improve connectivity and functionality of the identified KNHS and to help mitigate cumulative effects from the proposed Land Use Master Plan. Enhancements and restoration anywhere within the system would serve to improve the overall system function and should be considered in development designs wherever possible. **LGL recommends the following lands, however, be considered priority areas, where lands show evidence of degradation (e.g., lawns, farming, tree cutting, soil disturbances, lot encroachments)**:

- Areas recommended for "Natural Heritage Conservation" designations (i.e., core natural heritage features) – key areas for restoration would include mowed areas within the Grand Valley floodplain and recent encroachments into woodland areas from adjacent agricultural activities;
- Any areas within a 30-metres of wetlands and watercourses; and
- Existing or potential wildlife movement corridors/linkages, including ones identified through future EISs prepared in the study area.

Figure 13 indicates where the above-noted priority enhancement opportunities exist outside of the identified Core Natural Heritage Features. **Where degradation or disturbances exist within the identified Core Natural Heritage Features, assessment and restoration should be undertaken when development is proposed in proximity**. It is recommended the Secondary Plan mapping and policy framework reflect the priority enhancement areas to enable a net benefit to the NHS and its function.

8.2 Water Quantity and Quality Change Mitigation

The Hidden Valley NHS and associated habitats (with particular emphasis on the PSW and the Grand River) require maintenance of hydrologic and water quality conditions to support their ecological function. This is particularly true given the type of wildlife habitat the Hidden Valley NHS, including amphibian breeding habitat, and the nature of the PSW in the study area, which includes swamps. Water quantity and quality impacts from the proposed development may occur from stormwater, construction/long term erosion, dewatering, spills, impervious surfaces, and water redirection. The following mitigation measures are recommended, at minimum, to address water quality and quantity impacts:

1. Continue to **require a Stormwater Management (SWM) Plan** for all developments to incorporate quantity and quality controls to ensure no impact to the NHS, including as it relates to salt inputs – this report should consider salt inputs and cumulative water volumes and include strategies for mitigation where applicable (see Section 7.3.1 and 7.3.2);

2. Ensure policies and technical guidelines require the preparation and implementation of a **salt input prevention, management, and monitoring plans** with specific mechanisms for avoiding aquatic and wildlife habitat impacts – this report should consider cumulative impacts (see Section 7.3.1);
3. **Require a water balance and/or hydrogeological assessment** to be completed for all developments to ensure the development design and construction activities will result in no impacts to groundwater recharge, wetlands, or watercourses – this water balance should consider cumulative impacts (see Section 7.3.2);
4. Ensure policies and design guidelines require **incorporation of Low Impact Development (LID) measures** (green roofs, rain gardens, pervious pavers, infiltration trenches or storage compartments, etc.) to achieve **no net loss of groundwater recharge** (see Matrix SWM Strategy for more recommendations);
5. Continue to require **stormwater and LID management maintenance plans,** with implementation/monitoring protocol as development conditions, to ensure the continued functioning of stormwater controls and groundwater recharge;
6. Consider **establishing dewatering timing windows** of historically low rainfall averages (i.e., winter months) to avoid sensitive periods of amphibian breeding (i.e., spring) at the time of development approvals. Discharge should avoid natural features unless water quality is tested for water quality exceedances (e.g., chloride) and erosion is prevented during discharge;
7. Continue to **require Erosion and Sedimentation Control (ESC) plans** and associated development conditions to avoid erosion inputs during construction – this should include regular inspections to ensure their effective implementation;
8. Consider approval **conditions to avoid sensitive periods for habitat during construction, wherever possible,** particularly if the property does not currently have an adequate vegetative protection buffer between wetlands and watercourses and the proposed construction area;
9. **Consider higher than minimum buffers to core features** with widths being dependent on the level of water quality and quantity controls they need to accomplish (see Section 8.1.1) and the proximity of the development to the PSW;
10. Establish **design guidelines based on best management practices indicating that trails should be designed to prevent erosion**, including incorporation of appropriate substrate types, grade reversals at considered intervals, following the grade of the lands, avoiding steep slopes, and ensuring long term maintenance;
11. Ensure ***Conservation Authorities Act* approvals** are obtained; and
12. **Ensure EISs consider water quality and quantity and cumulative effects** in their assessment of impacts to the NHS.

8.3 Mortality and/or Disturbance Mitigation

As noted in Section 7.0 of this report, there are a variety of direct and indirect ways in which wildlife and vegetation can suffer mortality or disturbance due to adjacent development or human encroachments. Recommended mitigative measures for preventing mortality and disturbance are primarily associated with detailed design elements of a proposal, many of which could be incorporated into Subdivision or Site Plan Approvals, an Urban Design Guideline, City property maintenance priorities, and/or by-law implementation. These include but are not limited to:

1. **Incorporation of bird collision deterrence design requirements** with particular emphasis on any proposed mid or high-rise buildings;
2. **Establishing traffic signage and potential crossing markings** on Hidden Valley Road where the identified urban deer movement corridor traverses the road to help prevent traffic collisions;
3. **Consider land stewardship and education materials** to be registered on title and posted in areas where direct access is available to the identified core natural heritage features to ensure residents know what behaviours to avoid (e.g., animal or plant collection, feeding animals, allowing pets to leave home, plantings of invasive species), as well as along existing and proposed trails and wildlife corridors;
4. **Exclusionary fencing around construction sites** to prevent wildlife harm and employ an on-call environmental site inspector to periodically screen construction sites for wildlife which may become trapped inside the work zone;
5. **Establish wildlife encounter protocols** for wildlife handling and relocations, including permitting and notification requirements for wildlife encounter.
6. **Closing the internal system trails that are furthest into the Hidden Valley System** with physical barriers, re-plantings, and signage and adding garbage bins;
7. Establishing **fencing between proposed development and recommended buffers** for natural heritage features, along with a monitoring protocol, wherever possible to prevent cumulative noise impacts and encroachments;
8. **Pet control by-laws and enforcement** to limit domestic animal predation on wildlife; and
9. Ensure **dark sky friendly lighting** in accordance with best management practices.

Where Secondary Plan policies are recommended in this report, they have been noted in Section 9.0 for reference. The mitigation measures noted in this section, however, have a variety of implementation mechanisms, the majority of which apply to detailed design and enforcement**.** It is recommended an implementation plan be identified by the City of Kitchener Staff considering the recommended mitigation measures.

9.0 Conclusion

This report comprises the Comprehensive EIS for the revised Land Use Master Plan and future zoning for the Hidden Valley Community. To the extent possible, public input and existing information from prior studies in the past 20 years and as far back as 1979 have been used to:

- Characterize natural heritage features and functions in the study area;
- Identify an up-to-date Hidden Valley Natural Heritage System;
- Identify potential impacts to the system; and
- Provide mitigation options and minimum policy recommendations for the system's protection to the system.

In summary, this report recommends that the Hidden Valley Secondary Plan include:

1. A Natural Heritage Conservation designation which reflects the Core Natural Heritage Features identified in the study and limits development to only passive recreation and other similar uses, subject to an EIS;
2. A Significant Wildlife Overlay and associated policies which reflects the confirmed and candidate Significant Wildlife Habitat identified in this study and requires an EIS prior to development in these areas to demonstrate no impact;
3. A Supporting Features Overlay and associated policies which identify Environmentally Significant Groundwater Recharge and Discharge Areas and requires development within these areas to technically demonstrate no cumulative impacts to the natural heritage feature hydrologic inputs;
4. A Supporting Features Overlay and associated policies for identified Corridors/Linkages which requires the design and incorporation of these linkages/corridors into development proposals;
5. Policies associated with Corridors/Linkages which require an EIS to design corridor/linkage areas, with recommended widths of 50 metres or more;
6. Policies (with potential updates to designation mapping) requiring minimum vegetated buffer widths of 30 metres for wetlands and watercourses and 10 metres for other core features, if physical barriers are installed (20 metres if not);
7. Policies requiring the protection and reestablishment of previously degraded lands in priority areas (including in designated areas) to enhance the NHS; and
8. Policies requiring EISs, SWM Plans, and Water Balance Assessments for lands in and adjacent to the NHS to consider direct, indirect, and cumulative impacts including but not limited to chloride, water balance, enhancements, buffer widths, corridor/linkage design, and mitigation measures to achieve a net benefit.

It is the author's opinion that the above recommendations, in combination with appropriate development specific mitigation measures, by-law and development control enforcement, and supporting guidelines, will ensure the protection of the Hidden Valley Natural Heritage System.

Figures

Figure 2: Direct (Grand River) and Indirect (West, East, North, and Hofstetter Creek) Fish Habitat within the Hidden Valley Study Area

Figure 3: Regulated Areas under the Conservation Authorities Act within the Hidden Valley Study Area

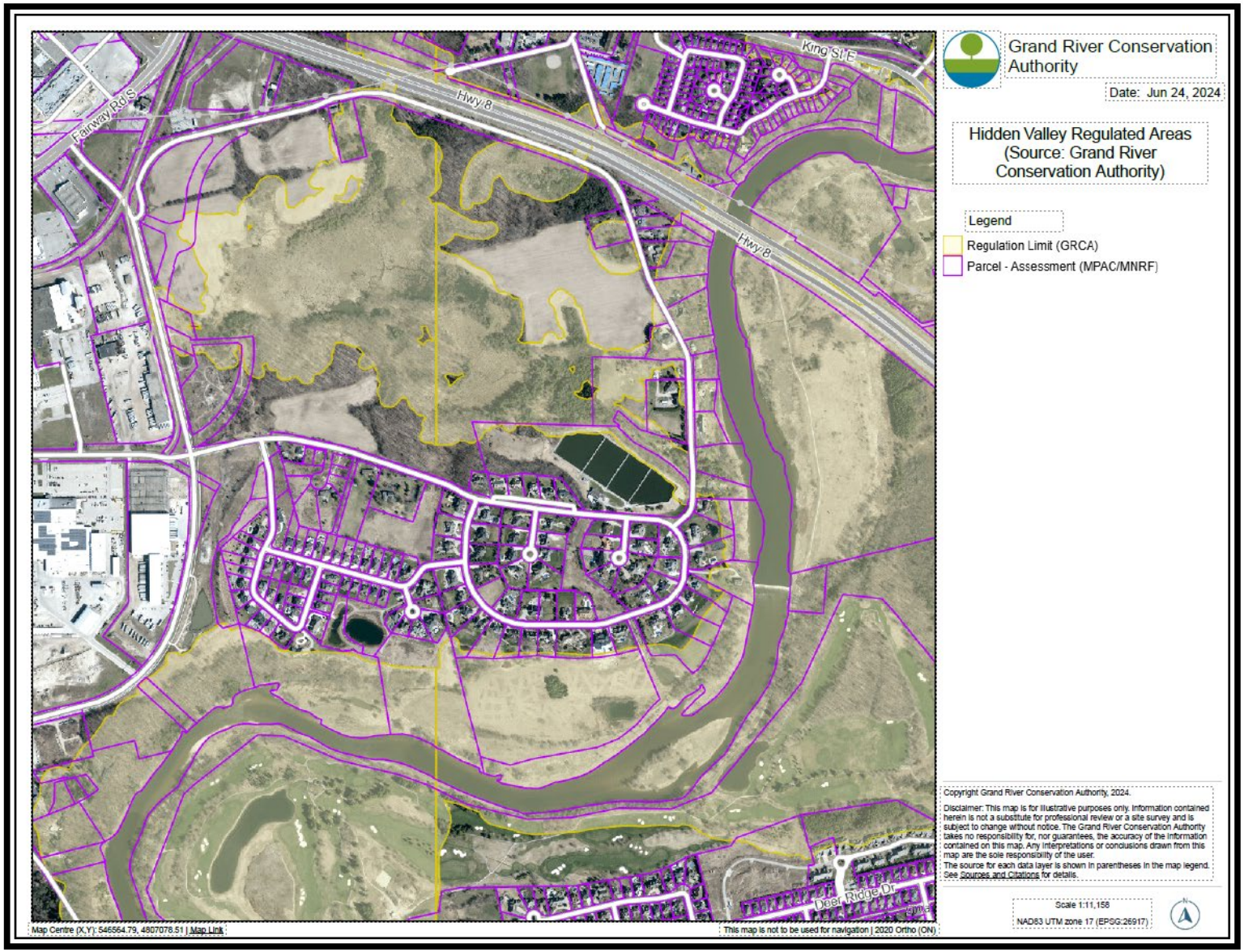

Figure 4: 2019 Hidden Valley Land Use Master Plan

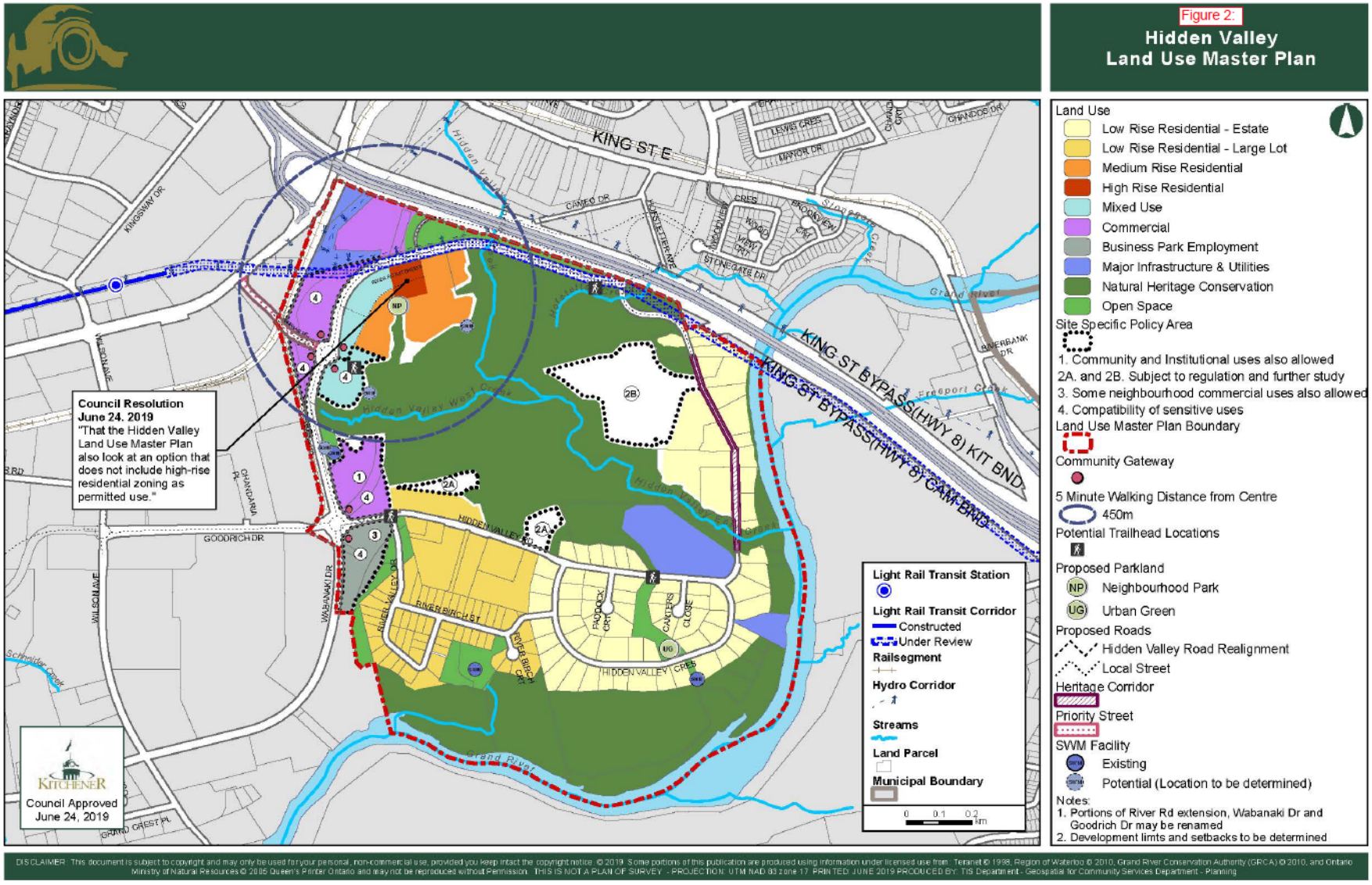

Figure 5: Recharge and Discharge Areas within the Hidden Valley Study Area

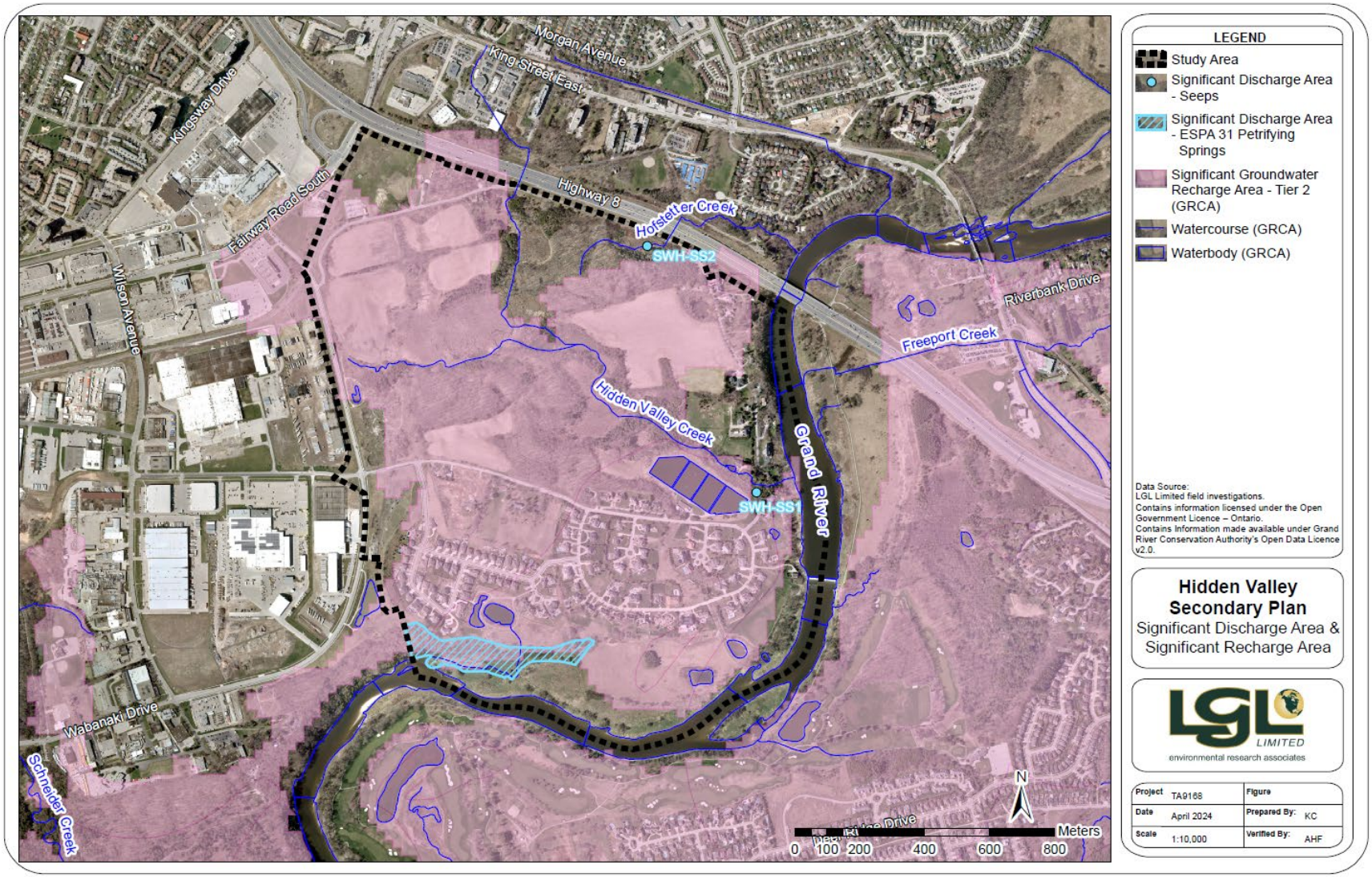

Figure 6: Ecological Land Classification Mapping for the Hidden Valley Study Area

Figure 7: Wildlife Habitat, SWH from LIO and BB Stations

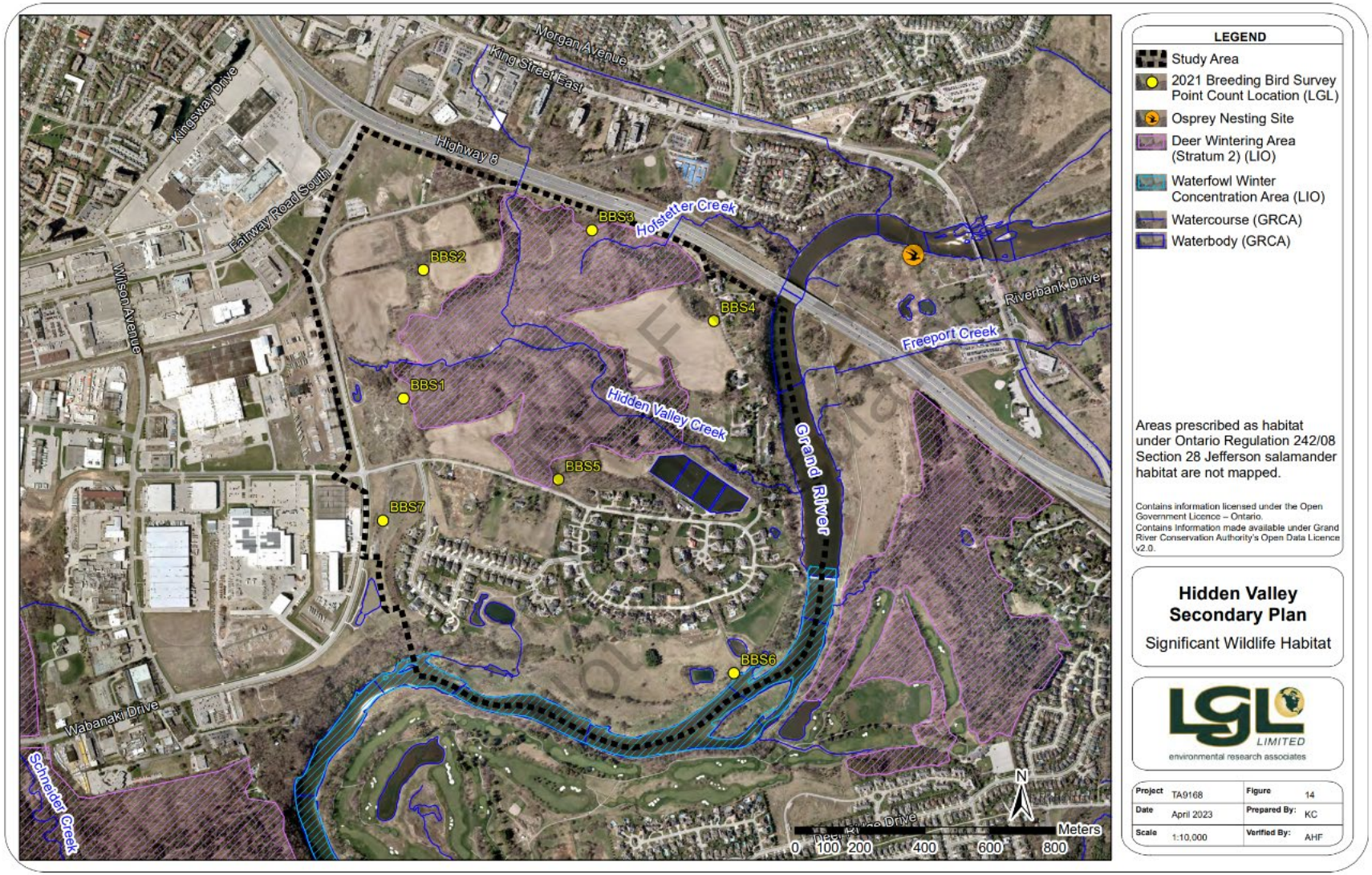

Figure 8: Aquatic Species at Risk Habitat

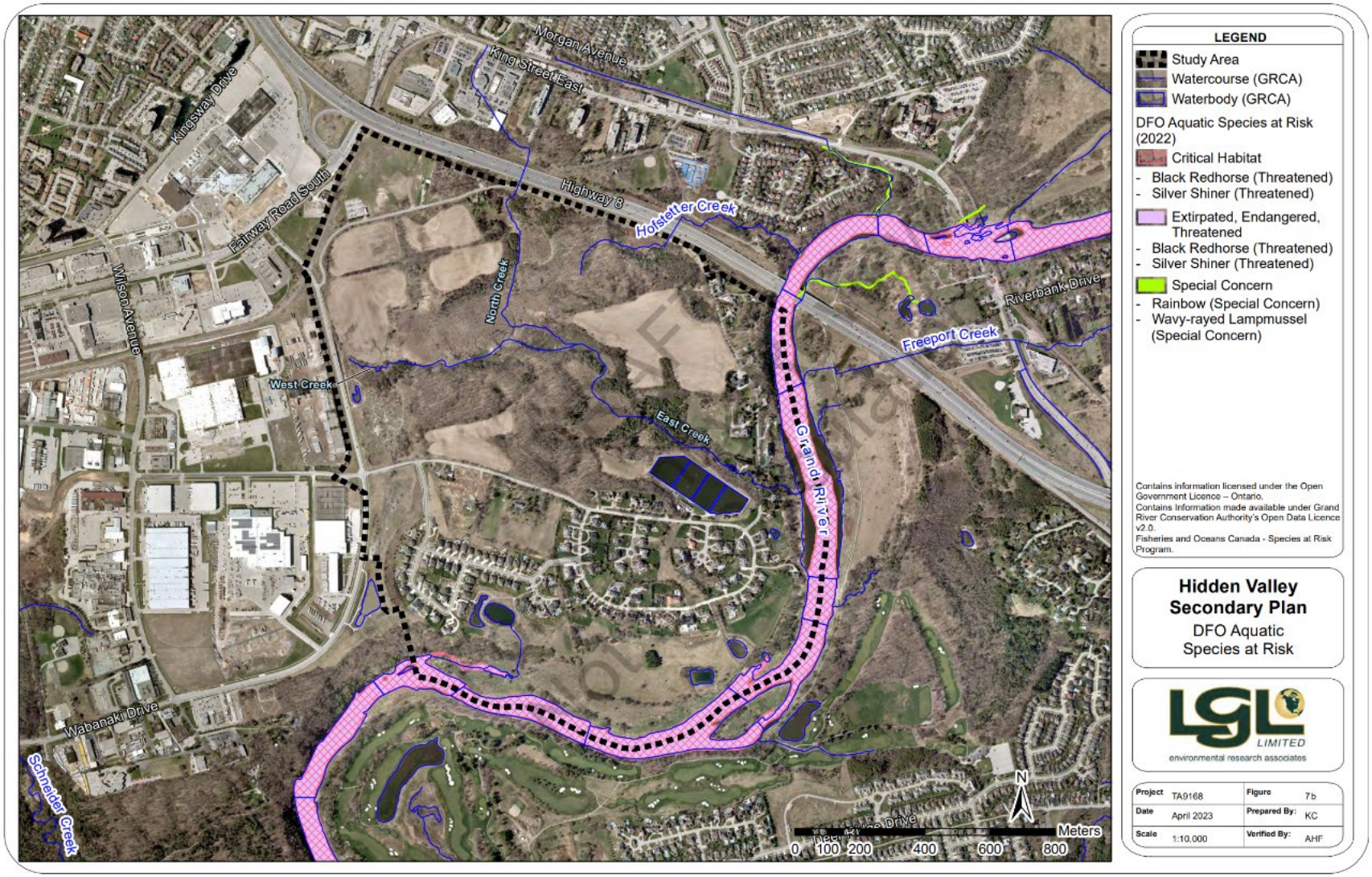

Figure 9: KNHS Component Map: Wetlands

Figure 10: KNHS Component Map: Valleylands and Associated Features

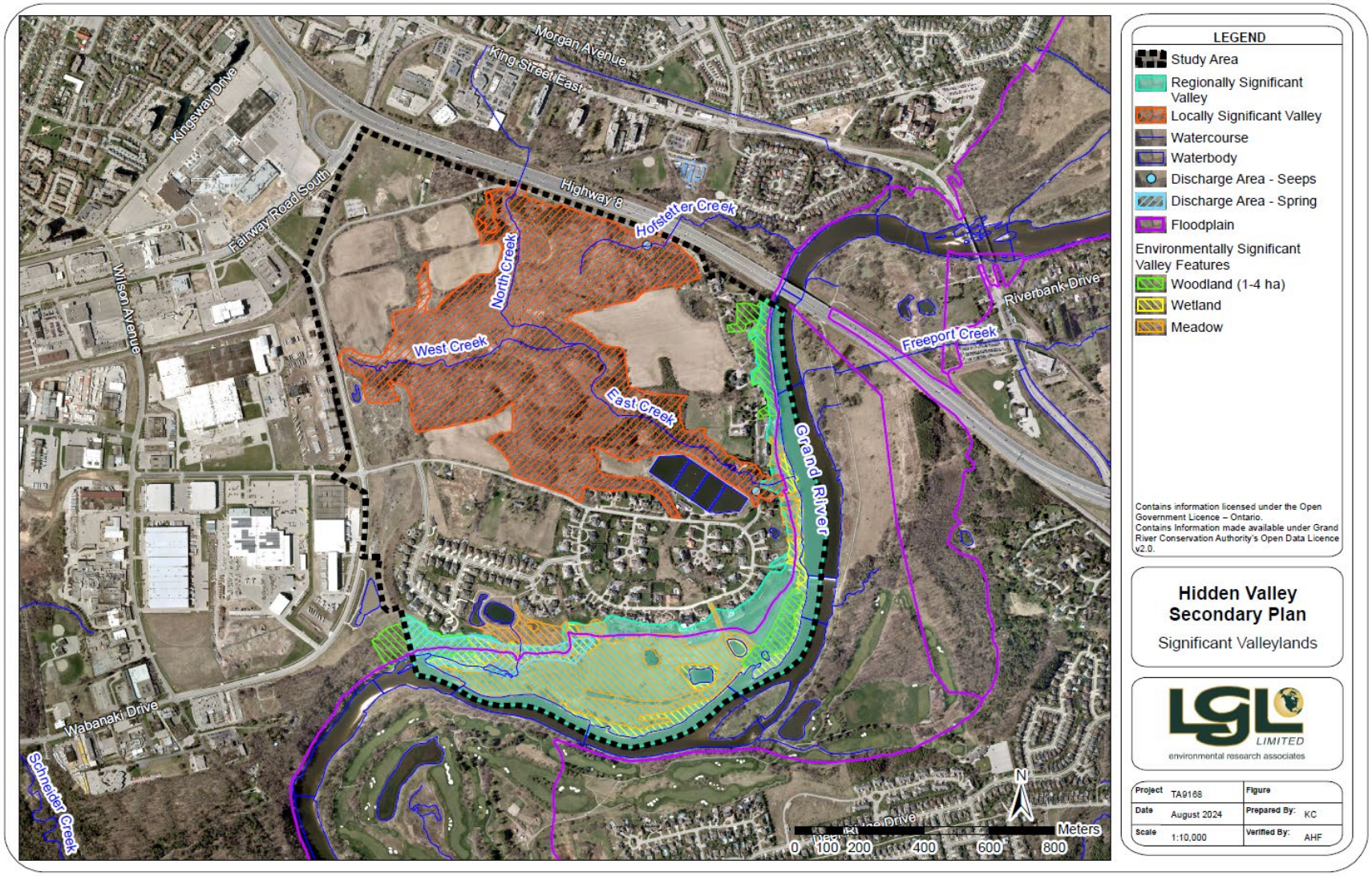

Figure 11: Revised Valley Boundary Based on Shading, Elevations, and Available Geotechnical Assessments

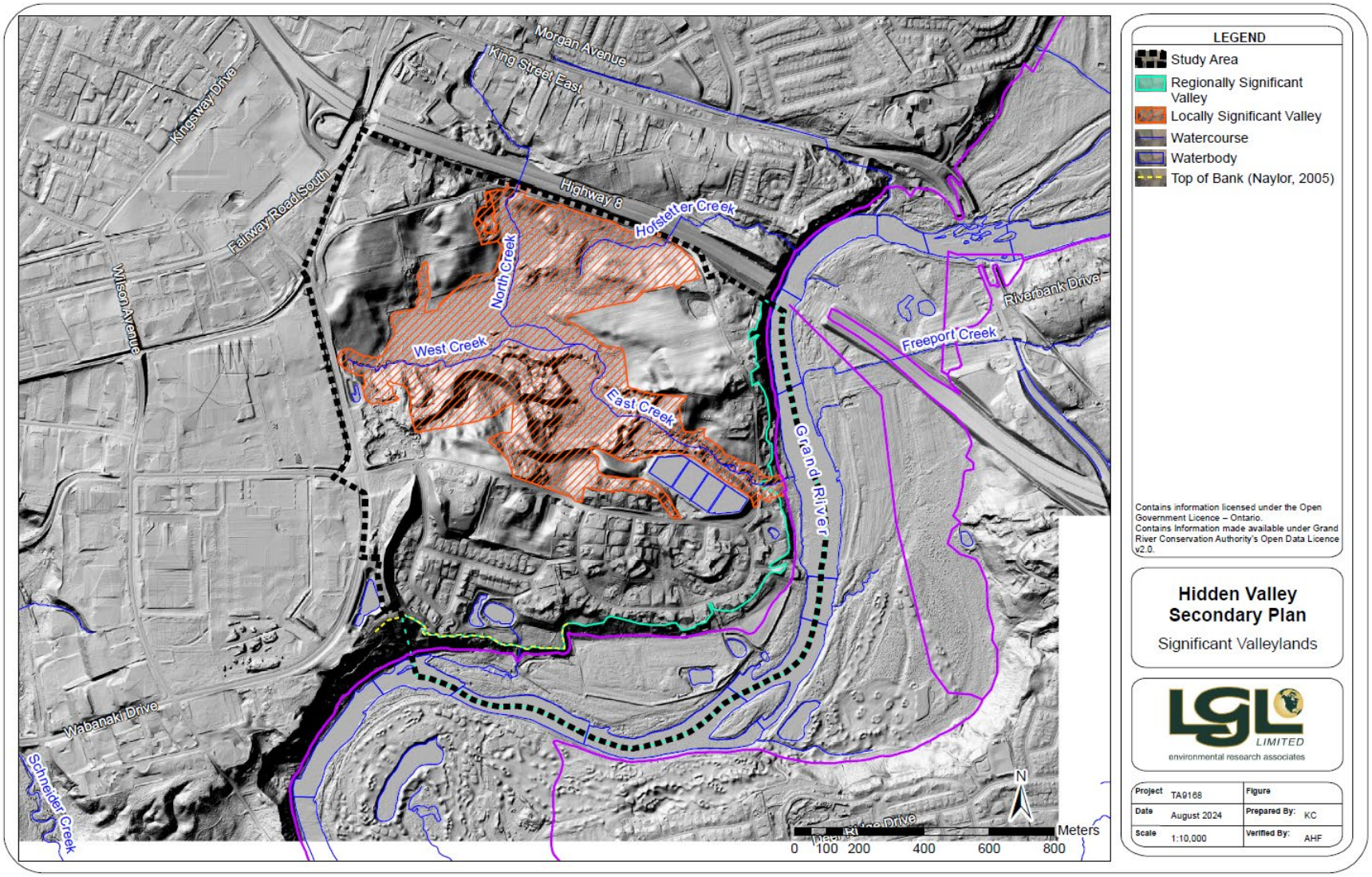

Figure 12: KNHS Component Map: Woodlands

Figure 13: KNHS Component Map: Linkages and Enhancement Areas

Figure 14: Restoration Area Identification Process (Source: KHNS Background Report)

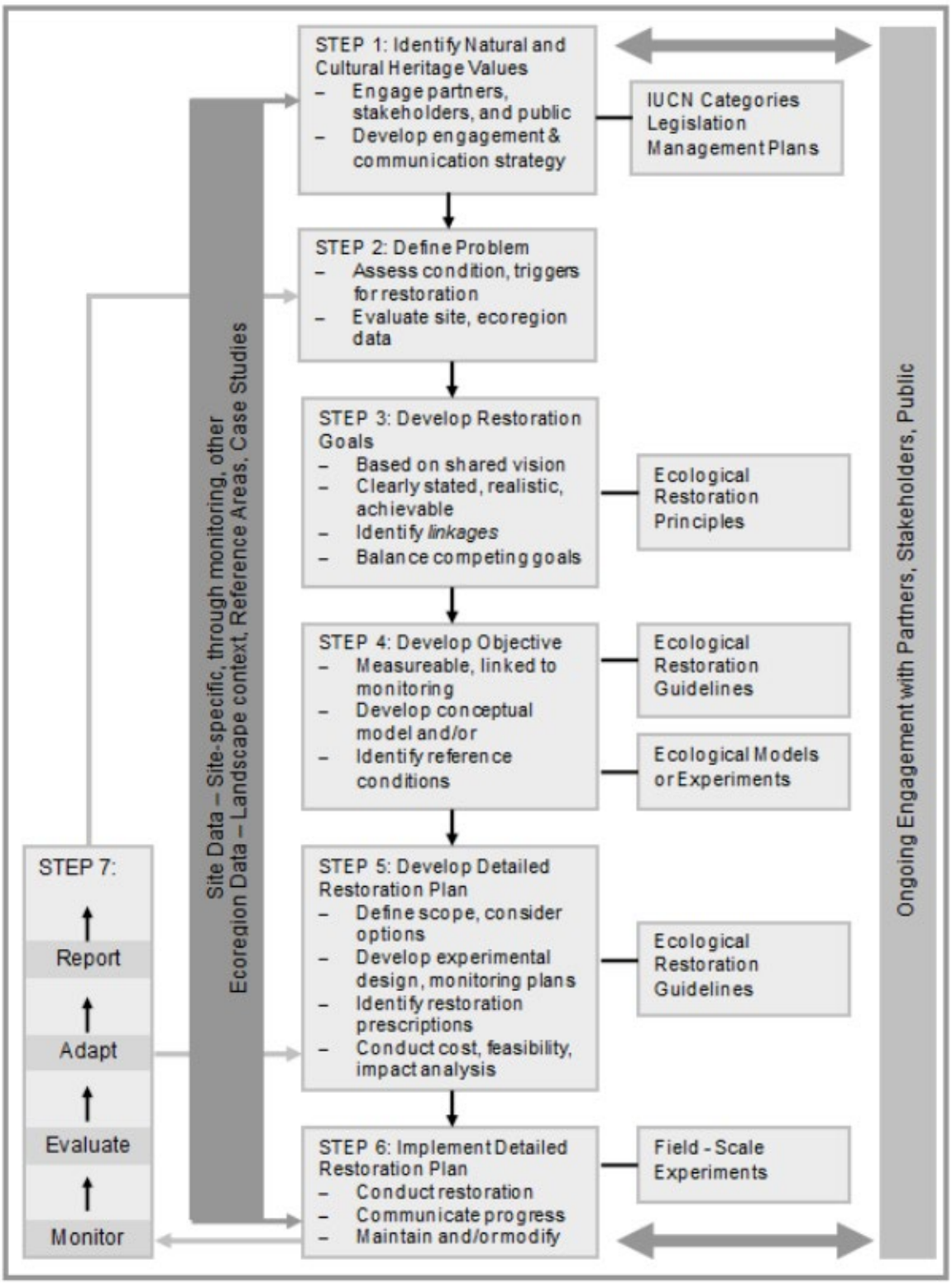

Figure 15: Regionally Environmentally Sensitive Policy Areas (ESPAs)

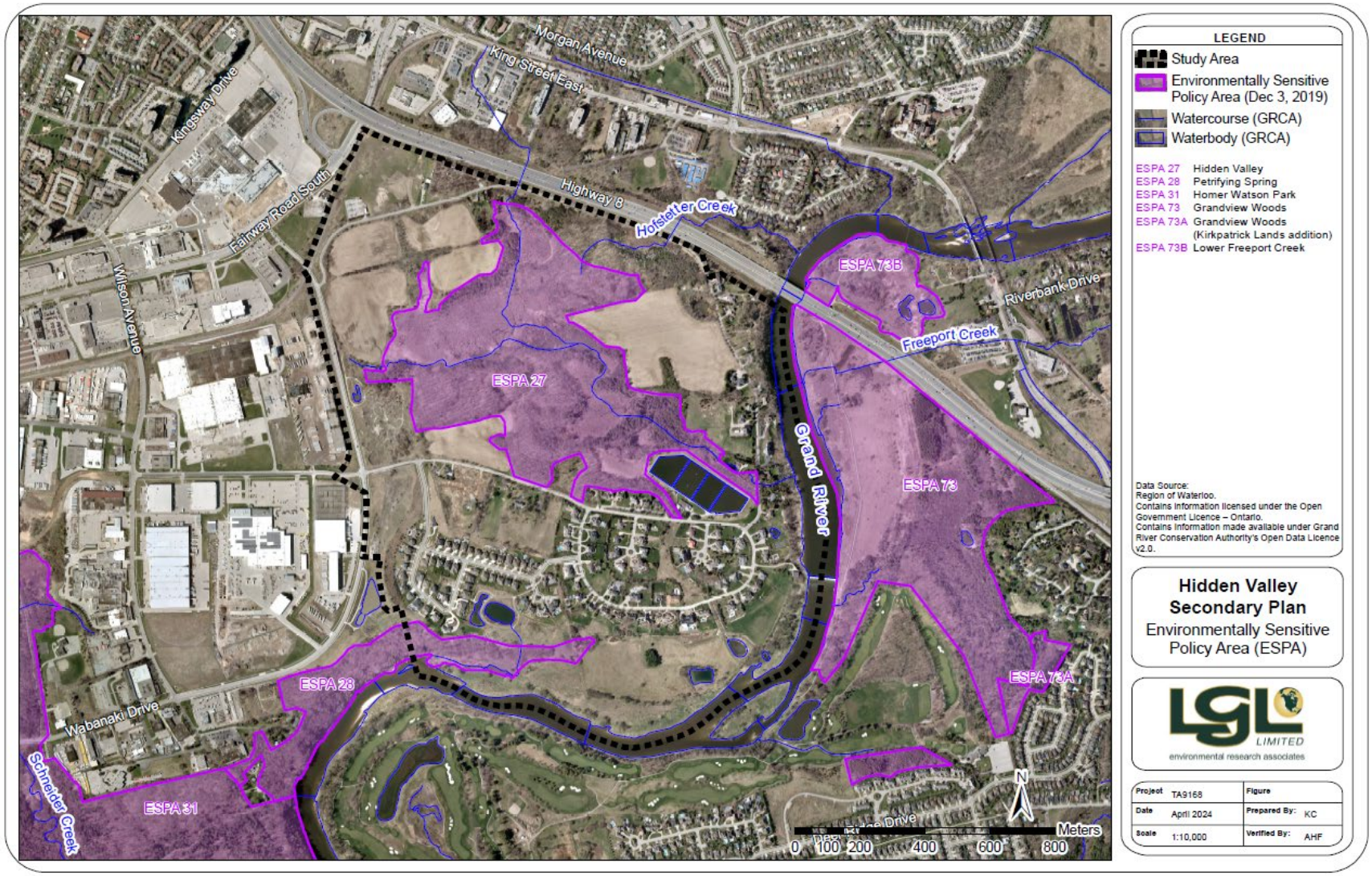

Figure 16: Proposed Natural Heritage System - Core Natural Heritage Features (Designation)

Figure 17: Proposed Natural Heritage System - Confirmed Significant Wildlife (Overlay)

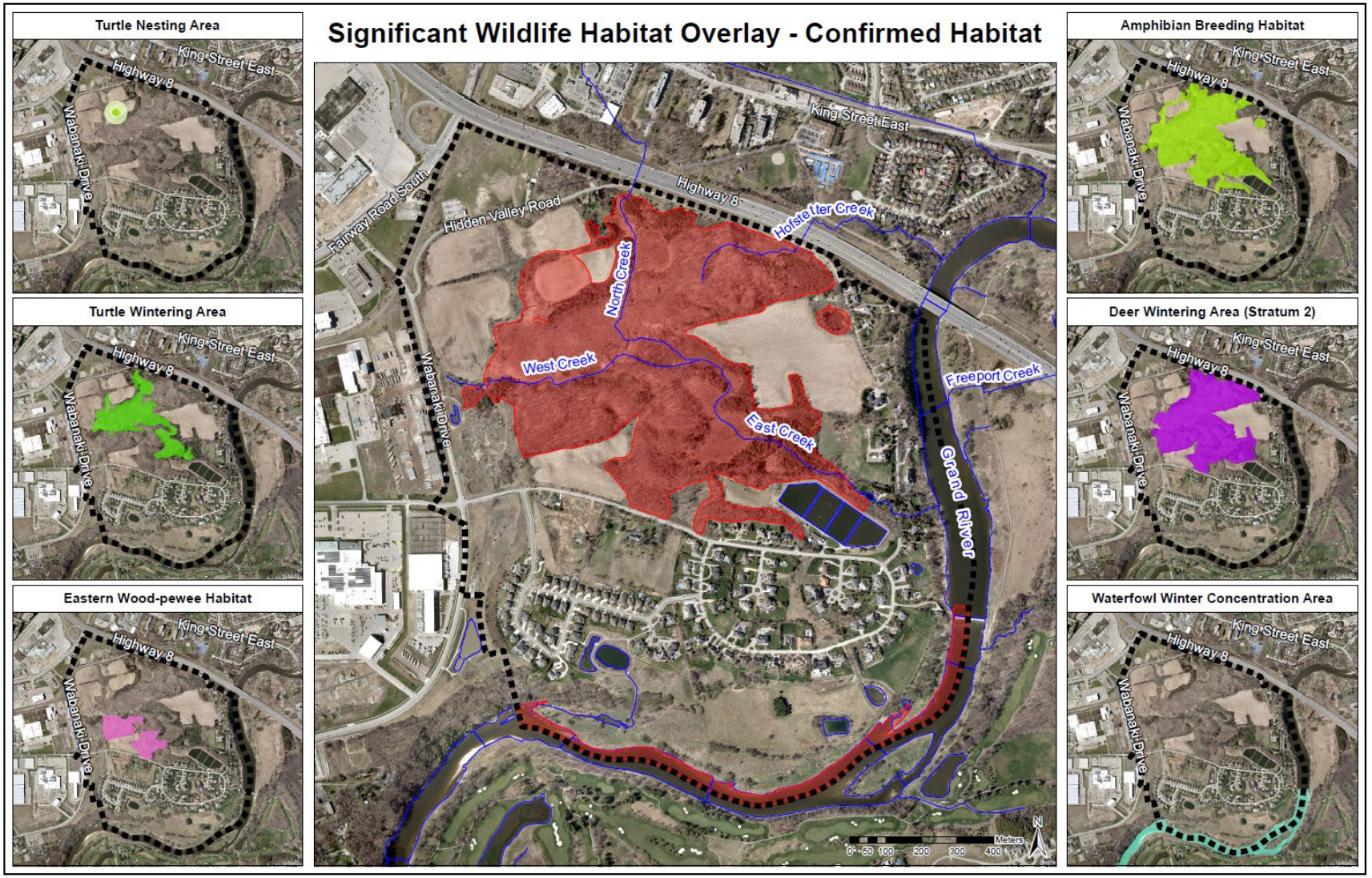

Figure 18: Proposed Natural Heritage System - Candidate Significant Wildlife Habitat (Overlay) (see Appendix D)

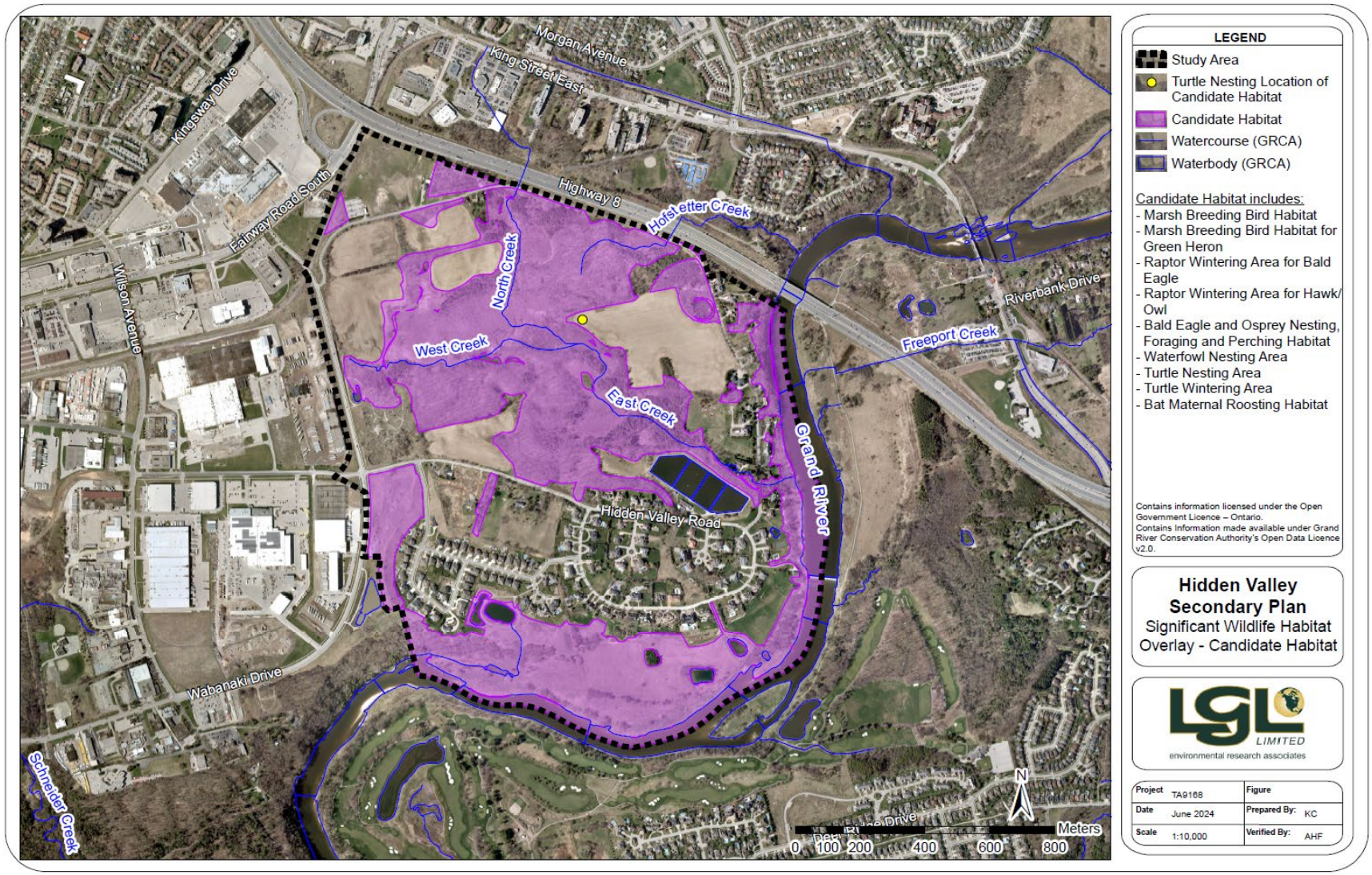

Figure 19: Greenfield/Vacant Land Development Associated with Proposed Land Use Master Plan

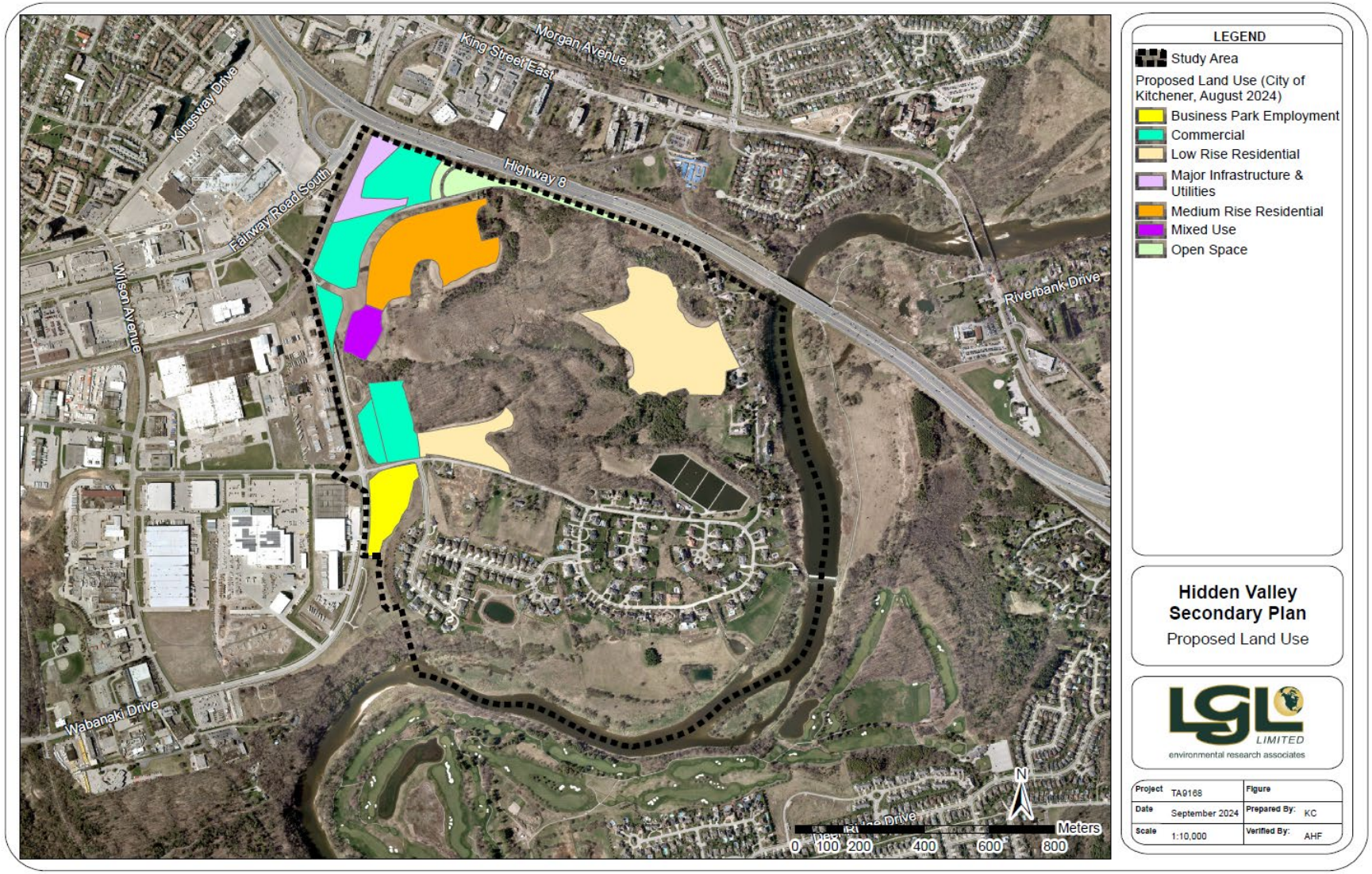

Figure 20: Recommended Minimum Buffers Mapping

10.0 References

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Appendix A Vegetation Community Summary

Appendix A:Vegetation Communities

ELC Code	Vegetation Type	Species Association	Comments
Terrestrial – Natural/Semi-natural			
TPO	OPEN TALLGRASS PRAIRIE		
TPO1	Dry Tallgrass Prairie	**Ground Cover**: Indian Grass (*Sorghastrum nutans*), Little Bluestem (*Schizachyrium scoparium*), Switch Grass (*Panicum virgatum*),	**Canopy Cover**: less than 25 percent **Stand Age**: Young **Level of Disturbance**: Low due to it being a restored berm
FOC	CONIFEROUS FOREST		
FOC2	Dry-Fresh White Cedar Coniferous Forest Type	**Overstorey:** Eastern white cedar dominant	**Canopy Cover:** 80 to 100 percent **Stand Age:** Young to Mature **Level of Disturbance:** Low, along bank of the Grand River
FOC2-2	Dry-Fresh White Cedar Coniferous Forest Type	**Overstorey:** Eastern white cedar dominant **Understorey:** common buckthorn (*Rhamnus cathartica*) **Ground Cover:** wild strawberry (*Fragaria virginiana*)	**Canopy Cover:** 80 to 100 percent **Stand Age:** Young to Mature
FOC3	Fresh-Moist Coniferous Forest	**Overstorey:** Easter White Cedar (*Thuja occidentalis*)	**Canopy Cover:** 80 to 100 percent **Stand Age:** Young to Mature **Level of Disturbance:** Low to moderate, along bank of the Grand River
FOC3-1	Fresh-Moist Hemlock Coniferous Forest Type	**Overstorey:** Eastern hemlock (*Tsuga canadensis*) dominant with eastern white cedar (*Thuja occidentalis*), yellow birch (*Betula alleghaniensis*) and sugar maple (*Acer saccharum saccharum*) **Understorey:** Choke cherry (*Prunus virginiana virginiana*), common buckthorn (*Rhamnus cathartica*) **Ground Cover:** Side-flowering aster (*Aster lateriflorus*), white snakeroot (*Eupatorium rugosum*), long-stalked sedge (*Carex pedunculata*), spinulose wood fern (*Drypoteris carthusiana*)	**Canopy Cover:** 80 to 100 percent **Stand Age:** Mature **Level of Disturbance:** Low to moderate due to proximity of pedestrian trail
FOC4-1	Fresh-Moist White Cedar Coniferous Forest Type	**Overstorey:** Eastern white cedar dominant **Understorey:** Low shrub cover **Ground Cover:** Sensitive fern (*Onoclea sensibilis*), marsh fern (*Thelyptris*	**Canopy Cover:** 80 to 100 percent **Stand Age:** Young to mature **Level of Disturbance:** Low

ELC Code	Vegetation Type	Species Association	Comments
		palustris), spotted touch-me-not (*Impatiens capensis*)	
FOC4-2	Fresh-Moist White Cedar-Hemlock Coniferous Forest	**Overstorey:** Eastern white cedar dominant with eastern hemlock, white pine (*Pinus strobus*) and sugar maple **Understorey:** Eastern white cedar, sugar maple, common buckthorn **Ground Cover:** Spinulose wood fern, bulblet fern (*Cystopertis bulbifera*)	**Canopy Cover:** 80 to 100 percent **Stand Age:** Young to mature **Level of Disturbance:** Low
FOM	MIXED FOREST		
FOM6-1	Fresh-Moist Sugar Maple-Hemlock Mixed Forest Type	**Overstorey:** Eastern hemlock with sugar maple, beech (*Fagus grandifolia*), white ash (*Fraxinus americana*) and yellow birch **Understorey:** Sugar maple, white ash **Ground Cover:** Wood ferns, wild ginger (*Asarum canadense*), Jack-in-the-pulpit (*Arisaemea triphyllum triphyllum*), lady fern (*Athrium filix-femina*)	**Canopy Cover:** 80 to 100 percent **Stand Age:** Mature **Level of Disturbance:** Low
FOM7-1	Fresh-Moist White Cedar-Hardwood Mixed Forest Ecosite	**Overstorey:** Eastern white cedar with yellow birch, white ash (*Fraxinus americana*) and sugar maple **Understorey:** White ash, sugar maple, choke cherry, common buckthorn **Ground Cover:** Lance-leaved aster (*Aster lanceolatus lanceolatus*), spinulose wood fern	**Canopy Cover:** 60 to 100 percent **Stand Age:** Young to mid-aged **Level of Disturbance:** Moderate due to proximity of cultural communities and pedestrian trails
FOD	DECIDUOUS FOREST		
FOD3	Dry-Fresh Cotton wood Deciduous Forest Type	**Overstorey:** Eastern Cottonwood (*Populus deltoides*) dominant	**Canopy Cover:** 60 to 100 percent **Stand Age:** Pioneer **Level of Disturbance:** Low to Moderate due to proximity to top of bank of the Grand River
FOD3-1	Dry-Fresh Poplar Deciduous Forest Type	**Overstorey:** Trembling aspen (*Populus tremuloides*) dominant **Understorey:** Trembling aspen **Ground Cover:** Kentucky bluegrass (*Poa pratensis pratensis*), Canada bluegrass (*P. compressa*), quack grass (*Elymus repens*)	**Canopy Cover:** 60 to 100 percent **Stand Age:** Pioneer **Level of Disturbance:** Moderate due to proximity to road and agricultural fields
FOD4	Dry-Fresh Deciduous Forest Type	**Overstorey:** Black walnut (*Juglans nigra*), white ash, basswood (*Tilia americana*), trembling aspen, **Understorey:** common buckthorn, staghorn sumac (*Rhus typhina*), riverbank grape (*Vitis riparia*)	**Canopy Cover:** 60 to 100 percent **Stand Age:** Young to mature

ELC Code	Vegetation Type	Species Association	Comments
		Ground Cover: Garlic mustard (*Allaria petiolata*), motherwort (*Leonurus cardiaca cardiaca*), Kentucky bluegrass, Canada bluegrass, wild strawberry (*Fragaria virginiana*)	**Level of Disturbance:** Low to moderate due to proximity to pedestrian trail and end of Cameo Drive
FOD4-2	Dry-Fresh White Ash Deciduous Forest Type	**Overstorey:** White ash, basswood (*Tilia americana*), trembling aspen **Understorey:** Eastern white cedar, common buckthorn, staghorn sumac (*Rhus typhina*), riverbank grape (*Vitis riparia*) **Ground Cover:** Garlic mustard (*Allaria petiolata*), motherwort (*Leonurus cardiaca cardiaca*), Kentucky bluegrass, Canada bluegrass, wild strawberry (*Fragaria virginiana*)	**Canopy Cover:** 60 to 100 percent **Stand Age:** Young to mature **Level of Disturbance:** Low to moderate due to proximity to pedestrian trails
FOD5	Dry-Fresh Sugar Maple Deciduous Forest Type	**Overstorey:** Sugar Maple mixed forest dominant	**Canopy Cover:** 80 to 100 percent **Stand Age:** Mature **Level of Disturbance:** Low to moderate due to adjacent residential properties
FOD5-1	Dry-Fresh Sugar Maple Deciduous Forest Type	**Overstorey:** Sugar maple dominant **Understorey:** Low shrub cover **Ground Cover:** white trillium (*Trillium grandiflorum*), yellow trout lily (*Erythronium americanum americanum*), wild sarsaparilla (*Aralia nudicaulis*), blue cohosh (*Caulophyllum thalictroides*)	**Canopy Cover:** 80 to 100 percent **Stand Age:** Mature **Level of Disturbance:** Moderate due to recent clearing of common buckthorn and proximity to roads and highway
FOD5-2	Dry-Fresh Sugar Maple-Beech Deciduous Forest Type	**Overstorey:** Sugar maple dominant with American beech (*Fagus grandifolia*) **Understorey:** Alternate-leaved dogwood (*Cornus alternifolia*), common buckthorn, red-berried elder (*Sambucus racemosa pubens*) **Ground Cover:** white trillium (*Trillium grandiflorum*), yellow trout lily (*Erythronium americanum americanum*), Pennsylvania sedge (*Carex pensylvanica*)	**Canopy Cover:** 80 to 100 percent **Stand Age:** Mature **Level of Disturbance:** Low to moderate due to proximity of pedestrian trail
FOD5-3	Dry-Fresh Sugar Maple-Oak Deciduous Forest Type	**Overstorey:** Sugar maple dominant with red oak (*Quercus rubra*) **Understorey:** Alternate-leaved dogwood, red-berried elder **Ground Cover:** white trillium, yellow trout lily, wild sarsaparilla, blue cohosh, jack-in-the-pulpit (*Arisaema triphyllum triphyllum*)	**Canopy Cover:** 80 to 100 percent **Stand Age:** Mature **Level of Disturbance:** Low to moderate due to usage by campers/inhabitants

ELC Code	Vegetation Type	Species Association	Comments
FOD5-6	Dry-Fresh Sugar Maple-Basswood Deciduous Forest Type	**Overstorey:** Sugar maple dominant with basswood **Understorey:** Alternate-leaved dogwood, red-berried elder, common buckthorn **Ground Cover:** white trillium, yellow trout lily, wild sarsaparilla, blue cohosh, jack-in-the-pulpit	**Canopy Cover:** 80 to 100 percent **Stand Age:** Mature **Level of Disturbance:** Low to moderate due to presence of pedestrian trails
FOD5-7	Dry-Fresh Sugar Maple-Black Cherry Deciduous Forest Type	**Overstorey:** Sugar maple dominant with black cherry **Understorey:** Alternate-leaved dogwood, red-berried elder, common buckthorn **Ground Cover:** white trillium, yellow trout lily, wild sarsaparilla, blue cohosh, jack-in-the-pulpit	**Canopy Cover:** 80 to 100 percent **Stand Age:** Mature **Level of Disturbance:** Low to moderate due to presence of pedestrian trails
FOD5-8	Dry-Fresh Sugar Maple-White Ash Deciduous Forest Type	**Overstorey:** Sugar maple dominant with white ash **Understorey:** Alternate-leaved dogwood, red-berried elder, common buckthorn **Ground Cover:** white trillium, yellow trout lily, wild sarsaparilla, blue cohosh, jack-in-the-pulpit	**Canopy Cover:** 80 to 100 percent **Stand Age:** Mature **Level of Disturbance:** Low to moderate due to presence of pedestrian trails
FOD7	Fresh-Moist Manitoba Maple Lowland Deciduous Forest	**Overstorey:** Manitoba Maple (*Acer negundo)* and Hybrid Crack Willow (*Salix X rubens*)	**Canopy Cover:** 60 to 80 percent **Stand Age:** Mid-aged
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest Type	**Overstorey:** Hybrid crack willow (*Salix X rubens*), Manitoba maple (*Acer negundo*) and black walnut (*Juglans nigra*) **Understorey:** Manitoba maple, common buckthorn, staghorn sumac **Ground Cover:** Garlic mustard, tall goldenrod, dame's rocket, motherwort, Canada bluegrass, Kentucky bluegrass	**Canopy Cover:** 60 to 80 percent **Stand Age:** Mid-aged **Level of Disturbance:** Moderate due to proximity of pedestrian trails and local businesses
FOD8-1	Fresh-Moist Poplar Deciduous Forest Type	**Overstorey:** Trembling aspen, large-tooth aspen (*Populus grandidentata*) and balsam poplar (*P. balsamifera*) dominant **Understorey:** Common buckthorn, choke cherry, red-berried elder **Ground Cover:** Sensitive fern, bittersweet nightshade (*Solanum dulcamara*), poison ivy (*Rhus radicans rhydbergii*), spinulose wood fern	**Canopy Cover:** 60 to 100 percent **Stand Age:** Young **Level of Disturbance:** Moderate due to proximity to roads and highway
Terrestrial – Cultural			

ELC Code	Vegetation Type	Species Association	Comments
CUP	CULTURAL PLANTATION		
CUP1	Deciduous Plantation Type	**Overstorey:** Black walnut (*Juglans nigra*) dominant	**Canopy Cover:** 60 to 90 percent **Stand Age:** Mature **Level of Disturbance:** Low to moderate due to proximity to agricultural fields
CUP1-3	Black Walnut Deciduous Plantation Type	**Overstorey:** Black walnut (*Juglans nigra*) dominant **Understorey:** Common buckthorn, glossy buckthorn (*Rhamnus frangula*), riverbank grape, thicket creeper (*Parthenocissus inserta*), wild red raspberry **Ground Cover:** Garlic mustard, dame's rocket, motherwort, bittersweet nightshade, poison ivy	**Canopy Cover:** 60 to 90 percent **Stand Age:** Mature **Level of Disturbance:** Low to moderate due to proximity to agricultural fields
CUP2	Mixed Plantation	**Overstorey:** Black walnut and red pine (*Pinus resinosa*) **Understorey:** Common buckthorn, glossy buckthorn (*Rhamnus frangula*), riverbank grape, thicket creeper (*Parthenocissus inserta*), wild red raspberry **Ground Cover:** Garlic mustard, dame's rocket, motherwort, bittersweet nightshade, poison ivy	**Canopy Cover:** 80 to 100 percent **Stand Age:** Mid-aged to Mature **Level of Disturbance:** Low to moderate due to proximity to agricultural fields
CUP3	Coniferous Plantation	**Overstorey:** Eastern white cedar, red pine (*Pinus resinosa*) **Understorey:** Eastern white cedar **Ground Cover:** Little evident	**Canopy Cover:** 100 percent **Stand Age:** Young to Mid-aged **Level of Disturbance:** Low
CUP3-1	Red Pine Coniferous Plantation Type	**Overstorey:** Red pine, eastern white cedar **Understorey:** Red pine **Ground Cover:** Little evident	**Canopy Cover:** 100 percent **Stand Age:** Young to Mid-aged **Level of Disturbance:** Low to moderate due to proximity of road and pedestrian trails
CUP3-3	Scotch Pine Coniferous Plantation	**Overstorey:** Scotch pine (*Pinus sylvestris*), eastern white cedar **Understorey:** Scotch pine **Ground Cover:** Little evident	**Canopy Cover:** 100 percent **Stand Age:** Young to Mid-aged **Level of Disturbance:** Low to moderate due to proximity of road and pedestrian trails
CUM	CULTURAL MEADOW		
CUM1-1	Dry-Moist Old Field Meadow Type	**Ground Cover:** Tall goldenrod, Canada goldenrod (*Solidago canadensis*), Canada thistle (*Cirsium canadense*), common milkweed (*Asclepias syriaca*), bittersweet nightshade, Kentucky bluegrass, Canada	**Level of Disturbance:** Moderate to high due to presence of pedestrian trails and proximity to agricultural fields

ELC Code	Vegetation Type	Species Association	Comments
		bluegrass, quack grass (*Elymus repens*), orchard grass (*Dactylis glomerata*)	
CUT	CULTURAL THICKET		
CUT1	Mineral Cultural Thicket Ecosite	**Overstorey:** Common buckthorn, staghorn sumac, hawthorn (*Cratageus* sp.), apple (*Malus* sp.) **Ground Cover:** Tall goldenrod, Canada goldenrod (*Solidago canadensis*), Canada thistle (*Cirsium canadense*), common milkweed (*Asclepias syriaca*), bittersweet nightshade, Kentucky bluegrass, Canada bluegrass, quack grass (*Elymus repens*), orchard grass (*Dactylis glomerata*)	**Level of Disturbance:** Moderate to high due to presence of pedestrian trails and proximity to agricultural fields
CUT1-1	Sumac Cultural Thicket Ecosite	**Overstorey:** Staghorn sumac, hawthorn (*Cratageus* sp.), riverbank grape, common buckthorn, white ash **Ground Cover:** Tall goldenrod, Canada goldenrod (*Solidago canadensis*), Canada thistle (*Cirsium canadense*), common milkweed (*Asclepias syriaca*), bittersweet nightshade, Kentucky bluegrass, Canada bluegrass, quack grass (*Elymus repens*), orchard grass (*Dactylis glomerata*)	**Level of Disturbance:** Moderate to high due to being within Highway 8 and Hydro right-of-way
CUW	CULTURAL WOODLAND		
CUW1	Mineral Cultural Woodland Ecosite	**Overstorey:** Green ash (*Fraxinus pennsylvanica*), Manitoba maple (*Acer negundo*) **Understorey:** Crab apple (*Malus pumila*), riverbank grape **Ground Cover:** Tall goldenrod, Canada goldenrod (*Solidago canadensis*), Canada thistle (*Cirsium canadense*), common milkweed (*Asclepias syriaca*), bittersweet nightshade, Kentucky bluegrass, Canada bluegrass, quack grass (*Elymus repens*), orchard grass (*Dactylis glomerata*)	**Canopy Cover:** 35 to 60 percent **Stand Age:** Young to mature **Level of Disturbance:** Moderate to high due to presence of pedestrian trails, proximity to agricultural fields and usage by campers/inhabitants
CUS1	Mineral Cultural Savannah	**Overstorey:** Black Cherry (*Prunus nigra*), Sugar Maple (*Acer saccharinum*), Pear (*Pyrus communis*), Eastern Red Cedar (*Juniperus virginiana*), White Cedar (*Thuja occidentalis*), Black Walnut and Scott's Pine (*Pinus sylvestris*)	**Canopy Cover:** 25 to 35 percent **Stand Age:** Young to Mature Disturbance: High, selectively cut
Wetland			
SWC	CONIFEROUS SWAMP		

ELC Code	Vegetation Type	Species Association	Comments
SWC3-2	White Cedar-Conifer Organic Coniferous Swamp Type	**Overstorey:** Eastern white cedar, tamarack (*Larix laricina*), white pine, yellow birch **Understorey:** Eastern white cedar, tamarack, white pine **Ground Cover:** Reed-canary grass (*Phalaris arundinacea*), swamp aster (*Aster puniceus*), swamp goldenrod (*Solidago patula*), sensitive fern, creeping bent grass (*Agrostis stolonifera*), purple loosestrife (*Lythrum salicaria*), spotted touch-me-not, marsh fern, fowl manna grass (*Glyceria striata*)	**Canopy Cover:** 80 to 100 percent **Stand Age:** Young **Level of Disturbance:** Low
SWM	MIXED SWAMP		
SWM1-1	White Cedar-Hardwood Mineral Mixed Swamp Type	**Overstorey:** Eastern white cedar dominant with white birch, yellow birch, green ash, black ash (*Fraxinus nigra*), trembling aspen, balsam fir (*Abies balsamea*), balsam poplar and white elm **Understorey:** Eastern white cedar **Ground Cover:** Sensitive fern (*Onoclea sensiblis*), marsh marigold (*Caltha palustris*), spotted touch-me-not (*Impatiens capensis*), creeping bent grass	**Canopy Cover:** 100 percent **Stand Age:** Young **Level of Disturbance:** Low
SWM6-1	Birch-Conifer Organic Mixed Swamp Type	**Overstorey:** Yellow birch, trembling aspen, tamarack **Understorey:** Eastern white cedar, white elm, yellow birch, tamarack, red-osier dogwood (*Cornus stolonifera*), red-berried elder, highbush cranberry (*Viburnum trilobum*), Tartarian honeysuckle (*Lonicera tatarica*), common buckthorn, glossy buckthorn **Ground Cover:** Swamp aster, swamp goldenrod, common cattail (*Typha latifolia*), sensitive fern, creeping bent grass, purple loosestrife, spotted touch-me-not, marsh fern, fowl manna grass	**Canopy Cover:** 60 to 80 percent **Stand Age:** Young to mid-aged **Level of Disturbance:** Low
SWD	DECIDUOUS SWAMP		
SWD2-2	Green Ash Mineral Deciduous Swamp Type	**Overstorey:** Green ash, trembling aspen, yellow birch **Understorey:** Eastern white cedar, common buckthorn, blue beech (*Ostrya virginiana*) **Ground Cover:** Sensitive fern, spotted touch-me-not, creeping bent grass	**Canopy Cover:** 40 to 100 percent **Stand Age:** Young to Mature **Level of Disturbance:** Moderate to high due to proximity to pedestrian trails

ELC Code	Vegetation Type	Species Association	Comments
			and flooding by beavers in portions of this community type
SWD4	Manitoba Maple Mineral Deciduous Swamp Type	**Overstorey:** Manitoba Maple (Acer negundo)	**Canopy Cover:** 40 to 60 percent **Stand Age:** Young
SWD4-1	Willow Mineral Deciduous Swamp Type	**Overstorey:** Hybrid Crack Willow (*Salix x rubens*)	**Canopy Cover:** 40 to 60 percent **Stand Age:** Young
SWD5-1	Black Ash Organic Deciduous Swamp Type	**Overstorey:** Black ash, white elm, tamarack, red maple **Understorey:** Common buckthorn, glossy buckthorn, red-osier dogwood **Ground Cover:** Sensitive fern, purple loosestrife, swamp aster, fowl manna grass, swamp goldenrod, narrow-leaved cattail (*Typha angustifolia*), creeping bent grass	**Canopy Cover:** 40 to 60 percent **Stand Age:** Young **Level of Disturbance:** Low to moderate due to proximity of pedestrian trails
SWT	THICKET SWAMP		
SWT2-5	Red-osier Mineral Thicket Swamp Type	**Overstorey:** Red-osier dogwood, winterberry (*Ilex verticillata*), common buckthorn, glossy buckthorn **Ground Cover:** Sensitive fern, spotted touch-me-not, marsh fern, creeping bent grass	**Level of Disturbance:** Low
MAM	MEADOW MARSH		
MAM2	Common Reed Mineral Meadow Marsh Type	**Ground Cover:** Common reed (*Phragmites australis*), Reed-canary grass (*Phalaris arundinacea*), common cattail, narrow-leaved cattail,	**Level of Disturbance:** Low to moderate due to proximity to pedestrian trail
MAM2-2	Reed-canary Grass Mineral Meadow Marsh Type	**Ground Cover:** Reed-canary grass (*Phalaris arundinacea*), common cattail, narrow-leaved cattail, swamp aster, creeping bent grass	**Level of Disturbance:** Low to moderate due to proximity to road
MAM2-5	Narrow-leaved Sedge Mineral Meadow Marsh Type	**Ground Cover:** Yellow Sedge (*Carex flava*), Inland Sedge (*Carex interior*), creeping bent grass, rough-leaved goldenrod (*Solidago patula*), reed-canary grass	**Level of Disturbance:** Low to moderate due to proximity to road
MAM2-10	Forb Mineral Meadow Marsh Type	**Ground Cover:** Spotted touch-me-not, swamp aster, common cattail, narrow-leaved cattail, reed-canary grass, fowl manna grass,	**Level of Disturbance:** Low to moderate due to proximity to agricultural fields
MAS	SHALLOW MARSH		

ELC Code	Vegetation Type	Species Association	Comments
MAS2-1	Cattail Mineral Shallow Marsh Type	**Ground Cover:** Common cattail, narrow-leaved cattail, reed-canary grass, creeping bent grass	**Level of Disturbance:** Low to moderate due to proximity to road and pedestrian trails
MAS3-1	Cattail Organic Shallow Marsh Type	**Ground Cover:** Common cattail, narrow-leaved cattail, reed-canary grass, creeping bent grass	**Level of Disturbance:** Low
OAO	OPEN AQUATIC	N/A	

Appendix B Plant List

Introduced	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Local Status Waterloo 2006	Local Status Waterloo 2020	Previous Field Surveys	Field Visit 2021
	SELAGINELLACEAE	**SELAGINELLA FAMILY**								
	Selaginella eclipes	meadow spike-moss	G4	S4					x	
	EQUISETACEAE	**HORSETAIL FAMILY**								
	Equisetum arvense	field horsetail	G5	S5					x	x
	Equisetum hyemale var. affine	scouring-rush	G5T5	S5					x	
	Equisetum sylvaticum	wood horsetail	G5	S5					x	
	OSMUNDACEAE	**ROYAL FERN FAMILY**								
	Osmunda cinnamomea	cinnamon fern	G5	S5					x	
	PTERIDACEAE	**MAIDENHAIR FERN FAMILY**							x	
	Adiantum pedatum	northern maidenhair fern	G5	S5					x	
	DENNSTAEDTIACEAE	**BRACKEN FERN FAMILY**								
	Pteridium aquilinum var. latiusculum	eastern bracken-fern	G5T5	S5					x	
	THELYPTERIDACEAE	**MARSH FERN**								
	Thelypteris palustris var. pubescens	marsh fern	GNR	S5					x	
	DRYOPTERIDACEAE	**WOOD FERN FAMILY**								
	Athyrium filix-femina var. angustum	northern lady fern	G5T5	S5					x	
	Cystopteris bulbifera	bulblet bladder fern	G5	S5					x	
	Dryopteris carthusiana	spinulose wood fern	G5	S5					x	
	Dryopteris clintoniana	Clinton's wood fern	G5	S4					x	
	Dryopteris cristata	crested wood fern	G5	S5					x	
	Dryopteris intermedia	evergreen wood fern	G5	S5					x	
	Dryopteris marginalis	marginal wood fern	G5	S5					x	
	Matteuccia struthiopteris var. pensylvanica	ostrich fern	G5T5	S5					x	
	Onoclea sensibilis	sensitive fern	G5	S5					x	
	Polystichum acrostichoides	Christmas fern	G5	S5					x	
	PINACEAE	**PINE FAMILY**								
*	*Larix decidua*	European larch	G5	SNA					x	x
	Larix laricina	tamarack	G5	S5					x	
*	*Picea abies*	Norway spruce	G5	SNA					x	x
	Picea glauca	white spruce	G5	S5			x	x	x	x
*	*Picea pungens*	Colorado spruce	G5	SNA						x
*	*Pinus mugo*	mugo pine	GNR	SNA						x
*	*Pinus nigra*	Austrian pine	GNR	SNA						x
	Pinus resinosa	red pine	G5	S5					x	
	Pinus strobus	eastern white pine	G5	S5					x	x
*	*Pinus sylvestris*	scotch pine	GNR	SNA					x	x
	Tsuga canadensis	eastern hemlock	G4G5	S5					x	x
	CUPRESSACEAE	**CEDAR FAMILY**								x
	Chamaecyparis nootkatensis	false cypress	GNR	SNA						x
	Juniperus communis	common juniper	G5	S5			x	x		x
	Juniperus virginiana	eastern red cedar	G5	S5					x	x
	Thuja occidentalis	eastern white cedar	G5	S5					x	x
	TAXACEAE	**YEW FAMILY**								x
*	*Taxus cuspidata*	Japanese Yew	GNR	SNA						x
	MAGNOLIACEAE	**MAGNOLIA FAMILY**								x
*	*Magnolia soulangeana*	saucer magnolia	GNR	SNA						x
	LAURACEAE	**LAUREL FAMILY**								x
	Lindera benzoin	spicebush	G5	S4					x	
	ARISTOLOCHIACEAE	**DUCHMAN'S-PIPE FAMILY**								x
	Asarum canadense	wild ginger	G5	S5					x	x
	RANUNCULACEAE	**BUTTERCUP FAMILY**								x
	Actaea pachypoda	white baneberry	G5	S5					x	x
	Actaea rubra	red baneberry	G5	S5					x	x
	Anemone acutiloba	sharp-lobed hepatica	G5T5	S5					x	x
	Anemone virginiana var. alba	tall anemone	G5T4T5	S4					x	x
	Aquilegia canadensis	wild columbine	G5	S5					x	x
	Caltha palustris	marsh-marigold	G5	S5					x	x
	Ranunculus abortivus	kidney-leaf buttercup	G5	S5					x	
*	*Ranunculus acris*	tall buttercup	G5	SNA					x	x

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	Ranunculus recurvatus var. recurvatus	hooked buttercup	G5T5	S5					x	x
	Thalictrum dioicum	early meadow-rue	G5	S5					x	x
	Thalictrum pubescens	tall meadow-rue	G5	S5					x	x
	BERBERIDACEAE	**BARBERRY FAMILY**							x	x
*	*Berberis vulgaris*	common barberry	GNR	SNA					x	
	Caulophyllum thalictroides	blue cohosh	G5	S5					x	x
	Podophyllum peltatum	may-apple	G5	S5					x	x
	PAPAVERACEAE	**POPPY FAMILY**							x	x
*	*Chelidonium majus*	celandine	GNR	SNA					x	x
	Sanguinaria canadensis	bloodroot	G5	S5					x	x
	ULMACEAE	**ELM FAMILY**							x	x
	Celtis occidentalis	common hackberry	G5	S4			x	x	x	x
	Ulmus americana	white elm	G4	S5					x	x
*	*Ulmus pumila*	Siberian elm	GNR	SNA					x	x
	MORACEAE	**MULBERRY FAMILY**							x	x
*	*Morus alba*	white mulberry	GNR	SNA					x	x
	URTICACEAE	**NETTLE FAMILY**							x	x
	Boehmeria cylindrica	false nettle	G5	S5					x	x
	Laportea canadensis	wood nettle	G5	S5					x	
	Pilea pumila	dwarf clearweed	G5	S5					x	x
*	*Urtica dioica ssp. dioica*	European stinging nettle	G5T5?	SNA					x	x
	JUGLANDACEAE	**WALNUT FAMILY**							x	x
	Carya cordiformis	bitternut hickory	G5	S5					x	x
	Carya ovata var. ovata	shagbark hickory	G5	S5					x	x
	Juglans cinerea	butternut	G3	S2?	END	END			x	x
	Juglans nigra	black walnut	G5	S4?			x	x	x	x
	FAGACEAE	**BEECH FAMILY**							x	x
	Fagus grandifolia	American beech	G5	S4					x	x
	Quercus alba	white oak	G5	S5					x	x
	Quercus macrocarpa	bur oak	G5	S5					x	x
*	*Quercus robur*	English oak	GNR	SNA					x	x
	Quercus rubra	red oak	G5	S5					x	x
	BETULACEAE	**BIRCH FAMILY**							x	x
	Betula alleghaniensis	yellow birch	G5	S5					x	x
	Betula papyrifera	white birch	G5	S5					x	x
*	*Betula pendula*	European weeping birch	GNR	SNA					x	x
	Carpinus caroliniana ssp. virginiana	blue beech	G5T5	S5					x	x
	Ostrya virginiana	ironwood	G5	S5					x	x
	PORTULACACEAE	**PURSLANE FAMILY**							x	x
	Claytonia virginica	Virginia spring beauty	G5	S5					x	x
	CARYOPHYLLACEAE	**PINK FAMILY**							x	x
*	*Dianthus armeria*	deptford pink	GNR	SNA					x	x
*	*Saponaria officinalis*	bouncing-bet	GNR	SNA					x	x
*	*Silene vulgaris*	catchfly	GNR	SNA					x	x
	POLYGONACEAE	**SMARTWEED FAMILY**							x	x
*	*Polygonum cuspidatum*	Japanese knotweed	GNR	SNA					x	x
*	*Polygonum lapathifolium*	green smartweed	GNR	SNA					x	x
*	*Polygonum persicaria*	lady's-thumb	GNR	SNA					x	x
*	*Rumex crispus*	curly-leaf dock	GNR	SNA					x	x
	Rumex orbiculatus	great water dock	G5	S5					x	x
	GUTTIFERAE	**ST. JOHN'S-WORT FAMILY**							x	x
*	*Hypericum perforatum*	common St. John's-wort	GNR	SNA					x	x
	TILIACEAE	**LINDEN FAMILY**							x	x
	Tilia americana	basswood	G5	S5					x	x
	MALVACEAE	**MALLOW FAMILY**							x	x
*	*Malva neglecta*	cheeses	GNR	SNA					x	x
	VIOLACEAE	**VIOLET FAMILY**							x	x
	Viola canadensis	Canada violet	G5	S5					x	x
	Viola cucullata	marsh blue violet	G5	S5					x	
	Viola pubescens	downy yellow violet	G5	S5					x	
	Viola sororia	woolly blue violet	G5	S5					x	x
	SALICACEAE	**WILLOW FAMILY**							x	x

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	Populus balsamifera ssp. balsamifera	balsam poplar	G5	S5					x	x
	Populus deltoides	cottonwood	G5	S5				x	x	x
	Populus grandidentata	large-tooth aspen	G5	S5					x	
	Populus tremuloides	trembling aspen	G5	S5					x	x
	Salix eriocephala	Missouri willow	G5	S5					x	
	Salix petiolaris	slender willow	G5	S5					x	x
*	*Salix X rubens*	reddish willow	GNR	SNA					x	x
*	*Salix X sepulcralis*	hybrid willow	GNR	SNA					x	x
	BRASSICACEAE	**MUSTARD FAMILY**							x	x
*	*Alliaria petiolata*	garlic mustard	GNR	SNA					x	x
*	*Barbarea vulgaris*	yellow rocket	GNR	SNA					x	
	Cardamine concatenata	cut-leaved toothwort	G5	S5					x	x
	Cardamine diphylla	two-leaved toothwort	G5	S5					x	x
	Cardamine pensylvanica	Pennsylvania bitter-cress	G5	S5					x	
*	*Hesperis matronalis*	dame's rocket	G4G5	SNA					x	x
*	*Rorippa microphylla*	small-leaved water-cress	GNR	SNA					x	
*	*Rorippa nasturtium-aquaticum*	water-cress	GNR	SNA					x	
	PRIMULACEAE	**PRIMROSE FAMILY**							x	x
	Lysimachia ciliata	fringed loosestrife	G5	S5					x	x
*	*Lysimachia nummularia*	moneywort	GNR	SNA					x	x
	Lysimachia thyrsiflora	tufted loosestrife	G5	S5					x	
	GROSSULARIACEAE	**GOOSEBERRY FAMILY**							x	x
	Ribes americanum	wild black currant	G5	S5					x	
	Ribes cynosbati	prickly gooseberry	G5	S5					x	
	Ribes triste	wild red currant	G5	S5					x	
	SAXIFRAGACEAE	**SAXIFRAGE FAMILY**							x	x
	Mitella diphylla	two-leaved bishop's cap	G5	S5					x	
	Tiarella cordifolia	false mitrewort	G5	S5					x	
	ROSACEAE	**ROSE FAMILY**							x	x
	Agrimonia gryposepala	tall hairy agrimony	G5	S5					x	x
	Argentia anserina	silverweed	G5	S5					x	
	Crataegus punctata	large-fruited thorn	G5	S5					x	
	Fragaria vesca ssp. americana	woodland strawberry	G5T5	S5					x	x
	Fragaria virginiana ssp. glauca	scarlet strawberry	G5	S5					x	x
	Geum aleppicum	yellow avens	G5	S5					x	x
	Geum canadense	white avens	G5	S5					x	x
	Malus coronaria	narrow-leaved crabapple	G5	S4					x	
*	*Malus pumila*	common apple	G5	SNA					x	x
	Potentilla norvegica ssp. norvegica	cinquefoil	G5	S5					x	x
*	*Potentilla recta*	rough-fruited cinquefoil	GNR	SNA					x	x
*	*Prunus avium*	sweet cherry	GNR	SNA					x	x
	Prunus serotina	black cherry	G5	S5					x	x
	Prunus virginiana var. virginiana	choke cherry	G5T5	S5					x	x
*	*Pyrus communis*	common pear	G5	SNA					x	x
	Rosa blanda	smooth rose	G5	S5					x	
*	*Rosa multiflora*	multiflora rose	GNR	SNA					x	x
	Rubus allegheniensis	alleghany blackberry	G5	S5					x	
	Rubus idaeus ssp. strigosus	wild red raspberry	G5T5	S5					x	x
	Rubus occidentalis	thimble-berry	G5	S5					x	x
	Rubus pensilvanicus	Pennsylvania raspberry	G5	SU					x	
	Rubus pubescens	dwarf raspberry	G5	S5					x	
*	*Sanguisorba minor*	salad burnet	G5	SNA					x	
	Waldsteinia fragarioides	barren strawberry	G5	S5					x	
	FABACEAE	**PEA FAMILY**							x	x
	Amphicarpaea bracteata	hog peanut	G5	S5					x	x
*	*Coronilla varia*	variable crown-vetch	GNR	SNA					x	x
	Gleditsia triacanthos var. inermis	'shade master' honey locust	GNR	SNA					x	x
*	*Lotus corniculatus*	bird's-foot trefoil	GNR	SNA					x	x
*	*Medicago lupulina*	black medick	GNR	SNA					x	x
*	*Medicago sativa ssp. sativa*	alfalfa	GNRTNR	SNA					x	x
*	*Melilotus alba*	white sweet-clover	G5	SNA					x	x

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*	*Robinia pseudo-acacia*	black locust	G5	SNA					x	x
*	*Trifolium pratense*	red clover	GNR	SNA					x	x
*	*Vicia cracca*	tufted vetch	GNR	SNA					x	x
	ELAEAGNACEAE	**OLEASTER FAMILY**							x	x
*	*Elaeagnus angustifolia*	Russian olive	GNR	SNA					x	x
	LYTHRACEAE	**LOOSESTRIFE FAMILY**							x	x
*	*Lythrum salicaria*	purple loosestrife	G5	SNA					x	x
	THYMELAEACEAE	**MEZEREUM FAMILY**							x	x
	Dirca palustris	leatherwood	G4	S4					x	
	ONAGRACEAE	**EVENING-PRIMROSE FAMILY**							x	x
	Circaea lutetiana ssp. canadensis	yellowish enchanter's nightshade	G5	S5					x	x
*	*Epilobium hirsutum*	great hairy willow-herb	GNR	SNA					x	x
*	*Epilobium parviflorum*	sparse-flowered willow-herb	GNR	SNA					x	
	Ludwigia palustris	marsh purslane	G5	S5					x	
	Oenothera fruticosa ssp. glauca	common sundrops	G5T5	SX					x	
	CORNACEAE	**DOGWOOD FAMILY**							x	x
	Cornus alternifolia	alternate-leaved dogwood	G5	S5					x	x
	Cornus amomum	silky dogwood	G5	S5					x	
	Cornus racemosa	red panicled dogwood	G5	S5					x	x
	Cornus rugosa	round-leaved dogwood	G5	S5					x	x
	Cornus sericea ssp. sericea	red-osier dogwood	G5	S5					x	x
	CELASTRACEAE	**STAFF-TREE FAMILY**							x	x
	Celastrus scandens	climbing bittersweet	G5	S5					x	
	Euonymus obovata	running strawberry-bush	G5	S4					x	x
	Euonymus sp.	euonymus	GNR	SNA					x	x
	AQUIFOLIACEAE	**HOLLY FAMILY**							x	x
	Ilex verticillata	winterberry	G5	S5					x	
	EUPHORBIACEAE	**SPURGE FAMILY**							x	x
	Acalypha rhomboidea	three-seeded mercury	G5	S5					x	
	RHAMNACEAE	**BUCKTHORN FAMILY**							x	x
*	*Frangula alnus*	glossy buckthorn	GNR	SNA					x	
	Rhamnus alnifolia	alder-leaved buckthorn	G5	S5					x	
*	*Rhamnus cathartica*	common buckthorn	GNR	SNA					x	x
	VITACEAE	**GRAPE FAMILY**							x	x
	Parthenocissus vitacea	inserted Virginia-creeper	G5	S5					x	x
	Vitis riparia	riverbank grape	G5	S5					x	
	ACERACEAE	**MAPLE FAMILY**							x	x
*	*Acer ginnala*	amur maple	GNR	SNA					x	x
	Acer negundo	Manitoba maple	G5	S5					x	x
*	*Acer palmatum*	Japanese maple	GNR	SNA					x	x
*	*Acer platanoides*	Norway maple	GNR	SNA					x	x
	Acer rubrum	red maple	G5	S5					x	x
	Acer saccharinum	silver maple	G5	S5					x	x
	Acer saccharum var. saccharum	sugar maple	G5	S5					x	x
	Acer X freemanii	freeman's maple	GNA	SNA					x	x
	ANACARDIACEAE	**SUMAC FAMILY**							x	x
*	*Cotinus coggygria*	smoke-tree	GNR	SNA					x	x
	Rhus hirta	staghorn sumac	G5	S5					x	
	Toxicodendron rydbergii	western poison-ivy	G5	S5					x	x
	OXALIDACEAE	**WOOD SORREL FAMILY**							x	x
	Oxalis stricta	upright yellow wood-sorrel	G5	SNA					x	x
	GERANIACEAE	**GERANIUM FAMILY**							x	x
*	*Geranium robertianum*	herb-robert	G5	S5					x	x
	BALSAMINACEAE	**TOUCH-ME-NOT FAMILY**							x	x
	Impatiens capensis	spotted touch-me-not	G5	S5					x	x
	ARALIACEAE	**GINSENG FAMILY**							x	x
	Aralia nudicaulis	wild sarsaparilla	G5	S5					x	x
	APIACEAE	**PARSLEY FAMILY**							x	x

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	Cicuta maculata	spotted water-hemlock	G5	S5					x	
	Cryptotaenia canadensis	honewort	G5	S5					x	
*	*Daucus carota*	wild carrot	GNR	SNA					x	x
	Hydrocotyle americana	American marsh-pennywort	G5	S4S5					x	
	Sanicula marilandica	black snakeroot	G5	S5					x	
	Sium suave	hemlock water-parsnip	G5	S5					x	
	GENTIANACEAE	**GENTIAN FAMILY**							x	x
	Gentianopsis crinita	fringed gentian	G5	S5			x	x	x	
	APOCYNACEAE	**DOGBANE FAMILY**							x	x
	Apocynum androsaemifolium ssp. androsaemifolium	spreading dogbane	G5T5	S5					x	
*	*Vinca minor*	periwinkle	GNR	SNA					x	x
	ASCLEPIADACEAE	**MILKWEED FAMILY**							x	x
	Asclepias exaltata	poke milkweed	G5	S4					x	
	Asclepias incarnata ssp. incarnata	swamp milkweed	G5T5	S5					x	x
	Asclepias syriaca	common milkweed	G5	S5					x	x
	SOLANACEAE	**POTATO FAMILY**							x	x
	Physalis heterophylla	clammy ground-cherry	G5	S4					x	
*	*Solanum dulcamara*	bitter nightshade	GNR	SNA					x	x
	CONVOLVULACEAE	**MORNING-GLORY FAMILY**							x	x
	Cuscuta gronovii	Gronovius' dodder	G5	S5					x	
	POLEMONIACEAE	**PHLOX FAMILY**							x	x
	Phlox divaricata	wild blue phlox	G5	S4					x	
	HYDROPHYLLACEAE	**WATER-LEAF FAMILY**							x	x
	Hydrophyllum canadense	broad-leaved water-leaf	G5	S4					x	x
	Hydrophyllum virginianum	Virginia water-leaf	G5	S5					x	x
	BORAGINACEAE	**BORAGE FAMILY**							x	x
*	*Echium vulgare*	blueweed	GNR	SNA					x	x
	Myosotis laxa	smaller forget-me-not	G5	S5					x	
	VERBENACEAE	**VERVAIN FAMILY**							x	x
	Verbena hastata	blue vervain	G5	S5					x	
	Verbena urticifolia	white vervain	G5	S5					x	x
	LAMIACEAE	**MINT FAMILY**							x	x
	Clinopodium vulgare	wild basil	G5	S5					x	x
	Collinsonia canadensis	stoneroot	G5	S4			x	x	x	x
*	*Glechoma hederacea*	creeping Charlie	GNR	SNA					x	x
*	*Leonurus cardiaca ssp. cardiaca*	common motherwort	GNRTNR	SNA					x	x
	Lycopus americanus	cut-leaved water-horehound	G5	S5					x	
	Lycopus uniflorus	northern water-horehound	G5	S5					x	
	Mentha arvensis	American wild mint	G5	S5					x	
	Monarda fistulosa	wild bergamot	G5	S5					x	
*	*Nepeta cataria*	catnip	GNR	SNA					x	x
*	*Prunella vulgaris ssp. vulgaris*	common heal-all	GNR	SNA					x	x
	Scutellaria lateriflora	mad-dog skullcap	G5	S5					x	
	PLANTAGINACEAE	**PLANTAIN FAMILY**							x	x
*	*Plantago lanceolata*	ribgrass	G5	SNA					x	x
*	*Plantago major*	common plantain	G5	SNA					x	x
	OLEACEAE	**OLIVE FAMILY**							x	x
	Fraxinus americana	white ash	G5	S5					x	x
*	*Fraxinus excelsior*	European ash	GNR	SNA					x	x
	Fraxinus nigra	black ash	G5	S4	END	THR			x	
	Fraxinus pennsylvanica	red ash	G4	S4					x	x
*	*Ligustrum vulgare*	common privet	GNR	SNA					x	x
*	*Syringa vulgaris*	common lilac	GNR	SNA					x	x
	SCROPHULARIACEAE	**FIGWORT FAMILY**							x	x
	Chelone glabra	turtlehead	G5	S5					x	
*	*Linaria vulgaris*	butter-and-eggs	GNR	SNA					x	x
	Pedicularis canadensis	Canada wood-betony	G5	S5					x	

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*	*Verbascum thapsus*	common mullein	GNR	SNA					x	x
*	*Veronica officinalis*	common speedwell	G5	SNA					x	x
	BIGNONIACEAE	**TRUMPET-CREEPER FAMILY**							x	x
*	*Catalpa speciosa*	northern catalpa	G4?	SNA					x	
	CAMPANULACEAE	**BLUEBELL FAMILY**							x	x
	Lobelia inflata	Indian tobacco	G5	S5					x	
	RUBIACEAE	**MADDER FAMILY**							x	x
	Galium asprellum	rough bedstraw	G5	S5					x	x
	Galium circaezans	white wild licorice	G5	S5			x	x	x	
*	*Galium mollugo*	white bedstraw	GNR	SNA					x	
	Galium palustre	marsh bedstraw	G5	S5					x	
	Galium trifidum ssp. trifidum	small bedstraw	G5T5	S5					x	
*	*Galium verum*	yellow bedstraw	GNR	SNA					x	
	CAPRIFOLIACEAE	**HONEYSUCKLE FAMILY**							x	x
	Diervilla lonicera	bush honeysuckle	G5	S5					x	
	Linnaea borealis ssp. longiflora	twinflower	G5T5	S5					x	
*	*Lonicera dioica*	douglas honeysuckle	G5	S5					x	
*	*Lonicera tatarica*	tartarian honeysuckle	GNR	SNA					x	x
	Sambucus nigra ssp. canadensis	common elderberry	G5T5	S5					x	x
	Sambucus racemosa var. racemosa	red-berried elderberry	G5	S5					x	x
	Triosteum aurantiacum	wild coffee	G5	S5S4					x	
*	*Viburnum opulus*	guelder rose	G5	S5					x	x
	VALERIANACEAE	**VALERIAN FAMILY**							x	x
*	*Valeriana officinalis*	common valerian	GNR	SNA					x	
	DIPSACACEAE	**TEASEL FAMILY**							x	x
*	*Dipsacus fullonum ssp. sylvestris*	wild teasel	GNR	SNA					x	x
	ASTERACEAE	**ASTER FAMILY**							x	x
*	*Achillea millefolium var. millefolium*	common yarrow	G5	SNA					x	
	Ageratina altissima var. altissima	white snakeroot	G5T5	S5					x	x
	Ambrosia artemisiifolia	common ragweed	G5	S5					x	x
	Ambrosia trifida	giant ragweed	G5	S5					x	x
	Anaphalis margaritacea	pearly everlasting	G5	S5					x	x
	Antennaria neglecta	field pussytoes	G5	S5					x	
*	*Arctium minus*	common burdock	GNR	SNA					x	x
*	*Artemisia biennis*	biennial wormwood	G5	SNA					x	x
	Aster ericoides var. ericoides	white heath aster	G5T5	S5					x	x
	Aster laevis var. laevis	smooth blue aster	G5	S5					x	x
	Aster lanceolatus ssp. lanceolatus	tall white aster	G5T5	S5					x	x
	Aster lateriflorus var. lateriflorus	calico aster	G5T5	S5					x	x
	Aster pilosus var. pilosus	hairy aster	G5T5	S5					x	x
	Bidens cernua	stick-tight	G5	S5					x	x
	Bidens frondosa	devil's beggar-ticks	G5	S5					x	x
	Bidens tripartita	European beggar-ticks	G5	S5				x	x	
	Bidens vulgata	tall beggar-ticks	G5	S5				x	x	
*	*Centaurea jacea*	brown knapweed	GNR	SNA					x	
*	*Centaurea macrocephala*	bighead knapweed	GNR	SNA					x	
*	*Centaurea paniculata*	panicled knapweed	GNR	SNA					x	
*	*Cichorium intybus*	chicory	GNR	SNA					x	x
*	*Cirsium arvense*	Canada thistle	G5	SNA					x	x
*	*Cirsium vulgare*	bull thistle	GNR	SNA					x	x
	Conyza canadensis	horseweed	G5	S5					x	x
	Coreopsis lanceolata	lance-leaved tickseed	G5	S4					x	
	Erigeron annuus	daisy fleabane	G5	S5					x	x
	Erigeron philadelphicus var. philadelphicus	Philadelphia fleabane	G5T5	S5					x	x
	Erigeron strigosus	daisy fleabane	G5	S5					x	x
	Eupatorium maculatum var. maculatum	spotted joe-pye-weed	G5T5	S5					x	x
	Eupatorium perfoliatum	perfoliate thoroughwort	G5	S5					x	x
	Eupatorium purpureum var. purpureum	purple joe-pye-weed	G5T5	S4			x	x	x	
	Eurybia macrophylla	large-leaved aster	G5	S5					x	x

Introduced	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Local Status Waterloo 2006	Local Status Waterloo 2020	Previous Field Surveys	Field Visit 2021
	Euthamia graminifolia	flat-topped bushy goldenrod	G5	S5					x	x
*	*Hieracium aurantiacum*	devil's paintbrush	G?	SE5					x	
*	*Hieracium caespitosum*	field hawkweed	GNR	SNA					x	x
*	*Hieracium piloselloides*	glaucous king devil	GNR	SNA					x	
*	*Leucanthemum vulgare*	ox-eye daisy	GNR	SNA					x	x
	Prenanthes alba	white rattlesnake-root	G5	S5					x	
	Prenanthes altissima	tall white rattlesnake-root	G5	S5					x	
	Rudbeckia hirta	black-eyed Susan	G5	S5					x	
*	*Rudbeckia triloba*	brown-eyed coneflower	G4	SNA					x	
	Solidago caesia	blue-stem goldenrod	G5	S5					x	
	Solidago canadensis	canada goldenrod	G5	S5					x	x
	Solidago canadensis var. scabra	tall goldenrod	G5	S5					x	x
	Solidago flexicaulis	zig-zag goldenrod	G5	S5					x	x
	Solidago gigantea	giant goldenrod	G5	S5					x	
	Solidago juncea	early goldenrod	G5	S5					x	
	Solidago nemoralis var. nemoralis	gray goldenrod	G5T5	S5					x	
	Solidago patula	rough-leaved goldenrod	G5	S4					x	
	Solidago rugosa ssp. rugosa	rough goldenrod	G5T5	S5					x	
*	*Sonchus arvensis ssp. arvensis*	field sow-thistle	GNRTNR	SNA					x	x
	Symphyotrichum cordifolium	heart-leaved aster	G5	S5					x	x
	Symphyotrichum novae-angliae	New England aster	G5	S5					x	x
	Symphyotrichum puniceum var. puniceum	shining aster	G5T5	S5					x	x
	Symphyotrichum urophyllum	arrow-leaved aster	G4G5	S4					x	x
*	*Tanacetum vulgare*	common tansy	GNR	SNA					x	x
*	*Taraxacum officinale*	common dandelion	G5	SNA					x	x
*	*Tragopogon dubius*	doubtful goat's-beard	GNR	SNA					x	x
*	*Tussilago farfara*	coltsfoot	GNR	SNA					x	x
	ALISMATACEAE	**WATER-PLANTAIN FAMILY**							x	x
	Alisma plantago-aquatica	common water-plantain	G5	S5					x	x
	Sagittaria latifolia	broad-leaved arrowhead	G5	S5					x	
	ARACEAE	**ARUM FAMILY**							x	x
	Arisaema triphyllum ssp. triphyllum	small jack-in-the-pulpit	G5T5	S5					x	x
	LEMNACEAE	**DUCKWEED FAMILY**							x	x
	Lemna minor	lesser duckweed	G5	S5					x	
	JUNCACEAE	**RUSH FAMILY**							x	x
	Juncus arcticulatus	jointed rush	G5	S5					x	
	Juncus bufonius	toad rush	G5	S5					x	
	Juncus dudleyi	Dudley's rush	G5	S5					x	
	Juncus effusus ssp. solutus	soft rush	G5T5	S5					x	
	Juncus nodosus	knotted rush	G5	S5					x	
	Juncus tenuis	path rush	GNR	S5					x	x
	Luzula acuminata	hairy woodrush	G5	S5					x	
	Luzula multiflora ssp. frigida	many-flowered woodrush	G5T5	S4S5					x	x
	CYPERACEAE	**SEDGE FAMILY**							x	x
	Carex albursina	white bear sedge	G5	S5					x	
	Carex arctata	drooping wood sedge	G5	S5					x	
	Carex bebbii	Bebb's sedge	G5	S5					x	x
	Carex blanda	woodland sedge	G5	S5					x	x
	Carex bromoides	bromelike sedge	G5	S5					x	x
	Carex cephaloidea	thin-leaved sedge	G5	S4				x	x	x
	Carex communis	fibrous rooted sedge	G5	S5					x	
	Carex comosa	bristly sedge	G5	S5					x	
	Carex deweyana	Dewey's sedge	G5	S5					x	
	Carex flava	yellow sedge	G5	S5					x	x
	Carex gracillima	graceful sedge	G5	S5					x	
	Carex granularis	meadow sedge	G5	S5					x	
	Carex hitchcockiana	Hitchcock's sedge	G5	S4S5					x	

Introduced	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Local Status Waterloo 2006	Local Status Waterloo 2020	Previous Field Surveys	Field Visit 2021
	Carex hystericina	porcupine sedge	G5	S5					x	
	Carex interior	inland sedge	G5	S5					x	
	Carex jamesii	James' sedge	G5	S4			x	x	x	
	Carex laxiflora	loose-flowered sedge	G5	S5					x	
	Carex leptalea ssp. leptalea	bristle-stalked sedge	G5T?	S5			x	x	x	
	Carex pedunculata	long-stalked sedge	G5	S5					x	x
	Carex pellita	woolly sedge	G5	S5				x	x	
	Carex pensylvanica	Pennsylvania sedge	G5	S5					x	x
	Carex plantaginea	plantain-leaved sedge	G5	S5					x	x
	Carex radiata	radiate sedge	G5	S5					x	x
	Carex retrorsa	retrorse sedge	G5	S5					x	
	Carex rosea	stellate sedge	G5	S5					x	x
	Carex sparganioides	burreed sedge	G5	S4S5			x	x	x	
	Carex stipata	awl-fruited sedge	G5	S5					x	x
	Carex stricta	tussock sedge	G5	S5					x	
	Carex tonsa var. rugosperma	red-seeded sedge	G5T5	S5					x	
	Carex vulpinoidea	fox sedge	G5	S5					x	x
	Carex woodii	wood's sedge	G4	S4			x	x	x	
	Schoenoplectus tabernaemontani	American great bulrush	G5	S5					x	
	Scirpus atrovirens	dark-green bulrush	G5	S5					x	x
	Scirpus cyperinus	wool-grass	G5	S5					x	
	POACEAE	**GRASS FAMILY**							x	x
*	*Agrostis gigantea*	red-top	G4G5	SNA					x	
*	*Agrostis stolonifera*	redtop	G5	SNA					x	
	Bromus ciliatus	fringed brome	G5	S5					x	x
*	*Bromus inermis ssp. inermis*	awnless brome	G5T5	SNA					x	x
*	*Dactylis glomerata*	orchard grass	GNR	SNA					x	x
	Danthonia spicata	poverty oat grass	G5	S5					x	
	Dichanthelium acuminatum var. acuminatum	acuminate panic grass	G5T5	S5					x	
*	*Echinochloa crusgalli*	common barnyard grass	GNR	SNA					x	x
	Elymus hystrix	bottle-brush grass	G5	S5					x	x
*	*Elymus repens*	quack grass	GNR	SNA					x	x
	Elymus virginicus var. virginicus	Virginia wild rye	G5T5	S5					x	
	Festuca rubra ssp. rubra	red fescue	G5T5	SNA					x	
	Festuca subverticillata	nodding fescue	G5	S4					x	
	Glyceria grandis	tall manna grass	G5	S5					x	
	Glyceria striata	fowl manna grass	G5	S5					x	
	Leersia oryzoides	rice cut grass	G5	S5					x	
*	*Lolium pratense*	meadow fescue	G5	SNA					x	
*	*Miscanthus sacchariflorus*	amur silver grass	GNR	SNA					x	x
	Oryzopsis asperifolia	white-grained mountain-rice	G5	S5					x	
	Panicum capillare	witch grass	G5	S5					x	x
	Phalaris arundinacea	reed canary grass	G5	S5					x	x
*	*Phleum pratense*	timothy	GNR	SNA					x	x
	Phragmites australis	common reed	G5	S5					x	x
	Poa compressa	Canada blue grass	GNR	SNA					x	x
	Poa pratensis ssp. pratensis	Kentucky bluegrass	G5T5	SNA					x	x
	Schizachne purpurascens ssp. purpurascens	false melic grass	G5T5	S5					x	
	Setaria sp.	foxtail	GNR	SNA					x	x
	Sphenopholis intermedia	slender wedge grass	G5	S4S5					x	
	Sporobolus cryptandrus	sand dropseed	G5	S4			x	x	x	
	Sporobolus neglectus	overlooked dropseed	G5	S4					x	
	TYPHACEAE	**CATTAIL FAMILY**							x	x
	Typha angustifolia	narrow-leaved cattail	G5	SNA					x	x
	Typha latifolia	broad-leaved cattail	G5	S5					x	x
	LILIACEAE	**LILY FAMILY**							x	x
	Allium tricoccum	wild leek	G5	S4					x	
*	*Asparagus officinalis*	garden asparagus	G5	SNA					x	
*	*Convallaria majalis*	lily-of-the-valley	G5	SNA					x	x

Introduced	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Local Status Waterloo 2006	Local Status Waterloo 2020	Previous Field Surveys	Field Visit 2021
	Erythronium americanum ssp. americanum	yellow dog's-tooth violet	G5T5	S5					x	x
*	*Hemerocallis fulva*	orange day-lily	GNR	SNA					x	x
	Hosta plantaginea	hosta	GNR	SNA					x	x
	Lilium michiganense	Michigan lily	G5	S4					x	
	Maianthemum canadense	wild lily-of-the-valley	G5	S5					x	x
	Maianthemum racemosum ssp. racemosum	false Solomon's seal	G5T5	S5					x	x
	Maianthemum stellatum	star-flowered Solomon's seal	G5	S5					x	x
	Polygonatum pubescens	hairy Solomon's seal	G5	S5					x	
	Streptopus lanceolatus var. roseus	rose twisted-stalk	G5	S5					x	
	Trillium erectum	purple trillium	G5	S5					x	
	Trillium grandiflorum	white trillium	G5	S5					x	
	Uvularia grandiflora	large-flowered bellwort	G5	S5					x	
	Iris versicolor	multi-coloured blue-flag	G5	S5					x	
	SMILACACEAE	**CATBRIER FAMILY**							x	
	Smilax herbacea	herbaceous carrion flower	G5	S4?					x	
	ORCHIDACEAE	**ORCHID FAMILY**							x	
*	*Epipactis helleborine*	common helleborine	GNR	SNA					x	x
	Liparis loeselii	fen twayblade	G5	S4S5					x	

Appendix C Running Wildlife List

Species Name/Taxa			Earlier Studies						Current Study		Status							Area Sensitive	
Taxa	Species Common Name	Scientific Name	Ecologistics 1979	LGL 2004	LGL 2007-2008	LGL 2013	WSP 2015/2018	LGL 2019-2020	LGL 2021	Breeding Status (Birds)	SARA	ESA	FWCA	MBCA	Provincial Status (S-Rank)	ROW Status (1996)	ROW Status (draft 2022)	SWH-TG AS Species	SWH-TG Area Sensitive Species
Amphibian	American Bullfrog	*Lithobates catesbeianus*	X					X					G		S4			x	Stable water levels
Amphibian	American Toad	*Anaxyrus americanus*	X	X	X			X							S5				
Amphibian	Blue-spotted Salamander	*Ambystoma laterale*						X					P		S4				
Amphibian	Eastern (Red-spotted) Newt	*Notophthalmus viridescens*	X	X	X										S5				
Amphibian	Eastern Red-backed Salamander	*Plethodon cinereus*	X	X									P		S5				
Amphibian	Gray Treefrog	*Hyla versicolor*	X	X		X		X					P		S5				
Amphibian	Green Frog	*Lithobates clamitans*	X		X	X		X	X						S5				
Amphibian	Jefferson Salamander	*Ambystoma jeffersonianum*			X						THR	END	P		S2				
Amphibian	Jefferson Salamander x Blue-spotted Salamander, Jefferson genome dominates	*Ambystoma hybrid pop. 1*	X		X										S2				
Amphibian	Northern Leopard Frog	*Lithobates pipiens*	X	X	X	X		X							S5				
Amphibian	Spotted Salamander	*Ambystoma maculatum*	X	X	X								P		S4				
Amphibian	Spring Peeper	*Pseudacris crucifer*		X				X							S5				
Amphibian	Wood Frog	*Lithobates sylvatica*	X	X	X			X							S5				
Bird	American Crow	*Corvus brachyhrynchos*	X	X		X	X	X	X	Possible (H)					S5				
Bird	American Goldfinch	*Spinus tristis*	X	X		X	X	X	X	Probable (P)				x	S5				
Bird	American Kestrel	*Falco sparverius*		X			X						P		S4		RS		
Bird	American Redstart	*Setophaga ruticilla*	X			X	X	X						x	S5B	RS		x	>100 ha forest
Bird	American Robin	*Turdus migratorius*	X	X		X	X	X	X	Probable (P)				x	S5				
Bird	American Tree Sparrow	*Spizelloides arborea*		X										x	S5				
Bird	American Woodcock	*Scolopax minor*	X	X	X		X								S4B				
Bird	Baltimore Oriole	*Icterus galbula*	X	X		X	X	X	X	Probable (T)				x	S4B				
Bird	Bank Swallow	*Riparia riparia*						X			THR	THR		x	S4B		RS		
Bird	Barn Swallow	*Hirundo rustica*	X			X	X	X	X	Possible (H)	THR	THR		x	S4B		RS		
Bird	Belted Kingfisher	*Megaceryle alcyon*	X	X				X	X	Possible (H)			P		S5B,S4N	RS			
Bird	Black-and-white Warbler	*Mniotilta varia*		X				X						x	S5B	RS		x	>100 ha continuous forest
Bird	Black-billed Cuckoo	*Coccyzus erythropthalmus*	X	X			X	X						x	S4S5B	RS			
Bird	Black-capped Chickadee	*Poecile atricapillus*	X	X		X	X	X	X	Probable (T)				x	S5				
Bird	Blackpoll Warbler	*Setophaga striata*		X										x	S5B				
Bird	Black-throated Blue Warbler	*Setophaga caerulescens*		X										x	S5B		RS	x	>100 ha of dense
Bird	Black-throated Green Warbler	*Setophaga virens*		X										x	S5B	RS		x	30 ha variable
Bird	Blue Jay	*Cyanocitta cristata*	X	X		X	X	X	X	Probable (T)			P		S5				
Bird	Blue-gray Gnatcatcher	*Polioptila caerulea*		X			X							x	S4B	RS		x	30 ha forest
Bird	Blue-winged Teal	*Anas discors*	X											x	S3B,S4M		RS		
Bird	Bobolink	*Dolichonyx oryzivorus*	X								THR	THR		x	S4B		RS	x	>50 ha dense
Bird	Brown Creeper	*Certhia americana*	X	X		X								x	S5	RS		x	30 ha mature
Bird	Brown Thrasher	*Toxostoma rufum*	X	X		X		X						x	S4B	RS			
Bird	Brown-headed Cowbird	*Molothrus ater*	X	X		X		X							S5				
Bird	Canada Goose	*Branta canadensis*		X		X		X	X	Confirmed (FY)				x	S5				
Bird	Cedar Waxwing	*Bombycilla cedrorum*	X	X		X	X	X						x	S5				
Bird	Chestnut-sided Warbler	*Setophaga pensylvanica*		X										x	S5B	RS			
Bird	Chimney Swift	*Chaetura pelagica*	X	X		X	X	X			THR	THR		x	S3B		RS		
Bird	Chipping Sparrow	*Spizella passerina*	X	X		X	X	X	X	Possible (S)				x	S5B,S3N				
Bird	Clay-colored Sparrow	*Spizella pallida*					X							x	S4B	RS	RS		
Bird	Cliff Swallow	*Petrochelidon pyrrhonota*		X				X						x	S4S5B		RS		
Bird	Common Grackle	*Quiscalus quiscula*	X	X		X	X	X	X	Possible (H)					S5				
Bird	Common Merganser	*Mergus merganser*							X	Possible (H)				x	S5	RS	RS	x	clear water,
Bird	Common Yellowthroat	*Geothlypis trichas*	X	X		X	X	X	X	Probable (T)				x	S5B,S3N				
Bird	Cooper's Hawk	*Accipiter cooperii*		X				X					P		S4	RS		x	dense Carolinian forest habitat >50
Bird	Dark-eyed Junco	*Junco hyemalis*		X										x	S5				
Bird	Double-crested Cormorant	*Phalacrocorax auritus*						X							S5B,S4N				
Bird	Downy Woodpecker	*Picoides pubescens*	X	X		X	X	X	X	Confirmed (FY)				x	S5				
Bird	Eastern Bluebird	*Sialia sialis*		X		X								x	S5B,S4N	RS			
Bird	Eastern Kingbird	*Tyrannus tyrannus*	X	X		X	X	X	X	Possible (H)				x	S4B				
Bird	Eastern Meadowlark	*Sturnella magna*	X	X							THR	THR		x	S4B,S3N		RS	x	open grasslands
Bird	Eastern Phoebe	*Sayornis phoebe*					X	X						x	S5B				
Bird	Eastern Screech-Owl	*Megascops asio*			X								P		S4				
Bird	Eastern Towhee	*Pipilo erythrophthalmus*	X											x	S4B,S3N				
Bird	Eastern Wood-Pewee	*Contopus virens*	X	X		X		X	X	Possible (S)	SC	SC		x	S4B		RS		
Bird	European Starling	*Sturnus vulgaris*	X	X		X	X	X	X	Possible (H)					SNA				
Bird	Field Sparrow	*Spizella pusilla*	X	X		X	X	X	X	Possible (S)				x	S4B,S3N		RS		
Bird	Gray Catbird	*Dumetella carolinensis*	X	X		X	X	X	X	Probable (P)				x	S5B,S3N				
Bird	Great Blue Heron	*Ardea herodias*	X	X		X	X	X						x	S4	RS	RS		
Bird	Great Crested Flycatcher	*Myiarchus crinitus*	X	X		X	X	X	X	Possible (H)				x	S5B				
Bird	Great Horned Owl	*Bubo virginianus*	X	X									P		S4				
Bird	Green Heron	*Butorides virescens*	X	X										x	S4B	RS	RS		

Species Name/Taxa			Earlier Studies						Current Study		Status							Area Sensitive	
Taxa	Species Common Name	Scientific Name	Ecologistics 1979	LGL 2004	LGL 2007-2008	LGL 2013	WSP 2015/2018	LGL 2019-2020	LGL 2021	Breeding Status (Birds)	SARA	ESA	FWCA	MBCA	Provincial Status (S-Rank)	ROW Status (1996)	ROW Status (draft 2022)	SWH-TG AS Species	SWH-TG Area Sensitive Species
Bird	Hairy Woodpecker	*Picoides villosus*		X		X			X	Possible (S)				x	S5			x	forests with tall
Bird	Horned Lark	*Eremophila alpestris*				X	X	X						x	S4				
Bird	House Finch	*Haemorhous mexicanus*		X			X	X						x	SNA				
Bird	House Sparrow	*Passer domesticus*	X	X		X	X	X	X	Possible (H)					SNA				
Bird	House Wren	*Troglodytes aedon*		X		X	X	X	X	Probable (T)				x	S5B				
Bird	Indigo Bunting	*Passerina cyanea*	X	X		X	X	X	X	Possible (S)				x	S5B				
Bird	Killdeer	*Charadrius vociferus*	X	X		X	X	X	X	Confirmed (NE)				x	S4B				
Bird	Least Flycatcher	*Empidonax minimus*		X		X	X	X						x	S5B	RS	RS	x	open habitat >100
Bird	Magnolia Warbler	*Setophaga magnolia*	X	X										x	S5B	RS	RS	x	30 ha forest with dense shrubs
Bird	Mallard	*Anas platyrhynchos*	X	X		X	X	X	X	Confirmed (FY)				x	S5				
Bird	Mourning Dove	*Zenaida macroura*	X	X		X	X	X	X	Possible (H)				x	S5				
Bird	Mourning Warbler	*Geothlypis philadelphia*		X			X							x	S5B	RS			
Bird	Nashville Warbler	*Oreothlypis ruficapilla*		X				X						x	S5B	RS			
Bird	Northern Cardinal	*Cardinalis cardinalis*	X	X		X	X	X	X	Probable (T)				x	S5				
Bird	Northern Flicker	*Colaptes auratus*				X	X	X	X	Possible (S)				x	S5				
Bird	Northern Goshawk	*Accipiter gentilis*		X									P		S4	RS	RS	x	extensive forests >100 ha
Bird	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	X			X	X	X	X	Probable (T)				x	S4B				
Bird	Northern Waterthrush	*Parkesia noveboracensis*		X										x	S5B	RS			
Bird	Orchard Oriole	*Icterus spurius*					X							x	S4B	RS	RS		
Bird	Osprey	*Pandion haliaetus*					X	X					P		S5B	RS			
Bird	Ovenbird	*Seiurus aurocapilla*		X										x	S5B	RS		x	>70 ha continuous
Bird	Philadelphia Vireo	*Vireo philadelphicus*		X										x	S5B				
Bird	Pied-billed Grebe	*Podilymbus podiceps*							X	Possible (H)				x	S4B,S2N	RS	RS		
Bird	Pileated Woodpecker	*Dryocopus pileatus*	X	X	X									x	S5			x	40-260 ha mature decid/mixed forest w/large diameter
Bird	Pine Warbler	*Setophaga pinus*		X				X						x	S5B,S3N	RS		x	15-30 ha white pine forest
Bird	Red-bellied Woodpecker	*Melanerpes carolinus*						X						x	S5	RS			
Bird	Red-breasted Nuthatch	*Sitta canadensis*						X						x	S5	RS		x	X (10ha interior
Bird	Red-eyed Vireo	*Vireo olivaceus*	X	X		X	X	X	X	Probable (T)				x	S5B				
Bird	Red-tailed Hawk	*Buteo jamaicensis*	X	X	X	X	X	X	X	Probable (T)			P		S5				
Bird	Red-winged Blackbird	*Agelaius phoeniceus*	X	X		X	X	X	X	Probable (T)					S5				
Bird	Ring-billed Gull	*Larus delawarensis*		X		X	X	X	X	Observed (X)				x	S5				
Bird	Rock Pigeon	*Columba livia*		X				X							SNA				
Bird	Rose-breasted Grosbeak	*Pheucticus ludovicianus*	X	X			X	X						x	S5B				
Bird	Ruby-crowned Kinglet	*Regulus calendula*		X										x	S5B,S3N	RS	RS		
Bird	Ruffed Grouse	*Bonasa umbellus*	X										G		S5		RS		
Bird	Savannah Sparrow	*Passerculus sandwichensis*	X	X			X	X						x	S5B,S3N			x	>50 ha grassland
Bird	Scarlet Tanager	*Piranga olivacea*		X										x	S5B	RS		x	20 ha mature
Bird	Short-eared Owl	*Asio flammeus*		X							THR	SC	P		S4?B,S2S3N	RS	RS	x	Loss of wetlands, 75-100 ha open
Bird	Song Sparrow	*Melospiza melodia*	X	X		X	X	X	X	Probable (T)				x	S5				
Bird	Sora	*Porzana carolina*		X										x	S5B	RS			
Bird	Spotted Sandpiper	*Actitis macularius*		X		X	X	X						x	S5B				
Bird	Swainson's Thrush	*Catharus ustulatus*		X										x	S5B	RS			
Bird	Swamp Sparrow	*Melospiza georgiana*		X				X						x	S5B,S4N				
Bird	Tennessee Warbler	*Oreothlypis peregrina*		X										x	S5B				
Bird	Tree Swallow	*Tachycineta bicolor*		X		X	X	X	X	Possible (H)				x	S4S5B				
Bird	Turkey Vulture	*Cathartes aura*				X		X	X	Observed (X)			P		S5B,S3N	RS			
Bird	Veery	*Catharus fuscescens*	X											x	S5B	RS		x	10 ha young forest, habitat
Bird	Virginia Rail	*Rallus limicola*		X										x	S4S5B	RS			
Bird	Warbling Vireo	*Vireo gilvus*	X	X		X	X	X						x	S5B				
Bird	White-breasted Nuthatch	*Sitta carolinensis*	X	X			X	X						x	S5			x	10 ha continuous
Bird	White-crowned Sparrow	*Zonotrichia leucophrys*		X										x	S5B,S3N				
Bird	White-winged Scoter	*Melanitta fusca*		X	X									x	S4B,S5N				
Bird	Wild Turkey	*Meleagris gallopavo*				X	X	X	X	Probable (P)			G		S5				
Bird	Willow Flycatcher	*Empidonax traillii*		X		X	X	X						x	S4B				
Bird	Wilson's Warbler	*Cardellina pusilla*		X		X								x	S5B				
Bird	Wood Duck	*Aix sponsa*	X	X										x	S5B,S3N				
Bird	Wood Thrush	*Hylocichla mustelina*	X					X			THR	SC		x	S4B		RS		
Bird	Yellow Warbler	*Setophaga petechia*	X	X		X	X	X	X	Probable (T)				x	S5B				
Bird	Yellow-bellied Sapsucker	*Sphyrapicus varius*		X										x	S5B,S3N	RS		x	dry, second growth forests
Bird	Yellow-billed Cuckoo	*Coccyzus americanus*		X				X						x	S4B				
Bird	Yellow-rumped Warbler	*Setophaga coronata*		X										x	S5B,S4N	RS			
Bird	Yellow-throated Vireo	*Vireo flavifrons*		X										x	S4B	RS		x	30 ha of open decid forest
Insect	Ebony Jewelwing	*Calopteryx maculata*					X								S5				
Insect	Monarch	*Danaus plexippus*					X	X			SC	SC	P		S2N,S4B				

Species Name/Taxa			Earlier Studies						Current Study		Status							Area Sensitive	
Taxa	Species Common Name	Scientific Name	Ecologistics 1979	LGL 2004	LGL 2007-2008	LGL 2013	WSP 2015/2018	LGL 2019-2020	LGL 2021	Breeding Status (Birds)	SARA	ESA	FWCA	MBCA	Provincial Status (S-Rank)	ROW Status (1996)	ROW Status (draft 2022)	SWH-TG AS Species	SWH-TG Area Sensitive Species
Insect	Mourning Cloak	*Nymphalis antiopa*					X								S5				
Mammal	American Mink	*Mustela vison*						X	X				F		S4				
Mammal	Beaver	*Castor canadensis*		X	X	X							F		S5				
Mammal	Coyote	*Canis latrans*		X		X		X					F		S5				
Mammal	Deer Mouse	*Peromyscus maniculatus*	X					X							S5				
Mammal	Eastern Chipmunk	*Tamias striatus*	X	X		X	X	X	X				P		S5				
Mammal	Eastern Cottontail	*Sylvilagus floridanus*	X	X		X		X	X				G		S5				
Mammal	Eastern Gray Squirrel	*Sciurus carolinensis*	X	X		X		X	X				G		S5				
Mammal	Ermine	*Mustela ermina*						X							S5				
Mammal	European Hare	*Lepus europaeus*	X										G		SNA				
Mammal	Groundhog	*Marmota monax*	X		X	X		X							S5				
Mammal	Least Weasel	*Mustela rixosa (nivalis)*	X (possible)										F		SU				
Mammal	Long-tailed Weasel	*Mustela frenata*	X (possible)										F		S4				
Mammal	Meadow Jumping Mouse	*Zapus hudsonius*	X												S5				
Mammal	Meadow Vole	*Microtus pennsylvanicus*	X	X	X			X							S5				
Mammal	Muskrat	*Ondatra zibethica*		X		X			X				F		S5				
Mammal	Northern Flying Squirrel	*Glaucomys sabrinus*	X (possible)										P		S5			x	51-100 ha continuous forest
Mammal	Northern Raccoon	*Procyon lotor*	X	X		X	X	X					F		S5				
Mammal	Red Fox	*Vulpes vulpes*					X	X					F		S5				
Mammal	Red Squirrel	*Tamiasciurus hudsonicus*		X				X					F		S5				
Mammal	Short-tailed Shrew	*Blarina brevicauda*	X																
Mammal	Striped Skunk	*Mephitis mephitis*	X	X				X					F		S5				
Mammal	White-footed Mouse	*Peromyscus leucopus*	X												S5				
Mammal	White-tailed Deer	*Odocoileus virginianus*	X	X	X	X	X	X	X				G		S5				
Reptile	Dekay's Brown Snake	*Storeria dekayi*		X	X			X							S5				
Reptile	Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	X	X	X	X		X							S5				
Reptile	Five-lined Skink (Gr.Lakes/St.Lawr. pop'n)	*Plestiodon fasciatus*	X (probable ID)								SC	SC	P		S3				
Reptile	Milksnake	*Lampropeltis triangulum*		X							SC		P		S4				
Reptile	Midland Painted Turtle	*Chrysemys picta marginata*		X	X	X	X	X	X				P		S4				
Reptile	Snapping Turtle	*Chelydra serpentina*				X	X	X			SC	SC	G		S4				

Appendix D SWH Screening Summary and Figure Set

Appendix D: Significant Wildlife Habitat Screening Summary Table

The first five columns are taken directly from MNRF (2015) SWH Ecoregion 6E Criteria Schedules. The final two columns provide some discussion of where criteria is met based on the review of background information and field investigations for the study area. Where possible, habitat mapping has been developed to depict the SWH.

Seasonal Concentration Areas of Animals

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Waterfowl **Stopover and Staging Areas** local and migrant waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only one of a few in the eco-district	American Black Duck Wood Duck Green-winged Teal Gadwall Green-winged Teal Blue-winged Teal Hooded Merganser Common Merganser Lesser Scaup Greater Scaup Long-tailed Duck Surf Scoter White-winged Scoter Black Scoter Ring-necked duck Common Goldeneye Bufflehead Redhead Ruddy Duck Red-breasted Merganser Brant Canvasback Ruddy Duck	CUM1 CUT1 - Plus evidence of SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	Fields with sheet water during Spring (mid-March to May). • Fields flooding during spring does qualify. • These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water) • Information Sources • Environment Canada. • Naturalist clubs often are aware of staging/stopover areas. • OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging. • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Ducks Unlimited projects • Element occurrence specification by Nature Serve: http://www.natureserve.org • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”ccxi • Any mixed species aggregations of 100Ⓔ or more individuals required. • The flooded field ecosite habitat plus a 100-300m radius area, dependant on local site conditions and adjacent land use is the significant wildlife habitat • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). • SWHMiSTIndex #7 provides development effects and mitigation measures.	Species (3) and community types are documented in Hidden Valley area. Sheet water and aggregations are not documented in the areas bound by Hidden Valley Road. No evidence of sheet water on fields due to well drained slopes and presumed tile drainage. Potentially suitable habitat available particularly in the Grand River corridor and floodplain.	Not identified

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Shorebird Migratory Stopover Area **<u>Rationale:</u>** High quality shorebird stopover habitat is extremely rare and typically has a long history of use.	Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM2 MAM3 MAM4 MAM5 MAM1	• Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremelyimportant for migratory shorebirds in May to mid-June and early July to October. • Sewage treatment ponds and storm water ponds do not qualify as a SWH. <u>Information Sources</u> • Western hemisphere shorebird reserve network. • Canadian Wildlife Service (CWS) Ontario Shorebird Survey. • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • Natural Heritage Information Center (NHIC) Shorebird Migratory Concentration Area	Studies confirming: • Presence of 3 or more of listed species and > 1000Ⓔ shorebird use days during spring or fall migration period. (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period) Whimbrel stop briefly (<24hrs) during spring migration, any site with >100Ⓔ Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100m radius area [cxlviii] • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #8 provides development effects and mitigation measures.	Limited habitat of exposed shorelines available in the study area, shoreline areas are well vegetated. Wildlife species not documented in study area.	Not confirmed.
Raptor Wintering Area **<u>Rationale:</u>** Sites used by multiple species, a high number of individuals and used annually are most significant **<u>Special Concern:</u>** Short-eared Owl Bald Eagle	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl	<u>Hawks/Owls</u>: Combination of ELC Community Series; need to have present one Community Series from each land class; Forest: FOD, FOM, FOC. Upland: CUM; CUT; CUS; CUW.	• The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. • Raptor wintering sites (hawk/owl) need to be > 20 ha [cxlviii, cxlix] with a combination of forest and upland.xvi, xvii, xviii, xix, xx, xxi. • Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands [cxlix] • Field area of the habitat is to be	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; One or more Bald Eagles or; At least 10 individuals and two of the listed hawk/owl species Ⓔ. • To be significant a site must be used regularly (3 in 5 years) [cxlix] for a minimum of 20 days by the above number of birdsⒺ. • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting areaⒺ	Limited field habitat is available in the study area, with most agricultural fields under row crops such as corn or soy for the past decade. Four species have been documented in the area but only Bald Eagle has been associated with over winter use. Areas along the Grand River corridor have been considered as Bald Eagle wintering habitat in prior years but are no longer mapped as this SWH type (NHIC).	Candidate habitat for Bald Eagle associated with the Grand River corridor, where waterfowl overwintering habitat is identified in LIO data layers. Candidate habitat for hawk/owl >20ha of ecosites combined located in Grand River corridor. Use not confirmed. **Figure SWH 1 Raptor Wintering Area**.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**		
		Bald Eagle: Forest community Series: FOD, FOM, FOC, SWD, SWM or SWC on shoreline areas adjacent to large rivers or adjacent to lakes with open water (hunting area).	wind swept with limited snow depth or accumulation. • Eagle sites have open water, large trees and snags available for roosting [cxlix] Information Sources: • OMNRF Ecologist or Biologist • Field Naturalist Clubs • Natural Heritage Information Center (NHIC) Raptor Winter Concentration Area • Data from Bird Studies Canada • Results of Christmas Bird Counts • Reports and other information available from Conservation Authorities.	• Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #10 and #11 provides development effects and mitigation measures.		
Bat Hibernacula **Rationale:** Bat hibernacula are rare habitats in all Ontario landscapes.	Big Brown Bat Tri-coloured Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)	• Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. • Active mine sites should not be considered as SWH • The locations of bat hibernacula are relatively poorly known. Information Sources • OMNRF for possible locations and contact for local experts • Natural Heritage Information Center (NHIC) Bat Hibernaculum • Ministry of Northern Development and Mines for location of mine shafts. Clubs that explore caves (eg. Sierra Club) • University Biology Departments with bat experts.	• All sites with confirmed hibernating bats are SWH Ⓔ. • The habitat area includes a 200m radius around the entrance of the hibernaculum cxlviii, ccvii, Ⓔ for most development types and 1000m for wind farms [ccv]. • Studies are to be conducted during the peak swarming period (Aug. – Sept.). Surveys should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects"[ccv]. • SWHMiST[cxlix] Index #1 provides development effects and mitigation measures.	• Candidate habitat identified in old farm building foundations that were removed/covered in 2021. • No other candidate habitat identified.	Not identified.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Bat Maternity Colonies **<u>Rationale:</u>** Known locations of forested bat maternity colonies are extremely rare in all Ontario landscapes.	Big Brown Bat Silver-haired Bat	Maternity colonies considered SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD FOM SWD SWM	• Maternity colonies can be found in tree cavities, vegetation and often in buildlings[xxii, xxv, xxvi, xxvii, xxxi] (buildings are not considered to be SWH). • Maternity roosts are not found in caves and mines in Ontario[xxii]. • Maternity colonies located in Mature deciduous or mixed forest stands[ccix, ccx,ccv] with >10/ha large diameter (>25cm dbh) wildlife trees[ccvii] • Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 [ccxiv] or class 1 or 2 [ccxii] . • Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred[ccx,lxiv] <u>Information Sources</u> • OMNRF for possible locations and contact for local experts • University Biology Departments with bat experts.	• Maternity Colonies with confirmed use by; • >10 Big Brown BatsⒺ • >5 Adult Female Silver- haired BatsⒺ • The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity coloniesⒺ. • Evaluation methods for maternity colonies should be conducted following methods outlined in the “Bats and Bat Habitats: Guidelines for Wind Power Projects”[ccv]. • SWHMiST[cxlix] Index #12 provides development effects and mitigation measures.	• Confirmed maternal roosting habitat for SAR bats in Stage 2 River Road Extension Study Area (WSP 2020). WSP did acoustic monitoring work as reported in WSP (2020) for the River Road extension, however this information was not available for this report. • It is confirmed that suitable maternal roosting habitat is available in treed and forested ecosites for non-SAR bats of ecosites FOD, FOM, SWD, SWM. • The criteria excludes coniferous community types – which are present in the study area and should be considered for SAR bat habitat at minimum (but are not mapped for SWH).	Candidate Maternal Roosting Habitat identified in FOD, FOM, SWD, SWM ecosites.Ecosite types of FOC and SWC have also been included which are more in line with current bat habitat guidelines (MECP 2021). **Figure SWH 2 Bat Maternity Roosting**
Turtle Wintering Areas **<u>Rationale:</u>** **Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant.**	Midland Painted Turtle **<u>Special Concern:</u>** Northern Map Turtle Snapping Turtle	Snapping and Midland Painted Turtles; ELC Community Classes; SW, MA, OA and SA, ELC Community Series; FEO and BOO Northern Map Turtle; Open Water areas such as deeper rivers or streams and lakes with current can	• For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen cix, cx, cxi, cxii • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. • <u>Information Sources</u>	• Presence of 5 over-wintering Midland Painted Turtles is significantⒺ. • One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significantⒺ. • The mapped ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH.	• Snapping Turtle and Midland Turtle are confirmed in Hidden Valley study area. • Overwintering habitat assumed to occur within the central wetland; as well as the SWM pond on Wabanaki Drive near West Creek (based on early emergence basking of Midland Painted Turtle). • No basking turtles noted in “Frog Pond’ • Overwintering in the Grand River corridor also possible, but not mapped.	• Confirmed habitat use of central wetland open water areas of Hidden Valley PSW; • Confirmed habitat use of SWM Pond on Wabanaki drive not considered SWH; • Possible (unconfirmed) habitat in the Grand River **Figure SWH 3 Turtle Wintering**

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**		
		also be used as over-wintering habitat.	• EIS studies carried out by Conservation Authorities. • Local field naturalists and experts, as well as university herpetologists may also know where to find some of these sites. • OMNRF Ecologist or Biologist • Field Naturalist clubs • Natural Heritage Information Center (NHIC)	• Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (Sept. – Oct.) or spring (Mar. – May) [cvii]. • Congregation of turtles is more common where wintering areas are limited and therefore significant cix, cx, cxi, cxii. • SWHMiST[cxlix] Index #28 provides development effects and mitigation measures for • turtle wintering habitat.		
Reptile Hibernaculum **Rationale:** Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant	**Snakes:** Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake **Special Concern:** **Milksnake** **Eastern Ribbonsnake** **Lizard:** **Special Concern (Southern Shield population): Five-lined Skink**	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice, Cave, and Alvar sites may be directly related to these habitats. Observations or congregations of snakes on sunny warm days in the spring or fall is a good indicator. For Five-lined Skink, ELC Community Series of FOD and FOM and Ecosites: FOC1 FOC3	• For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The existence of features that go below frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost linexliv, l, li, lii, cxii . • Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. • Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures [cciii]. Information Sources	Studies confirming: • Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. • Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula(eg. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct)Ⓔ • Note: If there are Special Concern Species present, then site is SWH • Note: Sites for hibernation possess specific habitat parameters (e.g. temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population (i.e. strong hibernation site fidelity). Other critical life processes (e.g. mating) often take place in close proximity to hibernacula.	No evidence of snake emergence or hibernacula has been noted in the study area to date. Potential habitat noted in areas of old farmsteads, and potentially some farm properties where sheds and barns persist in the study area. Not mapped. Records for skink are dated and the species has not been documented in the study area since the 1979 background report.	Habitat type not confirmed in study area.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
			• In spring, local residents or landowners may have observed the emergence of snakes on their property (e.g.old dug wells). • Reports and other information available from Conservation Authorities. • Field Naturalists clubs • University herpetologists • Natural Heritage Information Center (NHIC) • OMNRF ecologist or biologist may be aware of locations of • wintering skinkscandidate SWH.	• The feature in which the hibernacula is located plus a 30 m radius area is the SWHⒺ • SWHMiST[cxlix] Index #13 provides development effects and mitigation measures for snake hibernacula. • Presence of any active hibernaculum for skink is significant. • SWHMiST[cxlix] Index #37 provides development effects and mitigation measures for five- lined skink wintering habitat.		
Colonially - Nesting Bird Breeding Habitat (Bank and Cliff) **<u>Rationale:</u>** Historical use and number of nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow population are declining in Ontario.	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles. Cliff faces, bridge abutments, silos, barns. Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	• Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. • Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation. <u>Information Sources</u> • Reports and other information available from Conservation Authorities. • Ontario Breeding Bird Atlas • Bird Studies Canada; *NatureCounts* http://www.birdscanada.org/birdmon/ • Field Naturalist Clubs.	Studies confirming: • Presence of 1 or more nesting sites with 8[cxlix] or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. • A colony identified as SWH will include a 50m radius habitat area from the peripheral nests[ccvii] • Field surveys to observe and count swallow nests are to be completed during the breeding season. Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”[ccxi] • SWHMiST[cxlix] Index #4 provides development effects and mitigation measures	No suitable habitat of this type in the study area. Cliff Swallow and Northern Rough-winged Swallow have been documented in study area in multiple years. Areas associated with the corner of Wabanaki Drive and Hidden Valley Drive in the southwest portion of the study do exhibit some slope erosion but are too low and no evidence of species use.	Habitat not confirmed.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs) **<u>Rationale:</u>** Large colonies are important to local bird population, typically sites are only known colony in area and are used annually.	Great Blue Heron Black-crowned Night- Heron Great Egret Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15 m from ground, near the top of the tree. <u>Information Sources</u> Ontario Breeding Bird Atlas, colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNRF). • Natural Heritage Information Center (NHIC) Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries. • Reports and other information available from CAs. • MNRF District Offices. • Local naturalist clubs.	Studies confirming: • Presence of 5Ⓔ or more active nests of Great Blue Heron or other listed species. • The habitat extends from the edge of the colony and a minimum 300m radius or extent of the Forest Ecosite containing the colony or any island <15.0ha with a colony is the SWH cc, ccvii • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells SWHMiST[cxlix] Index #5 provides development effects and mitigation measures.	Suitable habitat is present in the study area. No conspicuous colonial nests observed. Green Heron last documented in study area in 2004. No nesting evidence confirmed.	Habitat not confirmed.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Colonially - Nesting Bird Breeding Habitat (Ground) **<u>Rationale:</u>** Colonies are important to local bird population, typically sites are only known colony in area and are used annually.	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1;50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1 – 6; MAS1 – 3; CUM CUT CUS	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in low bushes in close proximity to streams and irrigation ditches within farmlands. <u>Information Sources</u> • Ontario Breeding Bird Atlas , rare/colonial species records. • Canadian Wildlife Service • Reports and other information available from CAs. • Natural Heritage Information Center (NHIC) Colonial Waterbird Nesting Area • MNRF District Offices. • Field Naturalist clubs.	Studies confirming: • Presence of > 25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian TernⒺ. • Presence of 5 or more pairs for Brewer's BlackbirdⒺ. • Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significantⒺ. • The edge of the colony and a minimum 150m radius area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0ha with a colony is the SWH [cc, ccvii] • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #6 provides development effects and mitigation measures.	No habitat of this type observed or noted in the study area. Ring-billed Gull is common in study area and present over much of the industrial areas near the study area.	Habitat not confirmed.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Migratory Butterfly Stopover Areas **<u>Rationale:</u>** Butterfly stopover areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.	Painted Lady Red Admiral <u>Special Concern</u> Monarch	Combination of ELC Community Series; need to have present one Community Series from each landclass: <u>Field</u>: CUM CUT CUS <u>Forest</u>: FOC FOD FOM CUP Anecdotally, a candidate site for butterfly stopover will have a history of butterflies being observed.	A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and **will be located within 5 km of Lake Ontario** cxlix. • The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south xxxii, xxxiii, xxxiv, xxxv, xxxvi. • The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat cxlviii, cxlix. • Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes xxxvii, xxxviii, xxxix, xl, xli. <u>Information Sources</u> • OMNRF (NHIC) Agriculture Canada in Ottawa may have list of butterfly experts. • Field Naturalist Clubs • Toronto Entomologists Association • Conservation Authorities	Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct)xliii. MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/dayxxxvii, significant variation can occur between years and multiple years of sampling should occur xl, xlii. • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD. • MUD of >5000 **or** >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant.Ⓔ • SWHMiST cxlix Index #16 provides development effects and mitigation measures.	Habitat not within 5km of Lake Ontario or any major lake shoreline.	Habitat not confirmed.

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Landbird Migratory Stopover Areas **<u>Rationale:</u>** Sites with a high diversity of species as well as high numbers are most significant.	All migratory songbirds. Canadian Wildlife Service Ontario website: http://www.ec.gc.ca/nature/default.asp?lang=En&n=421B7A9D-1 All migrant raptors species: Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors)	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	Woodlots need to be >10 haⒺ in size **and within 5 km iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv of Lake Ontario**. • If multiple woodlands are located along the shoreline those Woodlands <2km from Lake Ontario are more significant [cxlix] • Sites have a variety of habitats; forest, grassland and wetland complexes [cxlix]. • The largest sites are more significant [cxlix] • Woodlots and forest fragments are important habitats to migrating birds[ccxviii], these features located along the shore and located within 5km of Lake Ontario are Candidate SWH cxlviii. <u>Information Sources</u> • Bird Studies Canada • Ontario Nature • Local birders and naturalist club • Ontario Important Bird Areas (IBA) Program	Studies confirm: • Use of the habitat by >200 birds/day and with >35 spp with at least 10 bird spp. recorded on at least 5 different survey dates Ⓔ. This abundance and diversity of migrant bird species is considered above average and significant. • Studies should be completed during spring (Apr./May) and fall (Aug/Oct) migration using standardized assessment techniques. Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”[ccxi] • SWHMiST [cxlix] Index #9 provides development effects and mitigation measures.	Habitat not within 5km of Lake Ontario or any major lake shoreline.	Habitat not confirmed.
Deer Yarding Areas Rationale: Winter habitat for deer is considered to be the main limiting factor for northern deer populations. In winter, deer congregate in “yards” to	White-tailed Deer	Note: OMNRF to determine this habitat. ELC Community Series providing a thermal cover component for a deer yard would include; FOM, FOC, SWM and SWC.	• Deer yarding areas or winter concentration areas (yards) are areas deer move to in response to the onset of winter snow and cold. This is a behavioural response and deer will establish traditional use areas. The yard is composed of two areas referred to as Stratum I and Stratum II. Stratum II covers the entire winter yard area and is usually a mixed or deciduous forest with plenty of browse available for food. Agricultural lands can also be included in this area. Deer move	No Studies Required: • Snow depth and temperature are the greatest influence on deer use of winter yards. Snow depths > 40cm for more than 60 days in a typically winter are minimum criteria for a deer yard to be considered as SWH. lvi, lvii, lviii, lix, lx, • Ⓔ • Deer Yards are mapped by OMNRF District offices. Locations of Core or Stratum 1 and Stratum 2 Deer yards considered	White-tailed Deer Wintering Area Stratum 2 identified in the central portion of Hidden Valley (via LIO data layers). Consistent with as shown in Figure 4 in the Kitchener Natural Areas Inventory.	Confirmed SWH -DWCA by MNRF and mapped via LIO data layers. **Figure SWH 4 Deer Yarding Areas**

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
survive severe winter conditions. Deer yards typically have a long history of annual use by deer, yards typically represent 10-15% of an areas summer range.		Or these ELC Ecosites; CUP2 CUP3 FOD3 CUT	to these areas in early winter and generally, when snow depths reach 20 cm, most of the deer will have moved here. If the snow is light and fluffy, deer may continue to use this area until 30 cm snow depth. In mild winters, deer may remain in the Stratum II area the entire winter. • The Core of a deer yard (Stratum I) is located within the Stratum II area and is critical for deer survival in areas where winters become severe. It is primarily composed of coniferous trees (pine, hemlock, cedar, spruce) with a canopy cover of more than 60%cxciv. • OMNRF determines deer yards following methods outlined in “Selected Wildlife and Habitat • Features: Inventory Manual" cxcv • Woodlots with high densities of deer due to artificial feeding are • not significantⒺ.	significant by OMNRF will be available at local MNRF offices or via Land Information Ontario (LIO). • Field investigations that record deer tracks in winter are done to confirm use (best done from an aircraft). Preferably, this is done over a series of winters to establish the boundary of the Stratum I and Stratum II yard in an "average" winter. MNRF will complete these field investigations. cxcv • If a SWH is determined for Deer Wintering Area or if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWHMiST[cxlix] Index #2 provides development effects and mitigation measures.		

Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Deer Winter Congregation Areas **<u>Rationale:</u>** Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions cxlviii.	White-tailed Deer	All Forested Ecosites with these ELC Community Series; FOC FOM FOD SWC SWM SWD Conifer plantations much smaller than 50 ha may also be used.	• Woodlots will typically be >100 ha in size Ⓔ. Woodlots <100ha may be considered as significant based on MNRF studies or assessment. • Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands [cxlviii]. • If deer are constrained by snow depth refer to the Deer Yarding Area habitat within Table 1.1 of this Schedule. • Large woodlots > 100ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha [ccxxiv]. • Woodlots with high densities of deer due to artificial feeding are not significant Ⓔ. <u>Information Sources</u> • MNRF District Offices. • LIO/NRVIS	Studies confirm: • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF cxlviii. • Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRF Ⓔ • Studies should be completed during winter (Jan/Feb) when >20cm of snow is on the ground using aerial survey techniques[ccxxiv] , ground or road surveys. or a pellet count deer density survey[ccxxv]. • If a SWH is determined for Deer Wintering Area or if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWHMiST [cxlix] Index #2 provides development effects and mitigation measures.	White-tailed Deer Wintering Area Stratum 2 identified in the central portion of Hidden Valley (via LIO data layers). Consistent with as shown in Figure 4 in the Kitchener Natural Areas Inventory.	Confirmed SWH -DWCA by MNRF and mapped via LIO data layers. **Figure SWH 4 Deer Yarding Areas**

Rare Vegetation Communities

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	Defining Criteria		
Cliffs and Talus Slopes **Rationale:** Cliffs and Talus Slopes are extremely rare habitats in Ontario.	Any ELC Ecosite within Community Series: TAO CLO TAS CLS TAT CLT	A Cliff is vertical to near vertical bedrock >3m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris	Most cliff and talus slopes occur along the Niagara Escarpment. Information Sources • The Niagara Escarpment Commission has detailed information on location of these habitats. • OMNRF District • Natural Heritage Information Center (NHIC) has location information available on their website • Field Naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes [lxxviii] • SWHMiST[cxlix] Index #21 provides development effects and mitigation measures.	Not identified.	Not documented in the study area.
Sand Barren **Rationale:** Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry	ELC Ecosites: SBO1 SBS 1 SBT 1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and	Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered, but less	A sand barren area >0.5ha in size[E]. Information Sources • OMNRF Distircts. • Natural Heritage Information Center (NHIC) has location information available on their website. • Field Naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens [lxxviii] • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.)[E]. • SWHMiST[cxlix] Index #20 provides development effects and mitigation measures.	Not identified.	Not documented in the study area.

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
	ELC Ecosite Code	**Habitat Description**	**Detailed Information and Sources**	**Defining Criteria**		
	treed (SBT1). Tree cover always ≤ 60%.	than 60%.				
Alvar **<u>Rationale:</u>** Alvars are extremely rare habitats in Ecosregion 6E. Most alvars in Ontario are in Ecoregions 6E and 7E. Alvars in 6E are small and highly localized just north of the Palaeozoic-Precambrian contact.	**Indicator Species:** 1) *Carex crawei* 2) *Panicum philadelphicum* 3) *Eleocharis compressa* 4) *Scutellaria parvula* 5) *Trichostema brachiatum* These indicator species are very specific to Alvars within Ecoregion 6E[Ⓔcxlix]	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or	An Alvar site > 0.5 ha in size [lxxv]. <u>Information Sources</u> • Alvars of Ontario (2000), Federation of Ontario Naturalists [lxxvi]. • Ontario Nature – Conserving Great Lakes Alvars[ccviii]. Natural Heritage Information Center (NHIC) has location information available on their website • OMNRF Districts • Feld Naturalist clubs. • Conservation Authorities.	• Field studies that identify four of the five[Ⓔ] **Alvar Indicator Species** [lxxv, cxlix] at a Candidate Alvar site is Significant. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses [lxxv] SWHMiST[cxlix] Index #17 provides development effects and mitigation measures.	Not identified.	Not documented in the study area.

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	Defining Criteria		
		indicator plants. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animals species. Vegetation cover varies from patchy to barren with a less than 60% tree cover [lxxviii].				
Old Growth Forest **<u>Rationale:</u>** Due to historic logging practices, extensive old growth forest is rare in the Ecoregion. Interior habitat provided by old growth forests is required by many wildlife species.	Forest Community Series: FOD FOC FOM SWD SWC SWM	Old Growth forests are characterized by heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.	Woodland areas 30 ha or greater in size or with at least 10 ha interior habitat assuming 100 m buffer at edge of forest Ⓔ. <u>Information Sources</u> • OMNRF Forest Resource Inventory mapping • OMNRF Districts. • Field Naturalist clubs • Conservation Authorities Sustainable Forestry Licence (SFL) companies will possibly know locations through field operations. • Municipal forestry departments	Field Studies will determine: • If dominant trees species of the are >140 years old, then the area containing these trees is Significant Wildlife Habitat [cxlviii] • The forested area containing the old growth characteristics will have experienced no recognizable forestry activities [cxlviii] (cut stumps will not be present) The area of forest ecosites combined or an eco-element within an ecosite that contains the old growth characteristics is the SWH. • Determine ELC vegetation types for the forest forest area containing the old growth characteristics [lxxviii] • SWHMiST[cxlix] Index #23 provides development effects and mitigation	Forestry activities in 2021 were noted in all woodlots and hedgerows, in addition to cultural communities. No old growth forest identified in area.	Not documented in the study area.

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
	ELC Ecosite Code	Habitat Description	Detailed Information and Sources	Defining Criteria		
				• measures.		
Savannah **<u>Rationale:</u>** Savannahs are extremely rare habitats in Ontario.	TPS1 TPS2 TPW1 TPW2 CUS2	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%.[lxxix, lxxx, lxxxi, lxxxii, lxxxiii]	No minimum size to site Ⓔ Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. <u>Information Sources</u> • Natural Heritage Information Center (NHIC) has location information available on their website • OMNRF Districts • Feld Naturalist clubs. • Conservation Authorities.	Field studies confirm one or more of the Savannah indicator species listed in [cxlix] Appendix N should be present Ⓔ . Note: Savannah plant spp. list from Ecoregion 6E should be used[cxlviii]. • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). • SWHMiST[cxlix] Index #18 provides development effects and mitigation measures.	Not identified.	Not documented in the study area.

Rare Vegetation Community	CANDIDATE SWH			CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
	ELC Ecosite Code	**Habitat Description**	**Detailed Information and Sources**	**Defining Criteria**		
Tallgrass Prairie **<u>Rationale:</u>** Tallgrass Prairies are extremely rare habitats in Ontario.	TPO 1 TPO 2	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover. [lxxix, lxxx, lxxxi, lxxxii, lxxxiii]	No minimum size to site Ⓔ. Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. <u>Information Sources</u> • Natural Heritage Information Center (NHIC) has location information available on their website • OMNRF Districts Feld Naturalist clubs. • Conservation Authorities.	Field studies confirm one or more of the Prairie indicator species listed in[cxlix] Appendix N should be present Ⓔ. Note: Prairie plant spp. list from Ecoregion 6E should be used[cxlviii] • Area of the ELC Ecosite is the SWH. Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotic sp.). • SWHMiST[cxlix] Index #19 provides development effects and mitigation • measures.	The only rare vegetation community type identified in the study area occurs on the berm east of Wabanaki Road, and behind the residential development of River Valley Drive. Given its anthropogenic origin and function as a berm as part of the stormwater management, it is not considered SWH.	Not identified in study area..
Other Rare Vegetation Communities **<u>Rationale:</u>** Plant communities that often contain rare species which depend on the habitat for survival.	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG[cxlviii] . Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.	Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M [cxlviii] The OMNRF/NHIC will have up to date listing for rare vegetation communities. <u>Information Sources</u> • Natural Heritage Information Center (NHIC) has location information available on their website • OMNRF Districts • Feld Naturalist clubs. • Conservation Authorities.	Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG[cxlviii] . • Area of the ELC Vegetation Type polygon is the SWH. • SWHMiST [cxlix] Index #37 provides development effects and mitigation measures.	Not identified.	Not identified.

Specialized Wildlife Habitat	Wildlife Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria		
Waterfowl Nesting Area **<u>Rationale:</u>** Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SWT1 SWT2 SWD1 SWD2 SWD3 SWD4 **Note: includes adjacency to Provincially Significant Wetlands**	A waterfowl nesting area extends 120 m [cxlix] from a wetland (> 0.5 ha) or a wetland (>0.5ha) and any small wetlands (0.5ha) within 120m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur [cxlix]. • Upland areas should be at least 120 m wide so that predators such as racoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites. <u>Information Sources</u> • Ducks Unlimited staff may know the locations of particularly productive nesting sites. OMNRF Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from Conservation Authorities.	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards Ⓔ, or; • Presence of 10 or more nesting pairs for listed species including Mallards Ⓔ. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”[ccxi] • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m [cxlviii] from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWHMiST[cxlix] Index #25 provides development effects and mitigation measures.	Wood Duck, Blue-winged Teal and Mallard are recorded for the study area. Unconfirmed nesting numbers, but there is potential for habitat use to occur. Candidate habitat is identified in the core PSW habitat, and also in the clusters of natural/semi-natural wetlands in the Grand River corridor. Wetlands or communities excluded: • Wetlands adjacent to the Highway 8; • linear wetlands on Grand River slopes just upstream of the weir, and constructed ponds in the floodplain. • CUW communities near Highway 8 that have no understory and are associated with residential lots; • CUT1/CUM1-1 at Wabanaki and Hidden Valley Roads due to disturbed and open nature	Candidate SWH-WNA identified, habitat use not confirmed. **Figure SWH 5 Waterfowl Nesting**

Bald Eagle and Osprey Nesting, Foraging and Perching Habitat **<u>Rationale:</u>** Nest sites are fairly uncommon in Eco-region 6E and are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.	Osprey **Special Concern** Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. • Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). <u>Information Sources</u> • Natural Heritage Information Center (NHIC) compiles all known nesting sites for Bald Eagles in Ontario. • MNRF values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat. • Nature Counts, Ontario Nest Records Scheme data. • OMNRF Districts. • Check the Ontario Breeding Bird Atlas [ccv] or Rare Breeding Birds in • Ontario for species documented Reports and other information available from Conservation Authorities. Field Naturalists clubs	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area[cxlviii] . • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the SWH [ccvii], maintaining undisturbed shorelines with large trees within this area is important [cxlviii]. For a Bald Eagle the active nest and a 400-800 m radius around the nest is the SWH. [cvi, ccvii] Area of the habitat from 400-800m is dependent on site lines from the nest to the development and inclusion of perching and foraginghabitat [cvi] • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for ≥ 3 years or suspected of not being used for >5 years before being considered not significant. [ccvii] • Observational studies to determine nest site use, perching sites and foraging areas need to be done from mid March to mid August.	An Osprey nest has been identified in background data layers just outside the study area, an Osprey Nest. However, the location identified and field confirmation of the nest, as well as metadata associated with the LIO record, confirm this occurrence on a hydro tower. No Ospreys are documented using the Hidden Valley PSW. Bald Eagle has been observed in the central study study area. No nesting or hunting documented in the PSW. Candidate habitat identified associated with the Grand River corridor.	SWH-BEONFP shown on Figure 4, however may not meet criteria for SWH but is available in LIO records. Candidate SWH identified in Grand River corridor. **Figure SWH 6 Bald Eagle and Osprey Nesting, Foraging, Perching**

				• Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #26 provides development effects • and mitigation measures		
Woodland Raptor Nesting Habitat **<u>Rationale:</u>** Nests sites for these species are rarely identified; these area sensitive habitats and are often used annually by these species.	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3	All natural or conifer plantation woodland/forest stands >30ha with >10ha of interior habitat [lxxxviiii, lxxxix, xc, xci, xciii, xciv, xcv,xcvi, cxxxiii]. Interior habitat determined with a 200m buffer[cxlviii] • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest. <u>Information Sources</u> • OMNRF Districts. • Check the Ontario Breeding Bird Atlas [ccv] or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada. • Reports and other information available from Conservation Authorities.	Studies confirm: • Presence of 1 or more active nests from species list is considered significant[cxlviii]. • Red-shouldered Hawk and Northern Goshawk – A 400m radius around the nest or 28 ha area of habitat is the SWH [ccvii]. (the 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest) Barred Owl – A 200m radius around the nest is the SWH [ccvii]. • Broad-winged Hawk and Coopers Hawk,– A 100m radius around the nest is the SWH[ccvii]. • Sharp-Shinned Hawk – A 50m radius around the nest is the SWH[ccvii]. • Conduct field investigations from mid-March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. • SWHMiST [cxlix] Index #27 provides development	Records for Northern Goshawk and Cooper's Hawk in the study area. Nesting unconfirmed.	Not confirmed.

				effects • and mitigation measures.		
Turtle Nesting Areas **<u>Rationale:</u>** These habitats are rare and when identified will often be the only breeding site for local populations of turtles.	Midland Painted Turtle <u>Special Concern Species</u> Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100m) [cxlviii] or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO 1 FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle- nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used. <u>Information Sources</u> • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Summary Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them. • Natural Heritage Information	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles Ⓔ • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH Ⓔ. • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100m around the nesting area dependant on slope, riparian vegetation and adjacent land use is the SWH.[cxlviii] • Travel routes from wetland to nesting area are to be considered within the SWH as part of the 30-100m area of habitat.[cxlix] • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. SWHMiST [cxlix] Index #28	Turtle nesting has been confirmed in at least two locations in the study during background studies. Criteria for one Snapping Turtle met in one area. Additional candidate habitat is available in the study area.	Confirmed SWH-TNA in only 1 location. Candidate SWH-TNA identified in 1 location. **Figure SWH 7 Turtle Nesting Area**

			Center (NHIC) • Field Naturalist clubs	provides development effects and mitigation measures for turtle nesting habitat.		
Seeps and Springs **<u>Rationale:</u>** Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamander spp.	Seeps/Springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system [cxvii, cxlix]. • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species [cxix, cxx, cxxi, cxxii, cxiii, cxiv]. <u>Information Sources</u> • Topographical Map. • Thermography. • Hydrological surveys conducted by Conservation Authorities and MOE. • Field Naturalists clubs and landowners. • Municipalities and Conservation Authorities may have drainage maps • and headwater areas mapped.	Field Studies confirm: • Presence of a site with 2 or more Ⓔ seeps/springs should be considered SWH. • The area of a ELC forest ecosite or an ecoelement within ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat [cxlviii]. • SWHMiST [cxlix] Index #30 provides development effects and mitigation measures	Hofstetter Creek headwater is identified as a seep area with observations in 2004 and 2021 of groundwater seeps. Seepage is noted at East Creek at Hidden Valley Road where it appears to originate from a pipe to the west. Springs are identified in the ESPA 31 Petrifying Spring, with calcium loving plant communities identified. Springs with calcium components are often especially valuable to wildlife. This spring is associated with deer wintering habitat.	Candidate SWH-SS is identified in the area of Hofstetter Creek (SWH-SS2) and East Creek (SWH-SS1). It is considered candidate as some of the other. Candidate SWH-SS within ESPA 31 Petrifying Springs. **Figure SWH 8 Seeps and Springs**
Amphibian Breeding Habitat (Woodland). **<u>Rationale:</u>** These	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus	All Ecosites associated with these ELC Community Series; FOC FOM FOD	• Presence of a wetland, pond or woodland pool (including vernal pools) >500m^2 (about 25m diameter) [ccvii] within or adjacent (within 120m) to a woodland (no minimum size).[clxxxii, lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx] Some small	Studies confirm; • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at	Confirmed: Five (5) of the amphibian species are documented in the PSW. 230m around the PSW was captured for the woodland ecosite types listed. Where they	Confirmed SWH-ABHW1 includes the Hidden Valley PSW and adjacent forest communities. **Figure SWH 9 Amphibian Woodland Breeding**

habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	Frog Wood Frog	SWC SWM SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians	wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat [cxlviii] <u>Information Sources</u> • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring- time choruses of amphibians on their property. • OMNRF District. • OMNRF wetland evaluations • Field Naturalist clubs • Canadian Wildlife Service Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	least 20 individuals (adults or eggs masses) [lxxi] or 2 or more of the listed frog species with Call Level Codes of 3Ⓔ. • A combination of observational study and call count surveys [cviii] will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands. • The habitat is the wetland area plus a 230m radius of woodland area[lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx, lxxi] . If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat. • SWHMiST [cxlix] Index #14 provides development effects and mitigation measures.	were not contiguous (>20m gap) these woodlands were excluded. Ecosites within the 230m were included in the SWH type where there were 100% surrounded by wetland or forest, and a small are of Cultural Thicket was therefore included in the SWH polygon. Candidate amphibian habitat of this type was not identified outside of the PSW, as wetland open water habitat in the Grand River floodplain are not considered to occur naturally, but are part of storm or wastewater management infrastructure. No candidate habitat identified.	

Amphibian Breeding Habitat (Wetlands) **<u>Rationale:</u>** Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within Central Ontario landscapes.	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green rog Mink Frog Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bull Frog) may be adjacent to woodlands.	• Wetlands>500m^2 (about 25m diameter) [ccvii]), supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats [clxxxii]. • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. • Bullfrogs require permanent water bodies with abundant emergent vegetation. <u>Information Sources</u> • Ontario Herpetofaunal Summary Atlas (or other similar atlases) • Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. • OMNRF Districts and wetland evaluations • Reports and other information available from Conservation Authorities.	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses) [lxxi] or 2 or more of the listed frog/toad species with Call Level Codes of 3Ⓔ. **or;** Wetland with confirmed breeding Bullfrogs are significantⒺ. • The ELC ecosite wetland area and the shoreline are the SWH. • A combination of observational study and call count surveys [cviii] will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. • If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWHMiST [cxlix] Index #15 provides development effects and mitigation measures.	• Outside of the PSW, no other wetland communities are identified as greater than 120m from woodlands; therefore this habitat type isn't considered present, and important amphibian breeding habitat is captured under the Amphibian Breeding Habitat Woodlands category.	N/A
Woodland Area-Sensitive Bird Breeding Habitat	Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	• Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha. [cv, cxxxi,] cxxxii, cxxxiii, cxxxiv, cxxxv, cxxxvi, cxxxvii, cxxxviii, • cxxxix, cxl, cxli, cxlii, cxliii, cxliv,	Studies confirm: • Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. Ⓔ • Note: any site with breeding	Of the indicator species as many as 7 have been identified in the Hidden Valley area. 5 of the species have not been documented since the 2004 investigations by LGL Limited. Breeding evidence, and only	Not identified.

Rationale: Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area sensitive interior forest song birds.	Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren **Special Concern:** Cerulean Warbler Canada Warbler		cxlv, cxlvi, cl, cli, clii, cliii, cliv, clv, clvi, clvii, clviii, clix, • **Interior forest habitat is at least 200 m from forest edge habitat**. [clxiv] • <u>Information Sources</u> • Local bird clubs. • Canadian Wildlife Service (CWS) for the location of forest bird monitoring. • Bird Studies Canada conducted a 3- year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to determine what forests were of greatest value to interior species • Reports and other information available from Conservation • Authorities.	Cerulean Warblers or Canada Warblers is to be considered SWH.Ⓔ • Conduct field investigations in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”[ccxi] SWHMiST [cxlix] Index #34 provides development effects and mitigation measures.	one of the species was documented in 2019 and 2020 by LGL. No deep interior forest habitat >200m from forest edge present. Linear woodlots along the Grand River in the study area do not provide interior habitat conditions.	

Wildlife	Species	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Ecosite	Habitat Criteria and Information Sources	Defining Criteria		
Marsh Breeding Bird Habitat **<u>Rationale:</u>** Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Sandhill Crane Green Heron Trumpeter Swan **Special Concern:** Black Tern Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	• Nesting occurs in wetlands. • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present [cxxiv]. • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water. <u>Information Sources</u> • OMNRF District and wetland evaluations. • Field Naturalist clubs • Natural Heritage Information Center (NHIC) Records. • Reports and other information available from Conservation Authorities. • Ontario Breeding Bird Atlas.	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or **or** 1 pair of Sandhill Cranes; **or** breeding by any combination of 5 or more of the listed species Ⓔ. • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH Ⓔ. • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST [cxlix] Index #35 provides development effects and mitigation measures	Four of the criteria species have been documented in the study area historically. However, breeding evidence to confirm habitat use not confirmed. Candidate habitat remains in the wetland habitat in the study area where ecosites are identified. CUM1 ecosites are only included in the floodplain area, due to the disturbed nature of CUM1 habitat outside of the Grand River corridor.	Candidate SWH associated with the identified ecosites in the study area. **Figure SWH 10a Marsh Breeding Bird General; Figure 10b Marsh Breeding Bird Green Heron**
Open Country Bird Breeding Habitat **<u>Rationale:</u>** This wildlife habitat is declining throughout	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier	CUM1 CUM2	• Large grassland areas (includes natural and cultural fields and meadows) >30 ha [clx, clxi, clxii, clxiii, clxiv, clxv, clxvi, clxvii, clxviii, clxix.] • Grasslands not Class 1 or 2 agricultural lands, and not	Field Studies confirm: • Presence of nesting or breeding of 2 or more of the listed species. Ⓔ • A field with 1 or more breeding Short-eared Owls is to be considered	One candidate species identified in the study area in several years of records. Habitat limited to approximately 12ha of suitable grassland areas in the floodplain of the Grand River. No suitable habitat identified.	Not identified.

Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	Savannah Sparrow **Special Concern** Short-eared Owl		being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years) Ⓔ. • Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. • The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species. <u>Information Sources</u> • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • Reports and other information available from C0nservation Authorities.	SWH. • The area of SWH is the contiguous ELC ecosite field areas. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST [cxlix] Index #32 provides development effects and mitigation measures		
Shrub/Early Successional Bird Breeding Habitat **<u>Rationale:</u>** This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records [cxcix].	<u>Indicator Spp</u>: Brown Thrasher Clay-coloured Sparrow <u>Common Spp.</u> Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher **Special Concern:**	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species	Large field areas succeeding to shrub and thicket habitats>10ha[clxiv] in size. Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years) Ⓔ. • Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species [clxxiii]. • Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. <u>Information Sources</u>	Field Studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species. Ⓔ • A habitat with breeding Yellow- breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat The area of the SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories	Six of the indicator species are recorded for the study area over time. Limited suitable habitat identified due to patch size and level of disturbance.	Not identified.

	Yellow-breasted Chat Golden-winged Warbler		• Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • Reports and other information available from Conservation • Authorities.	• Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST [cxlix] Index #33 provides development effects and mitigation measures.. Ⓔ		
Terrestrial Crayfish **<u>Rationale:</u>** Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare. [ccii]	Chimney or Digger Crayfish; (Fallicambarus fodiens) Devil Crayfish or Meadow Crayfish; (<u>Cambarus Diogenes)</u>	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM CUM1 with inclusions of above meadow marsh or swamp ecosites can be used by terrestrial crayfish.	Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish. • Constructs burrows in marshes, mudflats, meadows, the ground can't be too moist. Can often be found far from water. • Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well formed. <u>Information Sources</u> • Information sources from"Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF March 1998	Studies Confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites [cci] • Area of ELC ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH. Surveys should be done April to August in temporary or permanent water. Note the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult [cci] • SWHMiST [cxlix] Index #36 provides development effects and mitigation measures.	No records of terrestrial crayfish in the study area.	Not identified.

Special Concern and Rare Wildlife Species **<u>Rationale:</u>** These species are quite rare or have experienced significant population declines in Ontario.	All Special Concern and Provincially Rare (S1-S3, SH) plant and animal species. Lists of these species are tracked by the Natural Heritage Information Centre.	All plant and animal element occurrences (EO) within a 1 or 10km grid. Older element occurrences were recorded prior to GPS being available, therefore location information may lack accuracy	When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites [lxxviii] <u>Information Sources</u> • Natural Heritage Information Centre (NHIC) will have Special Concern and Provincially Rare (S1-S3, SH) species lists with element occurrences data. • NHIC Website "Get Information" : http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas • Expert advice should be sought as many of the rare spp. have little information available about their requirements.	Studies Confirm: • Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat or foraging habitat. • SWHMiST [cxlix] Index #37 provides development effects and mitigation measures.	Special Concern and Provincially Rare wildlife species documented in the study area include: • Jefferson Salamander • Barn Swallow • Blue-winged Teal • Chimney Swift • Eastern Wood-Pewee • Short-eared Owl • Wood Thrush • Monarch • SAR bats • Milksnake • Midland Painted Turtle • Snapping Turtle • Five-lined Skink Of these species, Jefferson Salamander and Chimney Swift are addressed under ESA. Eastern Wood-Pewee was most recently recorded by LGL in 2021, and Monarch by LGL and WSP in 2015-2020. Blue-winged Teal, Five-lined Skink have not been recorded since 1979, and reports for Short-eared Owl are from 2004 and are unconfirmed. No locations are mapped from these species. Wood Thrush were recorded by LGL in 2019-2020. However, Wood Thrush records were not for Hidden Valley. Barn Swallow was downlisted to SC and may meet criteria herein. No nesting habitat was confirmed for Barn Swallow in the study area and habitat isn't mapped.	SWH for this type is mapped as confirmed habitat used by Eastern Wood-Pewee in 2021 in the study area. Turtle, snake or bat habitat hasn't been mapped for this SWH. **Figure SWH 11 Special Concern and Rare Wildlife**

					Monarch records were not mapped. Midland Painted Turtle and Snapping Turtle have been addressed under Wintering and Breeding Habitat SWH and are not further mapped herein, but also meet criteria as SC species. Milksnake was documented as a roadkill. No habitat is mapped for this species, it is no longer considered SC or at risk. SAR bats are reported for the study area, but species at not confirmed. Bat habitat has been considered under Maternal Roosting SWH and will largely carry forward under SAR habitat. Special Concern and Provincially Rare plant species documented in the study area include: • Butternut Butternut is addressed under the ESA.	

Animal Movement Corridors

Habitat	SPECIES	CANDIDATE SWH		CONFIRMED SWH	Hidden Valley Secondary Plan Comprehensive EIS Summary	Conclusion
		ELC Eco-sites	Habitat Criteria and Information Sources	Defining Criteria		
Amphibian Movement Corridors **Rationale**: Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	• Corridors may be found in all ecosites associated with water. • Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1	Movement corridors between breeding habitat and summer habitat. Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2. (**Amphibian Breeding Habitat – Wetland)** of this Schedule Ⓔ. Information Sources • MNRF District Office. • Natural Heritage Information Center (NHIC). • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs.	• Field studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. • Corridors should consist of native vegetation with several layers of vegetation. • Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant[cxlix] • Corridors should have at least 15m of vegetation on both sides of waterway[cxlix] or be up to 200m wide[cxlix] of woodland habitat and with gaps <20m[cxlix] . • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat[cxlix]. • SWHMiST [cxlix] Index #40 provides development effects and mitigation measures	SWH type not identified, this criteria is identified for when Amphibian Breeding Wetland habitat is identified. Amphibian breeding habitat in the study area is considered Woodland under this SWH assessment.	Not identified.

Deer Movement Corridors **<u>Rationale:</u>** Corridors important for all species to be able to access seasonally important life-cycle habitats or to access new habitat for dispersing individuals by minimizing their vulnerability while travelling.	White-tailed Deer	Corridors may be found in all forested ecosites. A Project Proposal in Stratum II Deer Wintering Area has potential to contain corridors.	Movement corridor must be determined when **Deer Wintering Habitat** is confirmed as SWH from Table 1.1 of this schedule. Ⓔ • A deer wintering habitat identified by the OMNRF as SWH in Table 1.1 of this Schedule will have corridors that the deer use during fall migration and spring dispersion [clxxxii, clxxxiii, cxlix, cxciv]. • Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges). <u>Information Sources</u> • MNRF District Office. • Natural Heritage Information Center (NHIC). • Reports and other information available from Conservation Authorities. Field Naturalist Clubs.	• Studies must be conducted at the time of year when deer are migrating or moving to and from winter concentration areas . • Corridors that lead to a deer wintering habitat should be unbroken by roads and residential areas. • Corridors should be at least 200m wide[cxlix] with gaps <20m[cxlix] and if following riparian area with at least 15m of vegetation on both sides of waterway[cxlix] . Shorter corridors are more significant than longer corridors, [cxlix]. SWHMiST [cxlix] Index #39 provides development effects and mitigation measures	• Movement corridors to the Grand River are identified through observations of deer movement, vegetation communities and roadkill observations •	Candidate SWH-DMC1 and SWH-DMC2 are identified, connecting central Hidden Valley to the larger Grand River Corridor. SWH-DMC3 is along the Grand River corridor, which is considered a significant valleyland and provides an inter-regional corridor of at least 200m width.. **Figure SWH 12 Deer Movement Corridors**

LEGEND

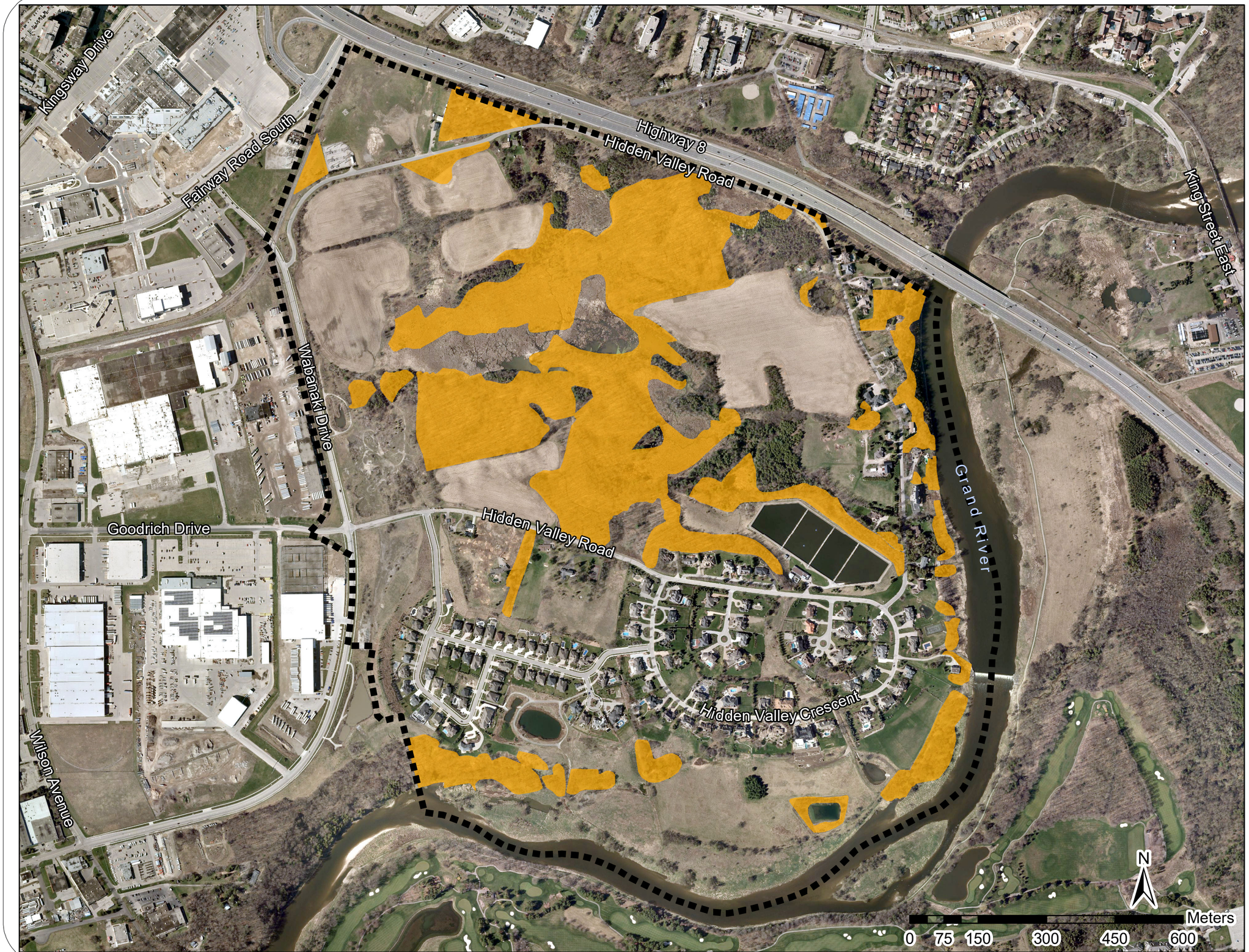
- Study Area
- Candidate Habitat for Bald Eagle
- Candidate Habitat for Hawk / Owl

Significant Wildlife Habitat

Raptor Wintering Area

LGL LIMITED
Est. 1971
environmental research associates

Project	TA9168	**Figure**	SWH1
Date	April 2023	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	AHF



LEGEND

- Study Area
- Candidate Maternity Roosting Habitat

Significant Wildlife Habitat

Bat Maternity Colonies

LGL Est. 1971 LIMITED
environmental research associates

Project	TA9168	**Figure**	SWH2
Date	April 2023	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	AHF

LEGEND

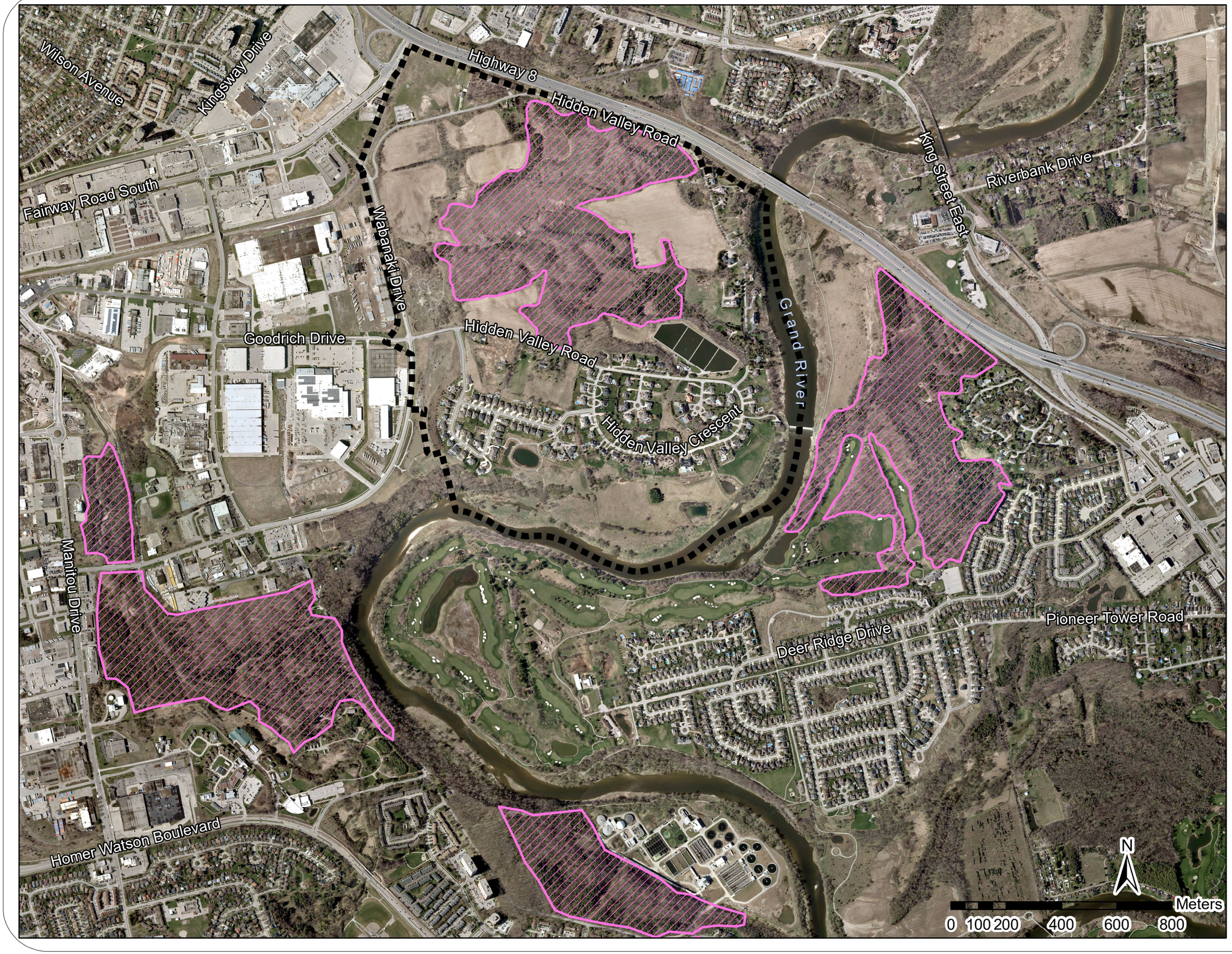
- Study Area
- Confirmed Habitat
- Candidate Habitat
- SWM Pond (excluded from SWH)

Significant Wildlife Habitat

Turtle Wintering Areas

LGL LIMITED
Est. 1971
environmental research associates

Project	TA9168	**Figure**	SWH3
Date	April 2023	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	AHF



LEGEND

- Study Area
- Deer Wintering Area (Stratum 2) (LIO)

Significant Wildlife Habitat

Deer Yarding Areas

LGL Est. 1971 LIMITED
environmental research associates

Project	TA9168	**Figure**	SWH4
Date	April 2023	**Prepared By:**	KC
Scale	1:13,000	**Verified By:**	AHF

LEGEND

- Study Area
- Candidate Habitat
- PSW and Wetland ELC Ecosites

Significant Wildlife Habitat

Waterfowl Nesting Area

LGL Est. 1971 LIMITED
environmental research associates

Project	TA9168	**Figure**	SWH5
Date	April 2023	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	AHF

LEGEND

- Study Area
- Candidate Habitat

Significant Wildlife Habitat

Bald Eagle and Osprey Nesting, Foraging and Perching Habitat

LGL LIMITED
Est. 1971
environmental research associates

Project	TA9168	**Figure**	SWH6
Date	April 2023	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	AHF

LEGEND

- Study Area
- Turtle Nesting Location of Confirmed Habitat
- Turtle Nesting Location of Candidate Habitat
- Confirmed Habitat (30m radius)
- Confirmed Habitat (100m radius)

Significant Wildlife Habitat

Turtle Nesting Area

LGL LIMITED
Est. 1971
environmental research associates

Project	TA9168	**Figure**	SWH7
Date	April 2023	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	AHF

LEGEND

- Study Area
- Candidate Habitat (Seeps)
- Candidate Habitat (ESPA 31 Petrifying Springs)

Significant Wildlife Habitat

Seeps and Springs

LGL Est. 1971 LIMITED
environmental research associates

Project	TA9168	**Figure**	SWH8
Date	April 2023	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	AHF

LEGEND

- Study Area
- Amphibian Breeding Habitat (Wetland Area + 230m radius of Woodland Area)
- Wetland Areas of the Amphibian Breeding Habitat
- 230m Radius around Wetland Areas

Significant Wildlife Habitat

Amphibian Breeding Habitat (Woodland)

LGL LIMITED
Est. 1971
environmental research associates

Project	TA9168	**Figure**	SWH9
Date	April 2023	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	AHF

LEGEND

- Study Area
- Candidate Habitat for Marsh Breeding Bird Species (MAM1, MAM2, MAM3, MAM4, MAM5, MAM6, SAS1, SAM1, SAF1, FEO1, BOO1)

Significant Wildlife Habitat

Marsh Breeding Bird Habitat

LGL Est. 1971 LIMITED
environmental research associates

Project	TA9168	**Figure**	SWH10a
Date	April 2023	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	AHF

LEGEND

- Study Area
- Candidate Habitat for Green Heron (All SW, MA and CUM1 sites)

Significant Wildlife Habitat

Marsh Breeding Bird Habitat

LGL LIMITED
Est. 1971
environmental research associates

Project	TA9168	**Figure**	XX
Date	April 2023	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	AHF

LEGEND

Study Area

Ecosite with Special Concern and Wildlife Species

Eastern Wood-pewee (*Contopus virens*)

Significant Wildlife Habitat

Special Concern and Rare Wildlife Species

LGL LIMITED
Est. 1971
environmental research associates

Project	TA9168	**Figure**	XX
Date	May 2023	**Prepared By:**	KC
Scale	1:8,000	**Verified By:**	AHF

Appendix E SAR Screening Summary

Appendix E: Species at Risk Screening Summary Table

Type	Species	Ecologistics (1979)	LGL Surveys (2004-2021)	MNRF NHIC (November 2021)	DFO SAR Mapping (Jan 2021)	Ontario Butterfly Atlas	Ontario Reptile and Amphibian Atlas	OBBA (2001-2005)	eBird (November 2021)	MNRF Screening (List for Waterloo)	Endangered Species Act Designation[1]	Habitat	Potential for Habitat/Screening Conducted by LGL	Mitigation Recommendations
Vegetation	American Chestnut (*Castanea dentata*)									X	Endangered	Generally found in deciduous or mixed forests with well drained soils. Most often found in the Carolinian zone in Ontario.	Not detected during field investigations	None
Vegetation	Butternut (*Juglans cinerea*)		X							X	Endangered	Generally grows in rich, moist, and well-drained soils often found along streams. It may also be found on well-drained gravel sites, especially those made up of limestone. It is also found, though seldom, on dry, rocky and sterile soils. In Ontario, the Butternut Generally grows alone or in small groups in deciduous forests as well as in hedgerows	Species confirmed in the study area (18 records).	Ensure up to date Butternut Health Assessment area completed for trees where a 50m protection zone cannot be maintained; Follow exemption regulations and/or ensure compliance with the ESA through next stages of design.
Vegetation	Black Ash (Fraxinus nigra)	X	X								Endangered	Black Ash is a medium-sized, shade-intolerant hardwood tree species that occurs on moist to wet sites such as swamps, bogs and riparian areas. It is a broad-leaved hardwood tree in the Olive family, growing 15 to 20 m in height, but can grow to as high as 27 m, and 30 to 50 cm in diameter. The leaves are roughly 15-30 cm in size.	This species has been documented in the past in the vegetation communities in Hidden Valley. While no specific survey was completed in 2021, this species is suspected to occur outside the project activities.	From Ontario.ca: The Ministry of the Environment, Conservation and Parks needs time to determine the best way to protect and recover Black Ash, including how to balance protections for Black Ash with managing invasive Emerald Ash Borer (EAB) and the social and economic realities of Ontarians. The ministry temporarily suspended protections for Black Ash for a period of two years from the time the species was added to the Species at Risk in Ontario List (Ontario Regulation 230/08). During this time, proponents will not need to seek authorizations for activities that impact Black Ash and its habitat. Therefore, no mitigation recommended at this time.

Type	Species	Ecologistics (1979)	LGL Surveys (2004-2021)	MNRF NHIC (November 2021)	DFO SAR Mapping (Jan 2021)	Ontario Butterfly Atlas	Ontario Reptile and Amphibian Atlas	OBBA (2001-2005)	eBird (November 2021)	MNRF Screening (List for Waterloo)	Endangered Species Act Designation[1]	Habitat	Potential for Habitat/Screening Conducted by LGL	Mitigation Recommendations
Vegetation	Pigmy pocket moss (*Fissidens exilis*)									X	Special Concern	Generally grows in moist, barren soil, typically clay, often associated with forests	Not detected during field investigations	None
Vegetation	American ginseng (*Panax quinquefolius*)	X								X	Endangered	Generally grows in rich, moist, undisturbed and relatively mature deciduous woods in areas of neutral soil (such as over limestone or marble bedrock).	Not detected during field investigations	None
Vegetation	Green dragon (*Arisaema dracontium*)									X	Special Concern	Generally grows in damp deciduous forests and along streams.	Not detected during field investigations	None
Vegetation	Kentucky coffee-tree (*Gymnocladus dioicus*)									X	Threatened	Generally inhabits open areas of floodplains and the edges of wetlands. Shade-intolerant.	Not detected during field investigations	None
Bird	Acadian flycatcher (*Empidonax virescens*)									X	Endangered	Generally requires large areas of mature, undisturbed forest; avoids the forest edge; often found in well wooded swamps and ravines	Not detected during field investigations	None
Bird	Bald eagle (*Haliaeetus leucocephalus*)								X	X	Special Concern	Prefers deciduous and mixed-deciduous forest; and habitat close to water bodies such as lakes and rivers; They roost in super canopy trees such as Pine	Known to occur along the Grand River. Overwintering habitat identified along Grand River corridor in areas downstream. Occasional visitor to Hidden Valley area. No nesting evidence to date for Hidden Valley area. Foraging and perching habitat is present in the study area along the Grand River corridor.	Future development scenarios should implement mitigation options Index #11 of the Significant Wildlife Habitat Mitigation Support Tool (MNRF 2014), which addresses several development types. Further consultation with the MECP or MNRF may be required.

Type	Species	Ecologistics (1979)	LGL Surveys (2004-2021)	MNRF NHIC (November 2021)	DFO SAR Mapping (Jan 2021)	Ontario Butterfly Atlas	Ontario Reptile and Amphibian Atlas	OBBA (2001-2005)	eBird (November 2021)	MNRF Screening (List for Waterloo)	Endangered Species Act Designation[1]	Habitat	Potential for Habitat/Screening Conducted by LGL	Mitigation Recommendations
Bird	Barn Swallow (*Hirundo rustica*)	X						X		X	Threatened	Prefers farmland; lake/river shorelines; wooded clearings; urban populated areas; rocky cliffs; and wetlands. They nest inside or outside buildings; under bridges and in road culverts; on rock faces and in caves etc.	Detected in 2021 surveys. Suitable nesting and foraging habitat is present in the study area.	Future development scenarios will need to ensure compliance with the ESA at all phases. Projects may qualify for streamlined approval and registration as outlined at: https://www.ontario.ca/page/alter-structure-habitat-barn-swallow
Bird	Black Tern (*Childonias niger*)									X	Special Concern	Generally prefer freshwater marshes and wetlands; nest either on floating material in a marsh or on the ground very close to water	Potential habitat identified. Species not detected.	None
Bird	Bobolink (*Dolichonyx oryzivorus*)	X								X	Threatened	This species occurs in tallgrass prairies, open meadows, and fallow agricultural fields. It's also often found in hay fields.	Reported in background documentation (Ecologistics 1979). Currently, habitat patches too small to support species. Only small patches of cultural meadow occur in the project area at southern edge of woodlot at ESPA 27, and within unopened road allowance to Schneider Creek. Agricultural fields were under row crops.	None
Bird	Canada warbler (*Wilsonia canadensis*)		X							X	Special Concern	Generally prefers wet coniferous, deciduous and mixed forest types, with a dense shrub layer. Nests on the ground, on logs or hummocks, and uses dense shrub layer to conceal the nest.	Species reported in breeding bird atlas for the square. Not detected in 2004 or 2013 for Hidden Valley. Suitable breeding and foraging habitat is present in the project area.	Not detected. No further mitigation at this time. Should this species be detected in the study area in the future, all project activities will need to ensure compliance with MBCA at all phases. Future development scenarios should implement mitigation options Index #37 of the Significant Wildlife Habitat Mitigation Support Tool (MNRF 2014), which addresses several development types. Further consultation with the MECP or MNRF may be required.
Bird	Cerulean warbler (*Dendroica cerulean*)									X	Threatened	generally found in mature deciduous forests with an open understorey; also nests in older, second-growth deciduous forests.	Not detected during field investigations	None
Bird	Chimney Swift (*Chaetura pelagica*)	X	X					X		X	Threatened	Historically found in deciduous and coniferous, usually wet forest types, all with a well-developed, dense shrub layer; now most are found in urban areas in large, uncapped chimneys.	Recorded in project area in 2004 and 2013 by LGL Limited. Suitable foraging habitat is present in the study area. No nesting habitat has been confirmed in the study area.	None

Type	Species	Ecologistics (1979)	LGL Surveys (2004-2021)	MNRF NHIC (November 2021)	DFO SAR Mapping (Jan 2021)	Ontario Butterfly Atlas	Ontario Reptile and Amphibian Atlas	OBBA (2001-2005)	eBird (November 2021)	MNRF Screening (List for Waterloo)	Endangered Species Act Designation[1]	Habitat	Potential for Habitat/Screening Conducted by LGL	Mitigation Recommendations
Bird	Common Nighthawk (*Chordeiles minor*)							X	X	X	Special Concern	Generally prefer open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests. Can also be found in urban areas (nest on flat roof-tops)	Not detected. This species wasn't identified in OBBA data, 1979 studies or 2004-2013 LGL field investigations, where it may be incidentally encountered during evening frog monitoring. E-bird provided a record for an August (migratory) observation over Hidden Valley wetland in 2018. And it is reported within the vicinity of Hidden Valley in more recent years. Suitable breeding habitat is present, including in the former quarry northeast of the Hidden Valley Road and Wabanaki Road intersection. Suitable feeding and foraging habitat is present through the study area.	Not detected. No further mitigation at this time. Should this species be detected in the study area in the future, all project activities will need to ensure compliance with MBCA at all phases. Future development scenarios should implement mitigation options Index #37 of the Significant Wildlife Habitat Mitigation Support Tool (MNRF 2014), which addresses several development types. Further consultation with the MECP or MNRF may be required.
Bird	Eastern Meadowlark (*Sturnella magna*)	X						X	X	X	Threatened	This species occurs in tallgrass prairies, open meadows, and fallow agricultural fields.	This species was detected in 2004 by LGL Limited. Subsequent surveys in 2012 and 2013 did not detect the species presence. Suitable habitat not present as fields are planted in corn. Small remnant cultural meadow not of the size typical to support this species.	None
Bird	Eastern whip-poor-will (*Caprimlugus vociferous*)									X	Threatened	Generally prefer semi-open deciduous forests or patchy forests with clearings; areas with little ground cover are also preferred; In winter they occupy primarily mixed woods near open areas.	Not detected. This species wasn't identified in OBBA data, 1979 studies or by 2004-2013 LGL field investigations, where in may be incidentally encountered during evening frog monitoring. No suitable breeding habitat is identified in the study area.	None
Bird	Eastern Wood-Pewee (*Contopus virens*)	X	X					X	X	X	Special Concern	Mixed and deciduous forests in the mid-canopy layer near forest clearings and edges. The forests usually have little understory vegetation.	Recorded in project area in 2021 by LGL Limited.	All project activities will need to ensure compliance with MBCA at all phases. Future development scenarios should implement mitigation options Index #37 of the Significant Wildlife Habitat Mitigation Support Tool (MNRF 2014), which addresses several development types. Further consultation with the MECP or MNRF may be required.
Bird	Golden-winged warbler (*Vermivora chrysoptera*)								X	X	Special Concern	Generally prefer areas of early successional vegetation, found primarily on field edges, hydro or utility right-of-ways, or recently logged areas.	Not detected during field investigations.	None

Type	Species	Ecologistics (1979)	LGL Surveys (2004-2021)	MNRF NHIC (November 2021)	DFO SAR Mapping (Jan 2021)	Ontario Butterfly Atlas	Ontario Reptile and Amphibian Atlas	OBBA (2001-2005)	eBird (November 2021)	MNRF Screening (List for Waterloo)	Endangered Species Act Designation[1]	Habitat	Potential for Habitat/Screening Conducted by LGL	Mitigation Recommendations
Bird	Henslow's sparrow (*Ammodramus henslowii*)									X	Endangered	Generally found in old fields, pastures and wet meadows. They prefer areas with dense, tall grasses, and thatch, or decaying plant material	Not detected during field investigations.	None
Bird	King rail (*Rallus elegans*)									X	Endangered	Generally this species requires large marshes with open shallow water that merges with shrubby areas	Not detected during field investigations, habitat not suitable	None
Bird	Least Bittern (I*xobrychus exilis*)									X	Threatened	Found in wetland habitats with open water. They prefer cattail marshes.	Not detected during field investigations	None
Bird	Louisiana waterthrush (*Seiurus motacilla*)									X	Special concern	Generally inhabits mature forests along steeply sloped ravines adjacent to running water. It prefers clear, cold streams and densely wooded swamps	Not detected during field investigations.	None
Bird	Northern bobwhite (*Colinus virginianus*)							X		X	Endangered	Generally inhabits a variety of edge and grassland type - habitats including non-intensively farmed agricultural lands.	Not detected during field investigations.	None
Bird	Olive-sided flycatcher (*Contopus cooperi*)									X	Special concern	Generally prefers natural forest edges and openings adjacent to rivers or wetlands. Commonly nest in conifers such as White and Black Spruce, Jack Pine and Balsam Fir.	Not detected during field investigations.	None
Bird	Peregrine falcon (*Falco peregrinus*)									X	Special concern	Generally nest on tall, steep cliff ledges adjacent to large waterbodies; some birds adapt to urban environments and nest on ledges of tall buildings, even in densely populated downtown areas.	Not detected during field investigations.	None
Bird	Red-headed woodpecker (*Melanerpes erythrocephalus*)							X	X	X	Special concern	Generally prefer open oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemeteries, as well as along beaver ponds and brooks	Not detected during field investigations.	None
Bird	Short-eared owl (*Asio flammeus*)									X	Special concern (Recommended for Threatened in 2022 by COSSARO)	Generally prefers a wide variety of open habitats, including grasslands, peat bogs, marshes, sand-sage concentrations, old pastures and agricultural fields	Not confirmed, agricultural fields are growing soy and are less suitable for use, leaving very small remnant cultural field patches.	None

Type	Species	Ecologistics (1979)	LGL Surveys (2004-2021)	MNRF NHIC (November 2021)	DFO SAR Mapping (Jan 2021)	Ontario Butterfly Atlas	Ontario Reptile and Amphibian Atlas	OBBA (2001-2005)	eBird (November 2021)	MNRF Screening (List for Waterloo)	Endangered Species Act Designation[1]	Habitat	Potential for Habitat/Screening Conducted by LGL	Mitigation Recommendations
Bird	Yellow-breasted chat (*Icteria virens*)									X	Endangered	Generally prefer dense thickets around wood edges, riparian areas, and in overgrown clearings	Not detected during field investigations	None
Fish	Black redhorse (*Mozostoma duquesnei*)			X	X					X	Threatened	Generally lives in moderately sized rivers and streams, with generally moderate to fast currents .	Not detected in previous fisheries surveys and not shown as being potentially present in watercourses of Hidden Valley (DFO SAR mapping). Present in Main Branch of Grand River.	Ensure project activities protect receiving wetlands and waterbodies through Best Management Practices and Erosion and Sediment Control Plans. May require consultation with MECP and DFO to ensure compliance with the ESA and SARA.
Fish	Silver shiner (*Notropis photogenis*)			X	X					X	Threatened	Generally prefer moderate to large, deep, relatively clear streams with swift currents, and moderate to high gradients	Not detected in previous fisheries surveys, and not shown as being potentially present in watercourses (DFO SAR mapping). Possible/suitable habitat in Grand River.	Ensure project activities protect receiving wetlands and waterbodies through Best Management Practices and Erosion and Sediment Control Plans. May require consultation with MECP and DFO to ensure compliance with the ESA and SARA.
Invertebrate	Monarch butterfly (Danaus plexippus)									X	Special concern	Exist primarily wherever milkweed and wildflowers exist; abandoned farmland, along roadsides, and other open spaces	Detected as incidental encounters.	Avoid milkweed removals during development stages of the Monarch. Ensure restoration plans include suitable host plants.
Invertebrate	Rusty-patched bumble bee (*Bombus affinis*)									X	Endangered	Generally inhabits a range of diverse habitats including mixed farmland, sand dunes, marshes, urban and wooded areas. It usually nests underground in abandoned rodent burrows	Not detected. This species is only known to inhabit Pinery Provincial Park in Ontario and has not been detected in the province since 2009.	None.
Invertebrate	West Virginia white (*Pieris virginiensis*)									X	Special concern	Generally prefer moist, deciduous woodlands. The larvae feed only on the leaves of the two-leaved toothwort (*Cardamine diphylla*), which is a small, spring-blooming plant of the forest floor.	Not detected during field investigations	None
Mammal	American badger (*Taxidea taxus jacksoni*)									X	Endangered	Generally prefer open habitats, whether natural (grasslands) or man-made (agricultural fields, road right-of-ways, golf courses)	Not detected during field investigations	None
Mammal	Little brown myotis (*Myotis lucifugus*)									X	Endangered	Overwintering habitat: Caves and mines that remain above 0C, Maternal Roosts: Often associated with buildings (attics, barns etc.). Occasionally found in trees (25-44 cm dbh).	Assumed present in forested communities of Hidden Valley. SAR bats generally confirmed during studies in support of the River Road Extension (WSP 2020).	Project activities must ensure compliance with the ESA at all phases. Consultation with the MECP will be required.

Type	Species	Ecologistics (1979)	LGL Surveys (2004-2021)	MNRF NHIC (November 2021)	DFO SAR Mapping (Jan 2021)	Ontario Butterfly Atlas	Ontario Reptile and Amphibian Atlas	OBBA (2001-2005)	eBird (November 2021)	MNRF Screening (List for Waterloo)	Endangered Species Act Designation[1]	Habitat	Potential for Habitat/Screening Conducted by LGL	Mitigation Recommendations
Mammal	Northern myotis (*Myotis septentrionalis*)									X	Endangered	Overwintering habitat: Caves and mines that remain above 0C, Maternal Roosts: Often associated with cavities of large diameter trees (25-44 cm dbh). Occasionally found in structures (attics, barns etc.)	Assumed present in forested communities of Hidden Valley. SAR bats generally confirmed during studies in support of the River Road Extension (WSP 2020).	Project activities must ensure compliance with the ESA at all phases. Consultation with the MECP will be required.
Mammal	Tri-colored bat (*Perimyotis subflavus*)									X	Endangered	In Ontario, tri-colored bat may roost in foliage, in clumps of old leaves, hanging moss or squirrel nests. They are occasionally found in buildings although there are no records of this in Canada (Poissant et al, 2010). They typically feed over aquatic areas with an affinity to large-bodied water and will likely roost in close proximity to these. Hibernation sites are found deep within caves or mines in areas of relatively warm temperatures. These bats have strong roost fidelity to their winter hibernation sites and may choose the exact same spot in a cave or mine from year to year.	Assumed present in forested communities of Hidden Valley. SAR bats generally confirmed during studies in support of the River Road Extension (WSP 2020).	Project activities must ensure compliance with the ESA at all phases. Consultation with the MECP will be required.
Mammal	Eastern small-footed myotis (*Myotis leibii*)									X	Endangered	This species is not known to roost within trees, but there is very little known about its roosting habits. The species generally roosts on the ground under rocks, in rock crevices, talus slopes and rock piles. It occasionally inhabits buildings. Areas near the entrances of caves or abandoned mines may be used for hibernaculum, where the conditions are drafty with low humidity, and may be subfreezing (Humphrey 2017).	Assumed present in Hidden Valley. SAR bats were generally confirmed during studies in support of the River Road Extension (WSP 2020).	Project activities must ensure compliance with the ESA at all phases. Consultation with the MECP will be required.
Mussel	Rainbow mussel (*Villosa iris*)				X					X	Special Concern	Most abundant in shallow, well-oxygenated reaches of small- to medium-sized rivers and sometimes lakes, on substrates of cobble, gravel, sand and occasionally mud	Not detected or recorded as being potentially present (as indicated by DFO SAR mapping) in Hidden Valley. Confirmed present in Grand River.	Ensure project activities protect receiving wetlands and waterbodies through Best Management Practices and Erosion and Sediment Control Plans. May require consultation with MECP and DFO to ensure compliance with the ESA and SARA.
Mussel	Wavy-rayed lampmussel (*Lampsilis fasciola*)				X					X	Threatened	Generally inhabit clear rivers and streams of a variety of sizes, where the water flow is steady and the substrate is stable	Not detected or recorded as being potentially present (as indicated by DFO SAR mapping) in Hidden Valley. Confirmed present in Grand River.	Ensure project activities protect receiving wetlands and waterbodies through Best Management Practices and Erosion and Sediment Control Plans. May require consultation with MECP and DFO to ensure compliance with the ESA and SARA.

Type	Species	Ecologistics (1979)	LGL Surveys (2004-2021)	MNRF NHIC (November 2021)	DFO SAR Mapping (Jan 2021)	Ontario Butterfly Atlas	Ontario Reptile and Amphibian Atlas	OBBA (2001-2005)	eBird (November 2021)	MNRF Screening (List for Waterloo)	Endangered Species Act Designation[1]	Habitat	Potential for Habitat/Screening Conducted by LGL	Mitigation Recommendations
Reptile	Blanding's turtle (*Emydonidea blandingii*)						X			X	Threatened	Generally occur in freshwater lakes, permanent or temporary pools, slow-flowing streams, marshes and swamps. They prefer shallow water that is rich in nutrients, organic soil and dense vegetation. Adults are generally found in open or partially vegetated sites, and juveniles prefer areas that contain thick aquatic vegetation including sphagnum, water lilies and algae. They dig their nest in a variety of loose substrates, including sand, organic soil, gravel and cobblestone. Overwintering occurs in permanent pools that average about one metre in depth, or in slow-flowing streams	Not detected during field investigations.	None
Reptile	Eastern ribbonsnake (*Thamnophis sauritus*)						X			X	Special Concern	Generally occur along the edges of shallow ponds, streams, marshes, swamps, or bogs bordered by dense vegetation that provides cover. Abundant exposure to sunlight is also required, and adjacent upland areas may be used for nesting	Not detected during field investigations.	None
Reptile	Milksnake (*Lampropeltis triangulum*)		X				X			X	No longer listed	Generally occur in rural areas, where it is most frequently reported in and around buildings, especially old structures. It is also found in a wide variety of habitats, from prairies, pastures, and hayfields, to rocky hillsides and a wide variety of forest types. They must also be in proximity of water, and suitable locations for basking and egg-laying.	Not detected since 2004 in study area. May potentially occur in study area. No area of hibernacula identified.	None
Reptile	Northern map turtle (*Graptemys geographica*)									X	Special concern	Generally inhabits both lakes and rivers, showing a preference for slow moving currents, muddy bottoms, and abundant aquatic vegetation. These turtles need suitable basking sites (such as rocks and logs) and exposure to the sun for at least part of the day.	Not detected during field investigations	None

Type	Species	Ecologistics (1979)	LGL Surveys (2004-2021)	MNRF NHIC (November 2021)	DFO SAR Mapping (Jan 2021)	Ontario Butterfly Atlas	Ontario Reptile and Amphibian Atlas	OBBA (2001-2005)	eBird (November 2021)	MNRF Screening (List for Waterloo)	Endangered Species Act Designation[1]	Habitat	Potential for Habitat/Screening Conducted by LGL	Mitigation Recommendations
Reptile	Queensnake (*Regina septemvittata*)									X	Endangered	Generally require a permanent body of water, flowing or still, with a temperature remaining at or above 18.3°C throughout most of the active season; abundant cover, such as flat rocks submerged and/or on the bank; and an abundance of crayfish. Other important habitat features may include rocky, gravelly, or slate stream-bed substrates, swift to moderate current, and woodland surroundings.	Not detected during field investigations	None
Reptile	Snapping turtle (*Chelydra serpentina)*		X				X			X	Special concern	Generally inhabit shallow waters where they can hide under the soft mud and leaf litter. Nesting sites usually occur on gravely or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits.	Confirmed present in study area as resident, with overwintering and nesting habitat identified.	Future development scenarios should implement mitigation options Indices #28 and #37 of the Significant Wildlife Habitat Mitigation Support Tool (MNRF 2014), which addresses several development types. Further consultation with the MECP or MNRF may be required.
Reptile	Wood turtle (*Glyptemys insculpta*)									X	Endangered	Generally inhabit fresh-water rivers and streams with sandy or gravely-sandy bottoms and prefers clear meandering watercourses with a moderate current. They nest on sand or gravel-sand beaches and banks. Although they prefer riparian areas with diverse, patchy cover, females also lay in gravel holes, at the edges of roads and railways, in utility right-of-ways, in farming fields, pastures and former fields – any sunny and easily dug spot.	Not detected during field investigations	None
Amphibian	Jefferson salamander (*Ambystoma jeffersonianum*)		X				X			X	Endangered	Inhabit deciduous and mixed deciduous forests with suitable breeding areas which generally consist of ephemeral (temporary) bodies of water that are fed by spring runoff, groundwater, or springs.	Species confirmed in project area, habitat regulations obtained for project area with the most recent regulated habitat map identified from 2018. Additional information on extent of habitat use has been collected on behalf of the landowner by consultants, however this information was not available for this report.	Ensure project activities are following the ESA through all project stages. Consultation with MECP will be required.