Final

Gordon Street (Lowes Road to Landsdown Drive), Guelph Schedule 'B' Class Environmental Assessment

Environmental Impact Study

Prepared for:

IBI Group
410 Albert Street, Suite 101
Waterloo, Ontario N2L 3V3

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NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Gordon Street (Lowes Road to Landsdown Drive), Guelph Schedule 'B' Class Environmental Assessment

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Project Team

Ryan Archer	Terrestrial and Wetland Biologist; Project Manager
Jeremy Bannon	Terrestrial and Wetland Biologist; Certified Arborist
Gerry Schaus	GIS Specialist

Report submitted on July 17, 2020

Ryan Archer, M.Sc.

Project Manager

Terrestrial and Wetland Biologist

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1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained by IBI Group, on behalf of the City of Guelph, to complete an Environmental Impact Study (EIS) to inform the Schedule "B" Municipal Class Environmental Assessment (EA) for improvements to Gordon Street in the City of Guelph. The EA study area comprises Gordon Street between Lowes Road in the south and Landsdown Drive in the north.

The Municipal Class EA is required due to the City's plans to construct a continuous two-way left-turn lane (TWLT) within the Gordon Street right-of-way (ROW). As a major north-south arterial road that is located within a rapidly growing part of the city, Gordon Street is and will continue to experience increasing traffic volumes associated with adjacent residential and commercial lands as well as the nearby University of Guelph. Upgrades to the road infrastructure are required to meet the existing and future traffic demands within the study area corridor. A TWLT lane is required to alleviate traffic congestion associated with left-turning vehicles both at road intersections and at various driveways along the study area stretch of Gordon Street. Road upgrades to install a TWLT lane will also provide opportunity for other improvements to road infrastructure, such as stormwater management and cycling/pedestrian movement, and will provide an opportunity to further mitigate deer road crossing hazards to motorists at two known deer crossing points within the study area.

An EIS is required by the City to address the following main objectives:

- Characterize adjacent vegetation communities, and confirm wetland boundaries with agency staff;
- Complete a preliminary Tree Inventory and Preservation Plan (TIPP) (summarized in the EIS, with full report provided under separate cover);
- Complete a screening for Species at Risk (SAR) with input from agency staff;
- Provide recommendations to reduce wildlife road mortality as part of road upgrade designs, with a focus on known deer crossing locations; and,
- Complete an impact assessment, identify mitigation measures and provide recommendations to inform the preliminary design, and to be carried forward to detailed design.

For the purposes of this report, the EIS study area comprises Gordon Street between Lowes Road and Landsdown Drive and adjacent lands up to 120m from the Gordon Street ROW. This report references a study area orientation in which Gordon Street runs north-south.

The study area falls within a heavily urbanized landscape within south Guelph that is dominated by single-detached, townhouse and multi-storey condominium residential development with some commercial businesses along the south end of the Gordon Street corridor. However, a large portion of the Gordon Street ROW abuts City-mapped Natural Heritage System (NHS) features to the west, south of Edinburgh Road. These natural features primarily comprise a portion of the Hanlon Creek Swamp Provincially Significant Wetland (PSW) complex as well as associated City-mapped Locally Significant Wetland (LSW). The City has also identified Significant Wildlife Habitat (SWH) within these wetland features due to the presence of deer overwintering habitat as originally identified by the Ontario Ministry of Natural Resources and Forestry (MNRF). These features are defined as Significant Natural Areas as described in the City Official Plan (OP) (City of Guelph 2018) and as mapped on Schedules 4, 4A and 4E of the OP (Appendix I).

The study area also contains a City-mapped Ecological Linkage (Schedule 4 of the OP), which crosses Gordon Street north of Arkell Road and connects the Hanlon Creek Swamp PSW to the west with the Torrance Creek Swamp PSW to the east. This linkage provides a corridor for wildlife movement, particularly for White-tailed Deer (*Odocoileus virginianus*), which are known to use the linkage to travel between overwintering and summer foraging habitats between these PSW features (TSHA et al. 1999, Dougan and Associates 2005, Dougan & Associates 2009). As part of land development applications for properties containing the OP-mapped Ecological Linkage ((NRSI 2002a, 2002b, North-South Environmental 2011, NRSI 2014, Stantec 2014, NRSI 2017), refinements have been made to the Ecological Linkage boundaries as confirmed by the City through development approvals. The refined Ecological Linkage (approximate boundaries) is shown on Map 1.

Two known deer road crossing locations are identified within the study area as mapped in OP Schedule 4. One is located in line with the Ecological Linkage crossing of Gordon Street, while the other is located immediately north, just south of the intersection with Edinburgh Road. These deer crossing locations are the focal areas in which deer road crossing mitigation measures are required. OP Schedule 4 also identifies Restoration Areas as another category of

Significant Natural Area. No Restoration Areas occur in immediate proximity to the study area Gordon Street ROW.

These features collectively represent components of Significant Natural Areas as mapped in the OP. See Map 1 for the location of these features, which represent the extent of the City's NHS within the EA study area. Other elements of the City's NHS, including Significant Woodland (to the west and east) and Significant Valleyland (to the west), are located in the surrounding vicinity but outside the EA study area as mapped in the OP.

2.0 Background Information Review

Existing natural heritage information was gathered and reviewed to identify key natural heritage features and species that are known or have potential to occur within the study area. Key sources of information included the Torrance Creek Subwatershed Study (TSHA et al. 1999), the City of Guelph Natural Strategy technical reports (Dougan and Associates 2005, 2009), and EIS reports for land developments within the study area including the following:

- *Salvation Army, City of Guelph Environmental Impact Study* (NRSI 2002a)
- *Salvation Army, City of Guelph Environmental Impact Study Addendum* (NRSI 2002b)
- *1274-1288 Gordon Street Environmental Impact Statement* (North-South Environmental 2011)
- *1274-1288 Gordon Street, Guelph – EIS Addendum* (North-South Environmental 2013)
- *Arkell Woods, 44, 56, 66 and 76 Arkell Road, City of Guelph Environmental Impact Study* (NRSI 2014)
- *Site Plan Application for the Proposed Condominium Development at 1291 Gordon St. in Guelph, ON; Environmental Implementation Report Addendum – Revised* (Stantec 2014)
- *1300 Gordon Street, Guelph Environmental Impact Study* (NRSI 2017)
- *1300 Gordon Street, Guelph Environmental Impact Study Addendum* (NRSI 2018)

The Environmental Study Report for the Gordon Street/Wellington Road 46 Class EA (TSHA 2000) was also referenced, which described previous upgrades made to Gordon Street within the current study area including measures that were taken to mitigate deer road crossing hazards.

Additional background information review was undertaken to incorporate any new information that may be available since completion of the previously completed studies.

Existing background information was requested from the Grand River Conservation Authority (GRCA) and the City of Guelph. A written response was received from the GRCA on May 2, 2019. City staff provided existing information of relevance to the study, including some of the above-listed EIS reports and site plan drawings for existing and proposed developments along Gordon Street.

Background information on the natural environment features within the study area vicinity was also gathered from the MNRF Natural Heritage Information Centre significant species database (MNRF 2019a), the MNRF's Land Information Ontario, and relevant taxa-specific databases, as listed below.

Initial wildlife species lists were compiled to provide information on species reported from the vicinity of the study area (10km radius) using various atlases including the Ontario Mammal Atlas (Dobbyn 1994), the Ontario Reptile and Amphibian Atlas (Ontario Nature 2018), the Ontario Butterfly Atlas (MacNaughton et al. 2019), and the Ontario Odonata Atlas (MNRF 2019b). Data on breeding birds in the area was extracted from the Ontario Breeding Bird Atlas (BSC et al. 2008). Since this atlas provides data based on 10x10km survey squares, information on breeding birds from the square that overlaps the study area (17NJ61) was compiled.

Other information sources that were reviewed included the following:

- City of Guelph Official Plan (City of Guelph 2018)
- *Hanlon Creek Watershed Plan* (MMM and LGL 1993)
- *Hanlon Creek State-of-the-Watershed Study* (PEIL 2003)
- GRCA online mapping (2019).

The planned approach to completing the EA, including the required scope of the EIS, was discussed at an EA kick-off meeting held on April 10, 2019 involving members of the study team and City staff.

2.1 Significant Species Habitat Screening

Species at Risk (SAR) are those listed on the Species at Risk in Ontario List (Ministry of Environment, Conservation and Parks (MECP) 2019). These include species identified by the Committee on the Status of Species at Risk in Ontario (COSSARO) as provincially Endangered, Threatened, or Special Concern (Government of Canada 2019). Species listed as Endangered or Threatened are protected under the ESA, which includes protection of their habitat.

Species considered Special Concern are included in the definition of Species of Conservation Concern (SCC), which includes the following:

- species designated provincially as Special Concern,

- species that have been assigned a conservation status (S-Rank) of S1 to S3 or SH by the Natural Heritage Information Centre (MNRF 2019a), and
- species that are designated federally as Threatened or Endangered by the Committee for the Status of Endangered Wildlife in Canada (COSEWIC) but not provincially by the COSSARO. These species may be protected by the federal *Species at Risk Act* (SARA) if they are listed as Threatened or Endangered on Schedule 1 of the SARA.

Habitat for SCC is considered SWH (OMNR 2010), which is afforded protection under the Provincial Policy Statement (OMMAH 2020) and City natural heritage protection policies. For the purposes of this report, the term "SAR" will refer to provincially Threatened and Endangered species regulated under the ESA while provincial species of Special Concern will be considered SCC.

Based on NRSI's examination of background sources and federally or provincially significant species with occurrence records in the study area vicinity (within 10km), an assessment of SAR and SCC suitable habitat presence within the study area was completed. Assessments of habitat suitability in the study area were made by cross-referencing each species' known habitat preferences or requirements (e.g., OMNR 2000) with existing natural features based on previous project reporting, NRSI biologist knowledge of the study area, and review of recent satellite imagery of the study area.

Based on the results of the preliminary screening, the following SAR were identified as having potential for suitable habitat within the study area:

- Butternut (*Juglans cinerea*) – provincially and federally Endangered
- Bank Swallow (*Riparia riparia*) (foraging habitat only) – provincially and federally Threatened
- Barn Swallow (*Hirundo rustica*) – provincially and federally Threatened
- Chimney Swift (*Chaetura pelagica*) – provincially and federally Threatened
- American Badger (*Taxidea taxus jacksoni*) (Jacksoni subspecies) – provincially and federally Endangered
- Eastern Small-footed Myotis (*Myotis leibii*) – provincially Endangered
- Little Brown Myotis (*Myotis lucifugus*) – provincially and federally Endangered

- Northern Myotis (*Myotis septentrionalis*) – provincially and federally Endangered
- Tri-colored Bat (*Perimyotis subflavus*) – provincially and federally Endangered

See Appendix II for the full habitat screening table for SAR and SCC with occurrence records in the study area vicinity.

A preliminary screening for the presence of SWH was also completed for the study area. The Significant Wildlife Habitat Technical Guide (SWHTG) outlines the types of habitats that the MNRF considers significant in Ontario as well as criteria to identify these habitats for Ecoregion 6E (OMNR 2000, MNRF 2015), in which the study area is located. The SWHTG groups SWH into five broad categories: seasonal concentration areas, rare vegetation communities, specialized wildlife habitat, habitats of SCC, and animal movement corridors.

One form of confirmed SWH is known from the study area: Deer Winter Congregation Areas SWH. This SWH extends to just within 120m of the Gordon Street ROW as mapped by the MNRF and is associated with the Hanlon Creek PSW to the west. This SWH has been recognized as a component of the City's NHS as mapped in Schedule 4E of the OP.

Based on the preliminary screening, the following were identified as Candidate SWH types within the study area:

- Bat Maternity Colonies
- Snake Hibernaculum *(including habitat for the SCC Eastern Ribbonsnake* (*Thamnophis sauritus septentrionalis*)*)*
- Waterfowl Nesting Area
- Turtle Nesting Area *(including habitat for the SCC Snapping Turtle* (*Chelydra serpentina serpentina*)*)*
- Amphibian Breeding Habitat (Woodland) *(including habitat for the SCC Western Chorus Frog* (*Pseudacris triseriata*)*)*
- Terrestrial Crayfish
- Potential habitat for the following SCC that is not addressed through other SWH categories:
    - Common Nighthawk (*Chordeiles minor*)

- Eastern Wood-Pewee (*Contopus virens*)
- Red-headed Woodpecker (*Melanerpes erythrocephalus*)

Monarch (*Danaus plexippus*) and Golden-winged Warbler (*Vermivora chrysoptera*) were also screened as having potential suitable habitat within the study area. These SCC are addressed under the categories of Migratory Butterfly Stop-over Area SWH and Shrub/Early Successional Bird Breeding Habitat SWH, respectively (MNRF 2015). However, based on provincial significance criteria these SWH categories are considered absent in the study area.

Although habitats for the SCC Monarch and Golden-winged Warbler do not qualify as SWH within the study area, suitable habitats for these species would fall under the City of Guelph's OP policies for Natural Areas. Specifically, habitats for provincially significant species (e.g., SCC) that are not considered provincial SWH are governed by OP policies identified in Section 4.1.4.4 (Habitat for Significant Species) (City of Guelph 2018).

See Appendix III for a summary of the SWH screening exercise including rationale as to whether the SWH types are considered "candidate" or not present within the study area.

3.0 Relevant Policies, Legislation and Planning Studies

Table 1 provides an overview of natural heritage-based policies, planning studies and legislation that were considered and which informed the field program and analysis. To help inform areas of opportunity for road improvement works and identify areas to be protected, inventoried natural features were evaluated against relevant policies, regulations, legislation and land use planning recommendations outlined in the following sections. The specific implications of these policies to the proposed undertaking are discussed in further in Section 4.0.

Table 1. Relevant Policies, Legislation and Planning Studies

Policy/Legislation	Description	Project Relevance
Provincial Policy Statement (OMMAH 2020).	• Issued under the authority of Section 3 of the Planning Act and came into effect on May 1, 2020, replacing the 2014 PPS. • Section 2.1 of the PPS – Natural Heritage establishes clear direction on the adoption of an ecosystem approach and the protection of resources that have been identified as 'significant'. • The Natural Heritage Reference Manual (OMNR 2010) and the Significant Wildlife Habitat Technical Guide (OMNR 2000, MNRF 2015a) were prepared by the MNRF to provide guidance on identifying natural features and in interpreting the Natural Heritage sections of the PPS	• Natural features that occur or may occur within the study area, and which receive protection under the PPS, include: o Provincially Significant Wetland, o Significant Woodland, o Significant Wildlife Habitat, and o Potential habitat for Endangered and Threatened species. • Section 2.1.4 of the PPS states that development or site alteration shall not be permitted in Provincially Significant Wetlands located in Ecoregion 6E (in which the study area is located). • Section 2.1.5 of the PPS states that development or site alteration shall not be permitted in Significant Woodland or Significant Wildlife Habitat unless it has been demonstrated that there will be no negative impacts on the features or their ecological functions. • Section 2.1.8 of the PPS states that development and site alteration shall not be permitted on adjacent lands to the natural features described above unless it is demonstrated that there will be no negative impacts to the natural features or their ecological functions. • Section 2.1.7 of the PPS states that development or site alteration shall not be permitted in habitat of Endangered or Threatened species except in accordance with provincial or federal requirements. • Section 2.1.2 of the PPS states that the connectivity of natural features in an area should be maintained, restored, or where possible, improved.
Endangered Species Act	• The original ESA, written in 1971, underwent a year-long review which resulted in a number of changes which came into force in 2007. • The ESA prohibits killing, harming, harassing or capturing SAR and protects their habitats from damage and destruction.	• Based on a preliminary assessment, multiple SAR were identified as having the potential to occur within the study area based on presence of suitable habitat.

Policy/Legislation	Description	Project Relevance
Migratory Birds Convention Act	• Prohibits the disturbance, destruction, or taking of a nest or eggs of migratory birds.	• Any vegetation removal required for construction of the road improvements must have regard for this legislation in the form of timing window restrictions or other suitable mitigation measures.
City of Guelph Official Plan (City of Guelph 2018)	• The City's NHS, as presented in the OP, includes Significant Natural Areas and Natural Areas and their minimum buffers, which have been defined based on their level of significance and mapped in the Official Plan schedules. • The NHS also includes Ecological Linkages, Restoration Areas and Wildlife Crossings as shown on Schedule 4 of the OP. • Significant Natural Areas include several categories of natural feature and area defined in the OP, including but not limited to Significant Wetlands, Fish Habitat, Significant Woodlands, SWH, Ecological Linkages, Restoration Areas and buffers associated with these features. • The purpose of the NHS as defined and mapped by the City is to o provide permanent protection for Significant Natural Areas, including Ecological Linkages, and their protective buffers; o identify Natural Areas for further study to determine areas requiring permanent protection within the NHS; and, o identify wildlife crossings to ensure mitigative measures are taken to minimize harm to wildlife, the public and property.	• The study area contains Significant Natural Area, including an Ecological Linkage, Deer Crossings, and Restoration Areas as mapped in Schedule 4 of the OP. • These areas are further characterized under OP NHS mapping to identify which natural heritage features are present. These include: - Provincially Significant Wetland and Locally Significant Wetland (Schedule 4A), - Significant Wildlife Habitat (Schedule 4E). • Habitat for SAR (Threatened and Endangered Species) is considered a form of Significant Natural Area where confirmed. • "Natural Areas", as defined in Section 4.1.4 of the OP, may also occur in the study area including the following: - Cultural Woodlands, - Habitat of Significant Species - Established Buffers. • Minimum and established buffers from the identified Significant Natural Areas and Natural Areas are to be incorporated into the Significant Natural Area or Natural Area that they are associated with, as per OP Section 4.1.1.10. • In accordance with OP Section 4.1.2.9, legally existing uses, including infrastructure and their normal maintenance, are recognized and may continue within the Natural Heritage System. "Infrastructure" includes transit and transportation corridors and facilities. "Normal Maintenance" means activities undertaken in conjunction with infrastructure, including roads, to ensure regular operation parameters and public safety in accordance with the associated guidelines,

Policy/Legislation	Description	Project Relevance
		regulations and maintenance policies, procedures and risk mitigation strategies for the infrastructure. • Where the City is undergoing public infrastructure improvements, species-appropriate mitigative measures will be implemented where warranted to minimize the incidence of human-wildlife conflict (OP Section 4.1.5.4).
Hanlon Creek Watershed Plan (MMM and LGL 1993)	• The Watershed Plan was developed to determine the measures necessary to protect and enhance the natural resources of the Hanlon Creek watershed and to define the level of development which could proceed within the constraints established for this protection.	• The natural features of the watershed were mapped and characterized, including the Hanlon Creek wetland complex that falls within the EA study area. • Recommendations were made to protect and enhance the core natural areas, including the implementation of site-specific buffers. • It was recommended that corridors be established that link the core natural areas into a continuous system. • Land use constraints were identified for natural core areas, buffers and linkages to allow for the protection and enhancement of these features. • The Plan recommended that the wetland buffer should include upland open habitat adjacent to Gordon Street and that a linkage to the Torrance Creek subwatershed can be provided.
Torrance Creek Subwatershed Study (TSHA et al. 1999)	• The Torrance Creek Subwatershed Study was prepared to provide a Management Strategy for the subwatershed to guide future land use and resource management. • Natural features and wildlife movement corridors were mapped and described to inform future land use planning within the subwatershed.	• Figure 4.22 of the Subwatershed Study identified the presence of a wildlife corridor crossing of Gordon Street, which corresponds to the current City OP mapping of an Ecological Linkage within the EA study area. • Section 6.3.3 identifies the wildlife corridor crossing at Gordon Street as a known deer movement corridor.
Guelph Natural Heritage Strategy, Phase 2: Terrestrial Inventory & Natural Heritage System	• The objectives of the Phase 2 report included application of defensible criteria toward developing a recommended NHS for the City of Guelph. • The resulting recommended NHS was used to inform current OP consolidation.	• Figure 7 maps the presence of the Hanlon Creek PSW and recommended 30m buffer within the EA study area. • Figure 11 maps the presence of Deer Wintering area as a form of SWH within the wetland features to the west of Gordon St. within the EA study area.

Policy/Legislation	Description	Project Relevance
(Dougan and Associates 2009)		• Figure 12 identifies the location of an Ecological Linkage with an associated Confirmed Deer Crossing at Gordon Street north of Arkell Road, as well as an additional Confirmed Deer Crossing at Gordon Street just south of Edinburgh Road. • These features were used to inform, and are consistent with, the Significant Natural Area and Deer Crossing locations identified in the OP.
GRCA Regulation 150/06	• Regulation issued under *Conservation Authorities Act,* R.S.O. 1990. • Through this regulation, the GRCA has the responsibility to regulate activities in natural and hazardous areas (i.e., areas in and near rivers, streams, floodplains, wetlands, and slopes).	• The study area includes lands that fall within the regulation limit of the GRCA due to the presence of the Hanlon Creek Swamp PSW and the adjacent area of interference surrounding the wetland features. • As such, permitting from the GRCA must be obtained for proposed works within their regulation area. • An EIS is required to demonstrate that the proposed development will result in no negative impact to the regulated natural features and their ecological functions.

4.0 Field Methods

Terrestrial field surveys were undertaken within the study area to characterize natural features and identify those that are significant and sensitive and that have potential to be adversely affected by the proposed undertaking. A total of 3 site visits were completed during May 2019. A 4th visit was completed in June 2020 following the City's extension of the EA study area limit from Edinburgh Road to Landsdown Drive in the north. The field investigations comprised 2 main components: tree inventory and assessment of potential bat roosting tree habitat, which focused on areas within and immediately adjacent to the study area ROW, and characterization and mapping of the natural features located west of Gordon Street and south of Edinburgh Road. The natural features west of Gordon Street are on land owned by the GRCA and were therefore accessible for NRSI site investigation outside of the municipal ROW boundary. These fieldwork tasks are described in more detail below.

Vegetation Community Mapping and Species Inventories

Vegetation communities within the study area were described and mapped using the Ecological Land Classification (ELC) system for southern Ontario (Lee et al. 1998) on May 23, 2019. ELC vegetation community mapping was restricted to the area west of Gordon Street and south of Edinburgh Road. This area represents the only area of natural feature coverage within the study area, with the exception of features north of Edinburgh Road that fall well to the rear of existing residential development that is located along the west side of Gordon Street. A comprehensive inventory of vascular flora was completed to inform the ELC vegetation community classifications. The vegetation inventory also included culturally-influenced and planted vegetation within the study area ROW and on developed properties immediately adjacent to (e.g., within 5m of) the ROW.

A site visit with GRCA staff was completed on May 23, 2019 to review and confirm the wetland boundary adjacent to the Gordon Street ROW within the study area. This boundary was interpreted to represent the boundary of the Hanlon Creek Swamp PSW. This is consistent with standard practices of City staff, whereby if the limit of wetland mapped as LSW in the OP is contiguous with PSW and is confirmed with City/GRCA staff, the outer wetland limit is incorporated into the PSW (L. Lefler, City of Guelph, pers. comm., July 2019). The confirmed boundary was immediately georeferenced by NRSI staff to sub-50cm accuracy using an SXBlue II GNSS GPS unit.

Tree Inventory

All trees ≥10cm diameter-at-breast-height (DBH) within the study area ROWs, including intersecting roads to a distance of approximately 20m from Gordon Street, were inventoried and assessed for health condition by Certified Arborists on May 27, 2019, and on June 25, 2020 within the Edinburgh Road-Landsdown Drive study area extension section. Trees immediately adjacent to (i.e., within approximately 5m of) the ROW limits, as could be accessed, were also inventoried where potential for road improvement impacts to adjacent trees exists. The following information was recorded for each tree:

- species,
- DBH (cm),
- crown radius (m),
- general health (excellent, good, fair, poor, very poor), and
- potential for structural failure (low, medium, high),
- general comments (i.e. disease, aesthetic quality, development constraints, sensitivity to development).

The location of each inventoried tree was georeferenced to sub-50cm accuracy using an SXBlue II GNSS GPS unit by the Certified Arborist. See the Tree Inventory and Preservation Plan (TIPP) for this Class EA (NRSI 2020) for additional discussion about the tree inventory methodology.

Bat Habitat Tree Assessment

An inspection of trees within the study area ROWs was completed to determine the presence of suitable snags or cavity trees that may provide bat roosting or maternity colony habitat. The initial assessment completed within the original Lowes Road to Edinburgh Road EA study area was timed to occur prior to full leaf-out so as to improve the likelihood of observing suitable roosting features on the trees. Due to the required seasonal timing of the site investigation completed for the Edinburgh Road-Landsdown Drive study area extension section (completed on June 25, 2020), the assessment was completed during leaf-on conditions. However, because trees within this section entirely comprise planted individuals and are widely spaced, a relatively thorough inspection of each tree was still possible despite the obscuring effects of the foliage. Bat habitat assessments were completed by staff experienced in such surveys and

followed guidelines for the identification of suitable bat habitat outlined in the MNRF's *Survey Protocol for Species at Risk Bats in Treed Habitats* (MNRF 2017a). This information was collected to assess the potential occurrence of SAR habitat for Little Brown Myotis, Northern Myotis, Tri-colored Bat, which make use of trees for roosting habitat. Any suitable habitat trees were documented and GPS-georeferenced on standardized survey forms.

Wildlife Habitat Assessment

Natural features within the study area were investigated for the presence of potentially significant habitats based on the screening exercise results presented in Section 2.1. This included searches for features such as potential snake hibernaculum access structures or terrestrial crayfish chimneys. Targeted wildlife surveys were not completed as part of this study scope. However, assessments of significant wildlife habitat suitability were made based on the natural feature characterization (see Section 6.0).

5.0 Existing Conditions

5.1 Physical and Hydrological Conditions

The study area is located within the physiographic region known as the Guelph Drumlin Field (Chapman and Putnam 1984). These drumlins are primarily comprised of loamy and calcareous till deposits, referred to as Wentworth Till. Local soils generally comprise stoney tills and deep gravel terraces typical of drumlins and meltwater spillways. Surficial soils within the study area vicinity have generally been described as within the "Guelph Series", comprising well drained soils with a predominantly loamy texture (North-South Environmental 2011).

The study area falls within the eastern extent of the Hanlon Creek subwatershed, with the topographical break for the adjacent Torrance Creek subwatershed located nearby to the east of the study area. The terrain is relatively gently sloping toward the west. No watercourses or other defined surface drainage channels exist within the study area.

5.2 Vegetation

5.2.1 Vegetation Communities

Natural features within the study area are limited to lands to the west of Gordon Street from Edinburgh Street in the north to approximately opposite the intersection with Arkell Road in the south. These lands are dominated by wetland associated with the Hanlon Creek Swamp PSW complex, plantation and meadow habitat.

See Map 2 for vegetation community and other land cover mapping for the study area and adjacent lands. A summary of ELC communities identified within the study area is provided in Table 3.

Table 2. Vegetation Communities within the Study Area

ELC Ecosite Type	ELC Description	Environmental Characteristics
Wetland		
MAS2-1	Cattail Mineral Shallow Marsh Type	This cattail community is dominated by Broad-leaved Cattail (*Typha latifolia*), and continues south into the Hanlon Creek Swamp feature (Map 2). Very few additional species are present within this wetland community, with Glossy Buckthorn (*Frangula alnus*) increasingly present nearer the northern boundary, transitioning into the SWT2-13 community. Narrow-leaved Cattail (*Typha angustifolia*) is also present in scattered, concentrated pockets. Few invasive species were documented within this community, excepting the

ELC Ecosite Type	ELC Description	Environmental Characteristics
		Glossy Buckthorn around the edge. One regionally significant species was documented within this community; an individual Sweet Gale (*Myrica gale*) (Map 3).
SWT2-13	Non-native Mineral Thicket Swamp Type	This thicket swamp community is dominated by dense Glossy Buckthorn. Located in the transition from shallow cattail marsh to the dry cultural communities to the east, more typical woody wetland species are persisting within breaks in the Glossy Buckthorn. White Birch (*Betula papyrifera*), Eastern Tamarack (*Larix laricina*), Trembling Aspen (*Populus tremuloides*) and Green Ash (*Fraxinus pennsylvanica*) are present in relatively low abundance. The ground layer is relatively sparse outside of the northern transitional edge, and contains goldenrods (*Solidago* spp.), Tall Buttercup (*Ranunculus acris*), and Reed Canary Grass (*Phalaris arundinacea*). Scots Pine (*Pinus sylvestris*) is present within the eastern portions of the community.
Cultural		
CUM	Cultural Meadow	East, and upland from the shallow marsh as well as within a drier lobe surrounded by swamp thicket, two similar cultural meadows are present (Map 2). Relatively diverse, these meadows comprise Smooth Brome (*Bromus inermis* ssp. *inermis*), Tall Buttercup, Wild Carrot (*Daucus carota*), Common Yarrow (*Achillea millefolium* ssp. *millefolium*), and Reed Canary Grass. Some establishing shrub and tree species include Glossy Buckthorn, Eastern Tamarack, Eastern White Cedar (*Thuja occidentalis*), White Birch, Trembling Aspen and White Spruce (*Picea glauca*). The majority of shrub and tree species represent wet-tolerant species, which indicates that the community likely experiences wet periods in early spring or during heavy rainfall events, eventually draining into the wetland communities and the Hanlon Creek Swamp to the south.
CUP3-3	Scots Pine Cultural Plantation	This community is a monoculture, row-planted naturalizing Scots Pine plantation, located east of the swamp thicket community of the PSW (Map 2). Dominated by Scots Pine, few other tree or shrub species are present. Limited White Birch, White Spruce, Glossy Buckthorn, European Buckthorn (*Rhamnus cathartica*) and Tartarian Honeysuckle (*Lonicera tatarica*) are scattered throughout the community. The groundcover is sparse, except around the edges of the plantation, and includes Smooth Brome, Field Horsetail (*Equisetum arvense*) and Tall Buttercup.
Residential	Residential	Manicured lawns are present throughout the study area, largely consisting of common lawn species including Kentucky Bluegrass (*Poa pratensis*), Red Clover (*Trifolium pratense*), White Clover (*Trifolium repens*), Black Medick (*Medicago lupulina*) and Smooth Brome. These areas were noted to be regularly maintained, and

ELC Ecosite Type	ELC Description	Environmental Characteristics
		are not considered suitable to represent any natural ELC community type.

5.2.2 Vascular Flora

In total, 77 plant species were identified during the vegetation and tree inventories. A complete list of these species is appended to this report (Appendix IV). Several of these comprised planted species within the ROW or on adjacent developed lands. Natural vegetative growth was primarily located within the natural vegetation communities west of Gordon Street and south of Edinburgh Road. Of the species observed within the study area, 47% were non-native species. Several of these species comprised ROW/developed land plantings, although multiple non-native species were also observed within the natural features. These included Scots Pine (*Pinus sylvestris*), which occurred as a plantation, and European Buckthorn (*Rhamnus cathartica*) and Glossy Buckthorn (*Frangula alnus*), which were dominant shrub thicket species and present within all identified vegetation communities.

Several of the naturally occurring inventoried species are urban-tolerant and reflective of disturbed or culturally-influenced conditions. However, certain observed species, such as those associated with the wetland, have lower tolerances to site alteration and disturbance and have a higher fidelity to a particular suite of habitat conditions (species with higher Coefficient of Conservatism (CC) values; see Appendix IV). These include species such as Tamarack (*Larix laricina*), Spotted Water-hemlock (*Cicuta maculata*), and Sweet Gale (*Myrica gale*), which have moderately high CC values of 6-7. The presence of these species is indicative of higher quality habitat conditions within the PSW, although the peripheral wetland edges inventoried within the study area exhibited a disturbance regime influenced by the proximity of developed areas. Roadside areas that are most likely to be impacted by the proposed undertaking were regularly mown sod grasses within the ROW and adjacent private lawn edges.

No federally or provincially significant vegetation species were inventoried within the study area. One regionally significant plant species, Sweet Gale, was inventoried within the study area (City of Guelph 2012). This species was located within the Non-Native Mineral Thicket Swamp (SWT2-13) and is well removed from the Gordon Street ROW as shown on Map 3.

5.2.3 Tree Inventory

In total, 191 trees were inventoried, comprising 26 species. Of the trees inventoried and assessed, 68 (35.6%) are native species and 123 (64.4%) are non-native species. See the TIPP report (NRSI 2020) for a complete list and mapping of trees inventoried within the study area.

Table 3 provides a list of tree species inventoried within the study area, whether they are native or non-native and their overall health.

Table 3. Summary of Inventoried Trees

Common Name	Scientific Name	Excellent	Good	Fair	Poor	Very Poor	Dead	Total
Native Species								
Black Walnut	*Juglans nigra*		1		1			2
Canada Yew	*Taxus canadensis*			1				1
Eastern White Cedar	*Thuja occidentalis*			13	1			14
Eastern White Pine	*Pinus strobus*		1	2				3
Freeman's Maple	*Acer* X *freemanii*		6	6	1	1		14
Manitoba Maple	*Acer negundo*			4				4
Silver Maple	*Acer saccharinum*			3				3
Speckled Alder	*Alnus incana*		1					1
Sugar Maple	*Acer saccharum* ssp. *saccharum*		1	6	1	1		9
Trembling Aspen	*Populus tremuloides*		1	1				2
White Ash	*Fraxinus americana*						4	4
White Elm	*Ulmus americana*			1				1
White Spruce	*Picea glauca*		1	8	1			10
Total			12	45	5	2	4	68
Non-Native Species								
Amur Maple	*Acer ginnala*			2				2
Austrian Pine	*Pinus nigra*	1		6	2			9
Burning Bush	*Euonymus alatus*			1	3			4
Chanticleer Pear	*Pyrus calleryana* 'Chanticleer'		1	13				14
Colorado Spruce	*Picea pungens*	2	3	10		1		16
Common Apple	*Malus domestica*			1				1
Crack Willow	*Salix fragilis*			1				1
European Ash	*Fraxinus excelsior*					3		3
Flowering Crab Apple	*Malus baccata*			1				1
Golden Weeping Willow	*Salix alba* var. *vitellina*			1				1
Japanese Silk Lilac	*Syringa reticulata*		2	1				3
Norway Maple	*Acer platanoides*		11	21	1			33

Common Name	Scientific Name	Excellent	Good	Fair	Poor	Very Poor	Dead	Total
Norway Spruce	*Picea abies*		2	16	1		1	20
River Birch	*Betula nigra*		1					1
Siberian Elm	*Ulmus pumila*			1				1
Small Leaf Linden	*Tilia cordata*			1	2			3
Thornless Honey Locust	*Gleditsia triacanthos* var. *inermis*		2	7		1		10
Total		3	22	83	9	5	1	123
Overall Total		3	34	128	14	7	5	191

5.3 Wildlife

5.3.1 Birds

In total, 114 bird species have been recorded in the vicinity of the study area (BSC et al. 2008). Refer to Appendix V for a complete list of all bird species known from the study area vicinity, including highest breeding evidence categories based on the OBBA (BSC 2001).

Based on background review data, 3 bird SAR (Bank Swallow, Barn Swallow, and Chimney Swift), and 4 bird SCC (Common Nighthawk, Eastern Wood-Pewee, Golden-winged Warbler, and Red-headed Woodpecker) were identified as having potential to occur within the study area based on existing records in the vicinity and presence of appropriate habitat (Appendix II). None of these species were observed during site investigations. However, because no targeted breeding bird surveys or crepuscular bird surveys (for Common Nighthawk) were completed as part of this work scope, their presence in the study area cannot be ruled out.

Bank Swallow and Barn Swallow occurrence in the study area is considered unlikely; Bank Swallow colonies are not known from the immediate vicinity (i.e., within 1km) and suitable Barn Swallow nesting structures are limited within the surrounding area (e.g., outbuildings, sheds). Suitable foraging habitat for these species is widespread within and outside the study area, and includes open-vegetated features such as wetland and meadow as well as developed lands.

Based on NRSI site characterization results, suitable habitat for Red-headed Woodpecker and Eastern Wood-Pewee is considered absent in the study area due to the lack of deciduous swamp and upland deciduous forest communities. Suitable habitat for Common Nighthawk is also considered highly limited to absent within the study area due to the dominance of wetland features within the natural communities that are not used by the species. Common Nighthawks may potentially nest on flat gravel roofs of buildings within the study area, and Chimney Swifts

may nest within study area chimney structures. However, these nesting habitats will not be negatively impacted by the undertaking. Suitable habitat for Golden-winged Warbler may occur within the Non-Native Mineral Thicket Swamp (SWT2-13) where open patches exist among the areas of shrub cover.

5.3.2 Herpetofauna

In total, 17 reptile and amphibian species have been recorded from the vicinity of the study area (Ontario Nature 2018). A complete list of all herpetofauna species known from the study area is provided in Appendix VI.

Based on a review of background information, 3 herpetofauna SCC, Eastern Ribbonsnake, Snapping Turtle and Western Chorus Frog, were identified as having potential to occur within the study area based on existing records in the vicinity and presence of suitable habitat (Appendix II). None of these species, nor any other significant herpetofauna species, were recorded during site investigations. Habitat significance for these species is addressed in the context of SWH (Section 6.1.2).

5.3.3 Mammals

In total, 31 mammal species have been documented within the vicinity of the study area (Dobbyn 1994). A complete list of all mammal species known from the study area is provided in Appendix VII.

Based on a review of background information, 5 mammal SAR (American Badger, Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis and Tri-colored Bat) were identified as having potential to occur within the study area based on existing records in the vicinity, known bat range extents, and presence of suitable habitat (Appendix II). No badger burrows were observed during site investigations; this species is therefore considered absent within the study area. Potential habitat for Eastern Small-footed Myotis in the study area is associated with structures that may be used for summer roosting such as house attics, sheds or other outbuildings. This species is not known to use trees for roosting in Ontario (Humphrey 2017). Potential habitat for this species will not be impacted by the undertaking.

Nine trees with cavity features that could potentially provide maternity roosting habitat for Little Brown Myotis, Northern Myotis or Tri-colored Bat (i.e., “cavity trees”) were documented within the study area. Of the 9 trees identified, 6 are located outside of the ROW, but fall within the

study area. Each tree is shown on Map 3. Table 4 provides detailed information about each identified cavity tree.

Table 4. Potential Bat Habitat Trees Inventoried Within the Study Area

Cavity Tree No.	TIPP Tree ID No.	Species	DBH (cm)	Decay Class*	Comments
1	Not inventoried	Sugar Maple (*Acer saccharum* ssp. *saccharum*)	18+16+20 +14	2 – Declining Live Tree	Cracks present with potential internal cavities
2	Not inventoried	Sugar Maple	23+26	2 – Declining Live Tree	2m high cavity
3	9	Sugar Maple	60	1 – Healthy Live Tree	4m high cavity
4	11	Sugar Maple	56	1 – Healthy Live Tree	Loose bark may provide suitable habitat
5	Not inventoried	White Birch (*Betula papyrifera*)	15+20	1 – Healthy Live Tree	2 cavities observed approximately 3m high
6	Not inventoried	Freeman's Maple	26+22+31	1 – Healthy Live Tree	5m high cavity
7	Not inventoried	Crack Willow (*Salix fragilis*)	20+18+32 +21	2 – Declining Live Tree	Loose bark and cracks may provide suitable habitat
8	53	Sugar Maple	47.2	2 – Declining Live Tree	3 cavities observed 1m, 3m and 3.5m high
9	57	Norway Maple (*Acer platanoides*)	76	2 – Declining Live Tree	Main large cavity may be too exposed for bats; smaller cavity may or may not be connected internally

*(Watt and Caceres 1999)

5.3.4 Insects

In total, 56 butterfly species and 69 odonate species are known from the study area vicinity (MacNaughton et al. 2019, MNRF 2019a). Three of these butterfly species (Delaware Skipper (*Anatrytone logan*), Wild Indigo Duskywing (*Erynnis baptisiae*), and Little Glassywing (*Pompeius verna*)) and 5 of these odonate species (Williamson's Emerald (*Somatochlora williamsoni*), Chalk-fronted Corporal (*Ladona julia*), Frosted Whiteface (*Leucorrhinia frigida*), Red-waisted (Belted) Whiteface (*Leucorrhinia proxima*), and Eastern Amberwing (*Perithemis tenera*)) are considered locally significant (City of Guelph 2012). See Appendices VIII and IX for a list of butterflies and odonates, respectively, known from the study area vicinity.

Of the 3 locally significant butterfly species with occurrence records in the vicinity, only 1 (Little Glassywing) has suitable host plants or habitat within the study area, where wet grassy areas and shaded woodland edges occur (Government of Canada 2014). These areas are well

removed from the Gordon Street ROW. The study area does not include suitable habitat for any of the locally significant odonate species known from the surrounding vicinity.

One insect SCC, Monarch, was screened has having potentially suitable habitat in the study area. However, the inventoried areas do not contain milkweed (*Asclepias* spp.). The study area is therefore not anticipated to represent important habitat for the species.

6.0 Natural Environment Constraints

The natural environment constraints analysis was used to identify those features and habitats that are sensitive to disturbance based on the rarity or sensitivity of the feature or the functions/processes that contribute toward their significance. This assessment also considered the policies, legislation, and regulations that apply to the study area natural features which must be considered in the evaluation of a preferred design. The following is a brief discussion of the results of this assessment with regards to significant natural areas and features which may represent constraints and are to be considered as part of the selection of a preferred alternative design for the proposed undertaking.

6.1 Significant Natural Features and Habitats

6.1.1 Significant Wetlands

The study area contains an eastern extent of the Hanlon Creek Swamp PSW as well as LSW as mapped in the City OP Schedule 4A. The outer boundary of the wetland feature, where it most closely approaches the Gordon Street ROW within the study area, was interpreted to represent the limit of the PSW based on guidance provided by City staff (L. Lefler, City of Guelph, pers. comm., July 2019). The outer wetland boundary was confirmed with the GRCA and surveyed as shown on Map 2. In accordance with Table 4.1 of the OP, PSWs require a minimum buffer of 30m. This minimum buffer represents a portion of the Significant Natural Area associated with the feature being buffered (see Map 3). The wetland buffer therefore represents a constraint to road improvement limits which should be incorporated into preliminary designs such that impacts to buffered areas are avoided if feasible. However, as identified in Section 4.1.2.9 of the OP, "*legally existing uses, existing utilities, facilities and infrastructure and their normal maintenance are recognized and may continue within the Natural Heritage System*". In the context of the proposed undertaking, "infrastructure" includes transit and transportation corridors and infrastructure, and "normal maintenance" includes the required ROW improvements that are the subject of the EA.

A portion of the existing ROW falls within 30m of the surveyed PSW boundary. Road improvement works will therefore require site alteration within the PSW buffer within a small portion of the study area (Map 3). Efforts should be made in the design and construction methodology of the road works to avoid, minimize or suitably mitigate impacts to the adjacent wetland feature.

6.1.2 Significant Wildlife Habitat

SWH within the study area is associated with a known Deer Winter Congregation Area within the Hanlon Creek Swamp PSW. This SWH is mapped in Schedule 4E of the OP and is based on MNRF mapping provided to the City of Guelph for the purposes of defining and mapping the city's NHS (Dougan and Associates 2009).

The MNRF/City-mapped SWH is well removed from the Gordon Street ROW at its closest point (approximately 110m) and does not include natural feature areas that have direct frontage onto the ROW west of Gordon Street and south of Edinburgh Road (Map 3). Deer winter congregation habitat in southern Ontario generally comprises large woodland areas that provide good access to winter foraging areas and are habitually used by deer from one generation to the next (MNRF 2014). Although the SWH is coarsely mapped, areas of denser tree cover that provide the SWH function are limited in proximity to the ROW. Much of the natural feature coverage within the study area represents open marsh or shrub-dominated swamp thicket. However, the study area natural features provide important movement corridor habitat (see Ecological Linkage below) that provide deer with access to and from the Hanlon Creek Swamp overwintering SWH on a seasonal basis. Potential impacts to deer that may be caused by the road improvement works are therefore focused on effects on deer movement patterns and seasonal travel corridors (see below).

Other forms of SWH that are not mapped in the City OP were screened for the study area as described in Section 2.1. Based on the results of field investigations, all of these SWH types were determined to be absent within the ROW, or in areas immediately adjacent to the ROW (i.e., within 10m) that may be directly or indirectly impacted through construction and/or operation of the planned road improvements. No terrestrial crayfish chimneys, no suitable turtle nesting habitat, and no habitat features that would be suggestive of potential snake hibernacula (e.g., rock fissures, old stone foundations, old wells) were observed elsewhere in the study area within the natural features on GRCA-owned lands west of Gordon Street. As discussed in Section 5.3.1, suitable habitat for the SCC Red-headed Woodpecker and Eastern Wood-Pewee is considered absent in the study area. Natural habitat for Common Nighthawk is also considered absent in the study area. See Section 6.1.6 for potentially suitable habitat for the SCC Golden-winged Warbler, which does not qualify as SWH based on MNRF criteria (MNRF 2015).

Other SWH categories that were screened as having potential to occur within the study area were not assessed through targeted surveys (e.g., breeding bird surveys, amphibian call surveys). However, these SWH categories are more distant from the ROW (i.e., 10-120m) and will not be directly impacted by the proposed undertaking. These include the following SWH categories:

- Bat Maternity Colonies
- Waterfowl Nesting Area
- Amphibian Breeding Habitat (Woodland)

These habitat types are considered Candidate SWH categories for the study area. As discussed in Section 8.4, indirect impacts to these adjacent features, such as through temporary construction disturbances and alterations to hydrological inputs (to amphibian breeding habitat) are not anticipated. These Candidate SWH types are therefore not discussed further.

6.1.3 Ecological Linkage and Deer Crossings

Map 3 shows the location of the Ecological Linkage within the study area. The Ecological Linkage shown on Map 3 represents a refinement of the linkage that is shown on Schedule 4 of the OP (Appendix I) based on site-based studies for land development applications (NRSI 2002a, 2002b, North-South Environmental 2011, NRSI 2014, Stantec 2014, NRSI 2017). The resulting Ecological Linkage is a 20m wide corridor that has been preserved across multiple properties to maintain and enhance wildlife movement functions. In accordance with site development approval conditions, the linkage has been or will be (depending on the specific property the linkage falls on) restored with native vegetation species to further facilitate this movement function. Portions of the Ecological Linkage within the study area currently exist as developed land (e.g., 1300 Gordon Street) pending completion of development approvals and required site restoration activities.

The primary basis for which this Ecological Linkage was originally identified is a local movement corridor for White-tailed Deer, which for several years has been documented to travel seasonally between the Torrance Creek Swamp and Hanlon Creek Swamp PSWs to access overwintering and foraging grounds. Historically, when the study area lands primarily comprised large-lot rural residential and agricultural lands, deer crossed Gordon Street in this area across a broad front stretching roughly between Edinburgh Road and Arkell Road (TSHA et al. 1999). In more recent years as the Gordon Street corridor has become increasingly developed, deer

movement paths and crossing locations at Gordon Street have become more constrained and defined where suitable movement habitat exists. These are represented by the mapped Ecological Linkage and two Deer Crossing locations on Gordon Street as shown on Schedule 4 of the OP.

In recommending the study area Ecological Linkage be incorporated into the city's NHS, Dougan and Associates (2009) acknowledged that deer are using travel corridors regardless of whether they are formally identified as linkages or not. Given the heavy traffic use of Gordon Street, this linkage location was therefore identified with the caveat that the City should implement measures in this area to reduce the risk of deer-vehicle collisions. Furthermore, Section 4.1.3.9.13 of the OP states that "*where Ecological Linkages are located such that wildlife need to cross a road, these areas shall also be identified as wildlife crossings and mitigative measures may be required in accordance with the provisions of Section 4.1.5 (Wildlife Crossings)"* (City of Guelph 2018). Section 4.1.5.3 of the OP specifies that where the City is undertaking public infrastructure improvements, species-appropriate mitigative measures will be implemented where warranted to minimize the incidence of human-wildlife conflicts. Section 4.1.5.5 states that "*where warranted, the City will proactively post signage to warn vehicular traffic of the potential for wildlife crossing such as deer*".

EIS studies completed for properties to the immediate west and east of Gordon Street that contain the Ecological Linkage (Salvation Army property, 1291 and 1300 Gordon Street) included assessments of deer movement which provided a more refined understanding of where deer are crossing Gordon Street (Stantec 2014, NRSI 2002a, 2017). These studies led to the current recommended alignment of the Ecological Linkage where it crosses Gordon Street. Based on recent wildlife movement studies (NRSI 2017), deer make use of the Salvation Army church parking lot and portions of the existing Ecological Linkage (particularly the restored 10m portion on the Salvation Army property) to approach Gordon Street. The majority of deer cross Gordon Street from the end of the northernmost Salvation Army church driveway entrance/exit. Once across Gordon Street, deer disperse to the north, northwest and west into the adjacent natural area. The reverse is true (deer converging on the Gordon Street crossing point opposite the Salvation Army church entrance/exit driveway) for deer travelling eastwards.

Earlier studies (TSHA et al. 1999, NRSI 2002a,b) estimated that approximately 5-20 individual deer cross Gordon Street at the Ecological Linkage location. Deer use of the corridor was

estimated to be declining, and was expected to continue declining as land development in the immediate vicinity continued into the future (NRSI 2002a). More recent deer movement studies (track surveys and a motion-capture camera survey) completed for a development application at 1300 Gordon Street found that deer movement across the property was infrequent during an October-March survey period (average values of 0.025-0.05 deer movements on the property per day across a 159-day survey period). The majority of deer camera captures comprised a single individual during a movement event. These results, suggesting low levels of deer crossing activity, correspond with available data on vehicle collisions within the study area stretch of Gordon Street, in which only 1 incidence of a vehicle-animal collision (type of animal not specified) was reported for the period January 1, 2014-December 31, 2018 (IBI Group 2020a). The animal collision occurred along a stretch between Arkell Road and Vaughan Street, and therefore was not adjacent to either of the mapped Deer Crossing areas.

The majority of deer movement activity on the 1300 Gordon Street property occurred between the hours of 10:00pm and 7:00am (NRSI 2017). This period of activity is typical for deer in natural settings, in which peak movement periods occur during evening and early morning periods (Cornicelli et al. 1996). This nighttime to early morning period of predominant movement activity is therefore not likely to primarily be a result of daily patterns of traffic volume on Gordon Street, but is coincident with what is likely the period of lightest vehicular use on the street. Cornicelli et al. (1996) found that movement behaviours of urban-adapted deer were consistent with other studies of deer activity, suggesting that they did not need to modify their activity periods around periods of human activity.

The Ecological Linkage is not anticipated to represent an important crossing for other wildlife species (e.g., small to medium-sized mammals, reptiles, amphibians, birds) nor for plant genetic dispersion (NRSI 2002b). Road mortality observations or data for small to medium-sized wildlife are not known from this location.

Comparatively less information is available for the northernmost study area Deer Crossing location (Map 3). Deer are known to travel through the relatively deep and heavily treed residential lots east of Gordon Street. Wildlife track survey data collected by NRSI for properties located east of Gordon Street and south of Valley Road during winter 2015 demonstrated that deer primarily moved in a north-south direction along the western boundary of the Torrance Creek Swamp PSW. Evidence of White-tailed Deer, Coyote (*Canis latrans*) and Eastern Cottontail (*Silvilagus floridianus*) movement was also observed within open portions of

the rear lot areas, but with movements primarily directed toward the south. No track evidence directed toward Gordon Street was observed, and areas immediately surrounding the existing houses fronting Gordon Street were apparently avoided. However, this study was completed prior to construction of a large residential building at 1280 Gordon Street (immediately south of the wildlife track study area), and wildlife movement patterns may have since been altered. The lands east of Gordon Street opposite Edinburgh Road are currently the subject of a development application, for which a new deer movement study is being completed (L. Lefler, City of Guelph, pers. comm., May 2019).

6.1.4 Species at Risk Habitat

Species at Risk Bats

Nine cavity trees were identified within the study area which may provide suitable roosting habitat (Map 3). Following a conservative approach, these trees would be considered potential roosting habitat for SAR bats. Impacts to these trees (e.g., removal or pruning) without proper consideration for avoidance or mitigation measures, in consultation with the MECP, may therefore constitute contravention of the ESA. As assumed habitat for SAR, impacts to these trees is also prohibited under City OP policies except where permitted or authorized by the MECP pursuant to the ESA.

Barn Swallow and Bank Swallow Foraging Habitat

A general habitat description for Barn Swallow has been provided by the MNRF to identify habitat areas subject to protection under Section 10 of the ESA. Protected habitat includes suitable foraging habitat up to 200m from a nest site (MNRF undated). Suitable foraging habitat for Barn Swallows includes a wide variety of open lands including human-modified landscapes. Wooded and forested features are generally considered unsuitable foraging habitat.

Categorized general habitat for Bank Swallow includes suitable foraging habitat within 500m of a breeding colony. This species is known to require natural or anthropogenic open habitats for foraging, similar to that described for Barn Swallow above (MNRF 2017b).

The majority of the study area, including open wetland and meadow habitats, and urban developed lands, provides suitable foraging habitat for these species. Potential habitat impacts associated with the proposed undertaking would therefore have no negative impact on foraging habitat availability for these species. For this reason and because these species are not

specifically documented within the study area, foraging habitat for Barn Swallow and Bank Swallow are not considered further in this report.

6.1.5 Woodland

Woodland in the study area is limited to a Scots Pine-dominated coniferous plantation (CUP3-3) located west of Gordon Street and south of Edinburgh Road (Map 2). Although this feature is identified as a plantation according to ELC, it does not meet the City's definition of Plantation as described in the OP (i.e., the CUP3-3 feature is not managed for the production of nuts, fruits, Christmas trees or nursery stock; and has not been established and is not managed for the purposes of tree removal at rotation). Further, this feature meets the City's definition of "woodland" because it is not used for the purposes of producing Christmas trees or nursery stock (City of Guelph 2018).

Significant Woodland has not been mapped within the study area based on Schedule 4C of the OP. However, the CUP3-3 feature measures 1.2ha in size. In accordance with OP Section 4.1.3.6.1, the CUP3-3 feature meets the definition of Significant Woodland because it is >1.0ha in size.

6.1.6 Habitat for Significant Species

The City OP defines Habitat for Significant Species as habitat for federally, provincially and locally significant species that are not provincially Endangered or Threatened or otherwise incorporated into SWH classifications. This category of habitat significance is intended to ensure that habitats for these significant species are considered through the development approvals process where these habitats occur outside of other natural feature significance designations.

One locally significant vegetation species, Sweet Gale, was documented within the study area as shown on Map 3. One individual of this species was observed. This species is located within an existing significant natural feature (Hanlon Creek Swamp PSW) and is well removed from the Gordon Street ROW (approximately 140m). This species won't be impacted by the planned undertaking and does not represent a project constraint. Under OP policies, the habitat of the locally significant species would be considered Habitat for Significant Species, which is a type of Natural Area within the City's NHS. However, the vegetation community that the Sweet Gale occurs in (Non-Native Mineral Thicket Swamp (SWT2-13)) is already considered a form of Significant Natural Area due to its status as part of the PSW complex.

Suitable habitat for the SCC Golden-winged Warbler occurs within the Non-Native Mineral Thicket Swamp (SWT2-13). However, this habitat is well removed from the ROW and will not be directly impacted by the undertaking. As stated above, it is already considered Significant Natural Area within the NHS.

6.2 Ultimate Development Constraints

Section 4.1.1 of the OP defines the components of the City's NHS comprising Significant Natural Areas and Natural Areas. Based on existing background information and NRSI site investigations, Significant Natural Area collectively represents the area of PSW and its 30m buffer, the Significant Woodland and its 10m buffer, and the Ecological Linkage as showing on Map 3. There are no additional NHS Natural Areas within the study area that fall outside of the Significant Natural Area designations.

Map 3 illustrates the ultimate development constraint limit within the study area. This outer limit corresponds to PSW and Significant Woodland buffers where the ROW is in closest proximity to these features south of Edinburgh Road, as well as the 20m Ecological Linkage where it abuts the Gordon Street ROW on the west and east sides. Section 4.1.2.9 of the OP states that "*legally existing uses, existing utilities, facilities and infrastructure and their normal maintenance are recognized and may continue within the Natural Heritage System*". As stated above, the planned widening of Gordon Street represents normal maintenance to City infrastructure and can therefore occur within the NHS. Nonetheless, measures must be taken to avoid or otherwise minimize or mitigate impacts to the NHS features in accordance with OP policy 4.1.2.8.

While not a constraint per se, the road improvement works must incorporate measures to mitigate deer crossing hazards to motorists at the identified Deer Crossing locations, as described above.

7.0 Evaluation of Alternative Design Options

An integral component of the EA includes the evaluation of multiple alternative designs with consideration for various criteria that collectively may render a design more or less preferred relative to the other design options. The evaluation considered several criteria spanning categories including but not limited to traffic capacity and operation, natural environment, social environment and cost. Within the Natural Environment category, the following individual sub-criteria were included for evaluation:

- Aquatic Habitat, Fisheries and Surface Water;
- Terrestrial Habitat (Natural);
- Floodplain;
- Wetlands;
- Trees (Landscaping);
- Wildlife
- Property Contamination; and,
- Stormwater Management.

Six different alternative plan options were compared in the evaluation matrix. These options included the following:

- Option 1: Widen equally about existing centreline with 4m wide continuous TWLT lane with existing sidewalks maintained;
- Option 2: Widen equally about existing centreline with 5m wide continuous TWLT lane with existing sidewalks maintained
- Option 3: Widen equally about existing centreline with 4m wide continuous TWLT lane and 3m wide multi-use trail on each side
- Option 4: Widen existing road on west side only with 4m wide continuous TWLT lane and 3m wide multi-use trail on each side
- Option 5: Widen equally about existing centreline with 4m wide continuous TWLT lane and 1.8m wide separated bike lanes and 2.1m wide sidewalks on both sides

- Option 6: Widen equally about existing centreline with 4m wide continuous TWLT lane and 1.8m wide boulevard cycle track and 1.5m wide sidewalks on both sides

The majority of Natural Environment criteria were determined to have an equally negligible effect among the design options with respect to potential for negative impact. For example, road design effects on aquatic habitat, fisheries and surface water were inapplicable due to lack of surface water features in the study area; none of the alternative designs would cause a direct negative impact to woodland or wetland features; and none of the alternatives were expected to have a negative effect on the floodplain. Any potential for hydrogeological impact to the adjacent PSW would be essentially equal among the potential design options. None of the evaluated alternative designs made any notable difference in the potential for deer crossing road mortality impacts and vehicular collision/motorist hazards.

The only Natural Environment criterion that differed among the design alternatives was number of tree removal requirements. Based on the alternatives evaluation, Option 6 was considered to be most preferred based specifically on anticipated tree removal requirements. According to an estimate of tree removal requirements undertaken by IBI Group (pre-dating NRSI's detailed tree inventory, and based on the original study area extent of Lowes Road to Edinburgh Road), it was determined that Option 6 would require 4 tree removals. By comparison, Option 1 would be next preferable with 8 anticipated tree removals. The least preferred option under this criterion was Option 5, in which 21 trees were expected to require removal.

See Appendix X for IBI Group's alternative design plan evaluation matrix table.

Based on IBI Group's evaluation of the alternatives, including various technical design considerations, and input from City staff and members of the public, Option #4 was selected as the preliminary preferred design option. This option was the basis of the Preliminary Design prepared and discussed in terms of impact potential further herein.

8.0 Impact Assessment

8.1 Description of the Proposed Works

The planned road improvements will include a widening of Gordon Street along its west side within the study area limits to accommodate a 4m wide continuous TWLT lane. New 3m wide multi-use trails will be constructed on each side of the road to replace the existing sidewalks. The road widening will also provide additional road space to better accommodate bus turning and passenger loading/unloading at the Arkell Road intersection. A grass boulevard will separate the road curb from the sidewalk on the west side of the road. New street tree plantings will be installed within the ROW adjacent to the far side of the sidewalk where spacing allows, farther from the road surface to minimize road salt spray effects. New road medians will be installed within the reconstructed roadway. See Appendix XI for an illustration of the preferred preliminary design.

8.2 Approach to Impact Assessment

The analysis of potential impacts was determined by comparing the details of the proposed undertaking with the characteristics of the existing natural features and their functions. The outcome of this process was based primarily on the resilience of the identified natural features and functions to withstand predicted disturbances caused by design, construction and operation of the transportation infrastructure. In this manner, both the significance and sensitivity of the affected natural features and functions to disturbance were considered. The following is a description of the types of impacts which will be discussed.

- Direct Impacts – associated with the disruption or displacement of natural features, caused by the actual “footprint” of the undertaking;
- Indirect Impacts – associated with changes in site conditions such as drainage and water quantity/quality, and construction-stage disturbances to the adjacent features;
- Induced Impacts – associated with human-induced disturbances imposed on the existing study area natural features and ecological functions during post-construction operation of the infrastructure; and,
- Cumulative Impacts – associated with the spatial and temporal implications of this plan in conjunction with land uses on the surrounding properties and their cumulative effects on natural environment receptors.

8.3 Direct Impacts and Mitigations

8.3.1 Vegetation Removal and Site Grading

The entirety of the reconstructed infrastructure will be located within the existing ROW limits. Therefore, no direct impacts to existing natural features, including the adjacent Significant Woodland and PSW features, will occur. The limits of the proposed works will be offset by approximately 8m from the Significant Woodland boundary, and approximately 24m from the PSW boundary, at their nearest points (Map 3).

The planned undertaking will require construction encroachment into the 30m PSW buffer and slightly into the 10m Significant Woodland buffer, which represent components of the Significant Natural Area. Specifically, the construction limit will extend 5.62m into the PSW buffer (comprising an encroachment area of 135m^2), and will extend 1.78m into the Significant Woodland buffer (comprising an encroachment area of 29m^2). However, the areas of encroachment represent lands that already fall within the developed Gordon Street ROW. All areas to be impacted by construction comprise manicured (mown, sodded) ground cover with planted street trees. No federally, provincially or regionally significant vegetation species will be negatively impacted.

As stated in Section 6.0, in accordance with Guelph OP Section 4.1.2.9, legally existing uses such as infrastructure, and their normal maintenance, are recognized and may continue within the NHS. Notwithstanding this, Section 4.1.2.8 states that where essential transportation infrastructure is permitted within the NHS, under OP policies 4.1.3 (Significant Natural Area policies) and 4.1.4 (Natural Area policies), the area of construction disturbance must be kept to a minimum and disturbed areas shall be re-vegetated or restored with site-appropriate native plant species wherever opportunities exist (City of Guelph 2018). The proposed construction encroachments into the NHS (outer areas of PSW and Significant Woodland buffers) are considered relatively minor and are not anticipated to negatively impact the protected natural features provided the recommended mitigation measures described below are implemented. Nonetheless, efforts must be made during construction to limit the extent and duration of impacts within the general area that occurs adjacent to the natural features (including the specific areas of NHS encroachment) to limit potential indirect impacts to these areas (see Section 8.4). Opportunities can also be taken through the landscape planting design of the ROW to restore these buffer areas with native vegetation species such that a net benefit is provided relative to the existing conditions in this area (see Section 9.0).

Tree Removal

Of 191 trees that were inventoried within the study area, 55 are anticipated to be removed. Of the 55 anticipated to be removed, 17 are recommended for removal as a result of their poor condition and/or because they have a probable potential for structural failure, which may pose a public hazard to adjacent structures or public use of the ROW.

The remaining 38 trees require removal based on the extent of construction activities within the ROW. A total of 31 trees requiring removal are boundary trees straddling the ROW limit. Written permission from the adjacent landowners will be required before boundary trees can be removed. Eight trees that are located on an adjacent private property have been identified for removal because a significant proportion of the root zone will be impacted by the road construction work, or due to safety concerns related to a dead individual (Tree #28). Efforts should be made during the Detailed Design stage to retain as many adjacent private and boundary trees as possible, such as through alteration of construction limits to avoid or lessen encroachment into root zones. A total of 16 trees requiring removal are located within the ROW. In addition to City-planted street trees, some of these may be lawn-planted trees inadvertently planted by private landowners within the City ROW. None of the inventoried trees are naturally-established.

Most of the trees to be removed are in fair health with an improbable potential for structural failure. Most are young plantings and have a DBH of <20cm. However, some of the trees identified for removal are larger, such as a 73.5cm DBH Norway Maple, a 62.2cm DBH Sugar Maple, and a 56.7cm DBH Norway Spruce. As stated above, it is anticipated that some of these large trees located outside or straddling the boundary of the ROW can be preserved through Detailed Design planning of the road improvements.

Recommendations have been provided in the TIPP to protect trees to be retained through the use of tree protection fencing. Recommended measures have also been provided in the TIPP to mitigate construction impacts to adjacent retained trees, and to inspect tree protection fencing and respond to instances of mortality or damage to retained trees. Based on City guidelines, a total of 54 trees are to be planted in compensation for 18 trees to be removed that are not exempt from the City's compensation requirements. See Section 5.0 of the TIPP for a detailed breakdown and description of tree compensation requirements based on the preliminary design. These compensation plantings are to be established within the Gordon Street ROW to the extent feasible, and will in part replace street trees requiring removal to accommodate the

undertaking. Compensation planting details will be provided within a future Landscape Plan to be provided during the Detailed Design stage. See the TIPP (NRSI 2020) for additional details of the tree removal, protection, and mitigation requirements.

8.3.2 Impacts to Wildlife and their Habitats

Species at Risk Bats

Of the 9 cavity trees inventoried within the study area, 2 are anticipated to require removal based on the preliminary design (cavity trees #3 and #4 (Map 3), which correspond to tree inventory IDs #9 and #11, respectively (NRSI 2020)). Following a precautionary approach, it is assumed that these may be used for roosting by bats, including SAR bats. The removal of these trees may therefore kill, harm or harass roosting bats, potentially resulting in ESA contravention, if not appropriately mitigated.

It is recommended that these trees be retained as part of the Detailed Design of the road improvements, due to the potential bat roosting habitat function provided by these trees but also because they represent large (62.2cm DBH and 56cm DBH for cavity trees #3 and #4, respectively) trees in fair condition with an improbable potential of structural failure. Both of these trees are also boundary trees that are shared with adjacent private landowners (NRSI 2020). If it is determined through Detailed Design that these trees will require removal, the MECP must be consulted to confirm appropriate measures to suitably avoid impacts to SAR bats and to determine if any other measures to mitigate the habitat loss will be required.

Deer Crossings and Ecological Linkage

The planned undertaking will require minor widening of the ROW infrastructure through the two Deer Crossing locations and the Ecological Linkage. As stated above, lands to be directly impacted are entirely contained within the existing ROW. Vegetative restoration works of the Ecological Linkage that have previously been undertaken within the Salvation Army church property will not be impacted.

The existence of the two Deer Crossings is a function of surrounding land uses and development over time that have constrained the crossings to these locations. The location of these crossings is not dependent on the existence of vegetation within the ROW, and therefore the planned construction footprint within the ROW does not remove linkage habitat or render the two locations less suitable for crossing. However, see Section 8.5 regarding potential for post-

construction human use of the transportation corridor to affect the Ecological Linkage function or deer road crossing activity.

The relatively minor widening of the ROW infrastructure that is proposed is not expected to affect the likelihood of deer crossings at the two identified crossing locations in the study area. Deer that cross at these locations are already accustomed to the existing Gordon Street ROW and tend to cross outside of periods of peak vehicular traffic volumes. Section 8.5 further discusses existing and future anticipated deer-vehicle collision hazards and recommended mitigation measures.

Other Wildlife

Other wildlife species that occur within the study area are common and ubiquitous on the landscape, and are adapted to or have been habituated to urban environments. The ROW roadside lands to be directly impacted are manicured and do not provide important habitat functions beyond those described above. The planned undertaking will not negatively impact local wildlife species or populations.

Vegetation clearing has the potential to directly impact bird breeding activity through damage and destruction of nests, eggs and young, or avoidance of the area by breeding adults. Vegetation clearing should therefore occur outside the bird nesting season of April 1-August 31 so as to limit disturbances to nesting activities of birds and to avoid destruction of active nests. The destruction of migratory birds and their nests is prohibited under the federal *Migratory Birds Convention Act*.

8.4 Indirect Impacts and Mitigations

The planned road improvements have the potential to cause indirect impacts to adjacent lands and natural features if not mitigated appropriately. Recommended mitigation measures are provided for each potential impact below.

8.4.1 Disturbance to Adjacent Vegetation and Wildlife Habitat

The potential for indirect disturbance to adjacent natural features is limited to the area west of Gordon Street and south of Edinburgh Road. Lands immediately adjacent to the ROW in this location, which could potentially be disturbed by ROW construction activities, comprise Cultural Meadow (CUM). However, the Significant Woodland represented by the Scotch Pine Coniferous Plantation (CUP3-3) occurs within approximately 8m of the ROW limit in this area,

and is therefore also susceptible to disturbance if appropriate construction mitigations are not implemented. The PSW is further removed from the ROW and is not expected to be impacted by construction activities.

Efforts should be made to avoid unnecessary or inadvertent damage or destruction of vegetation adjacent to project construction limits. Clearly defined construction limits in the form of tree protection fencing should be established to avoid unnecessary vegetation removal where tree protection measures have been recommended in the TIPP. Tree protection fencing will take the form of paige wire fencing following the specifications outlined in the TIPP. Silt fencing can be combined with tree protection fencing where erosion and sediment control measures are also required. Where tree protection fencing is not required along construction area limits, construction limit fencing in the form of silt fencing, or otherwise brightly coloured snow fencing, should be used to delineate the work area.

Measures have been recommended in the TIPP to protect retained trees through the installation of appropriate tree protection fencing as detailed on Map 1 of the TIPP. Prior to any construction activities (rough grading, vegetation and tree removal), the tree protection fencing should be installed at least 1m beyond the dripline of trees to be retained, where possible, in order to protect the root systems. In areas where paved surfaces exist, or where construction is proposed within a dripline but an attempt is made to retain the tree, fencing may need to be adjusted to follow the edges of the paved surface or construction limit, based on specific site conditions. Mitigation measures, such as pruning, have also been recommended for specific notable trees (due to species or size) to limit damage potential to these individuals during construction. See the TIPP (NRSI 2020) for further details about the recommended tree protection measures.

Potential indirect impacts to natural features and wildlife may also arise from noise, vibrations, human presence, dust and artificial lighting associated with construction activities.

During construction activities such as vegetation clearing and grubbing, dust can potentially result in the following:

- Changes in vegetation due to increased heat absorption and decreased transpiration,
- Immediate visual impacts.

Impacts due to dust should be mitigated for by moistening areas of bare, dry soil with water as needed during construction activities to reduce the amount of dust produced.

In order to minimize disturbances to deer crossing activity, based on known periods of road crossing activity it is recommended that construction activities be limited to the period 7:00am-5:00pm.

Wildlife impacts resulting from dust, noise, and vibrations are expected to be temporary, minimal and localized during the road construction works. Furthermore, wildlife occupying the affected roadside areas are urban-adapted and resilient to some degree of disturbance. Significant effects on wildlife are not anticipated and it is expected that displaced wildlife species will return to the vicinity of the roadside features following construction. As deer crossing activity typically occurs between dusk and early morning periods, during which construction activity is ceased, no construction impacts on deer crossing activity are anticipated.

8.4.2 Sedimentation and Erosion

During vegetation removal and site grading activities, areas of bare soil will be exposed along roadside areas which have the potential to erode during rainfall events and impact adjacent lands and vegetation. Reduced vegetation cover along the roadsides in combination with the presence of exposed soils during construction activities may also increase the potential for stormwater flow to down-slope areas, such as into the adjacent woodland and wetland features west of Gordon Street, if not appropriately mitigated. Increased stormwater surface flow and erosion processes may cause the deposition of sediments onto down-slope vegetation, ultimately causing vegetation die-back or impaired health.

Soil compaction also has potential to occur as a result of heavy machinery in the area of construction. Soil compaction can greatly reduce the permeability of soils and affect their ability to retain water during rain/snow melt events. This will result in an increase in surface water run-off which will ultimately increase the erosion potential and the amount of sediment being transported into adjacent areas.

An Erosion and Sediment Control (ESC) Plan must be developed prior to any construction activities on-site. The primary principles associated with sedimentation and erosion protection measures are to: (1) minimize the duration of soil exposure, (2) retain existing vegetation, where feasible, (3) encourage re-vegetation, (4) divert runoff away from exposed soils, (5) keep runoff velocities low, and (6) trap sediment as close to the source as possible.

The ESC Plan should include, but not be limited to, the following measures:

- Placement of silt fencing along any construction limits that are down-gradient of construction zones and may receive sediment-laden runoff;
- Regular inspection, maintenance/repair and where necessary, replacement of damaged silt fencing;
- Operation and storage of all materials and equipment in a manner that prevents any deleterious substance from leaving the construction zone;
- Stripping and strategic placement of topsoil stockpiles, and placement of sediment control fencing around all stockpile areas; and,
- Re-vegetation of completed areas as soon as possible after construction.

8.4.3 Water Quantity Control

The corridor storm runoff will continue to be managed via the existing storm sewer system and drainage within the ROW will be managed and directed to the existing storm sewer with possible minor modification to the pipe network and catchbasin locations. Overall, the impervious area will be marginally increased as Active Transportation facilities are upgraded. The existing on-road cycling facilities will be displaced to the boulevard area and the existing roadway pavement area will be widened marginally to accommodate the proposed continuous TWLT lane between intersections. Direct impacts on impervious areas will be quantified during the Detailed Design process that follows and opportunities for Low Impact Development (LID) provisions will be further investigated. Such measures may include shallow boulevard depressions with infiltration potential, where residual boulevard space permits, subterraneous infiltration galleries, if warranted. Detailed design analyses will include consideration of local groundwater source protection requirements in accordance with City policy and will be subjected to approvals by the City's hydrogeologist and the MECP.

Under the current condition, it is expected that nominal amounts of stormwater runoff from pervious grassed surfaces along the ROW edge passively sheet flow into the adjacent natural areas west of Gordon Street and south of Edinburgh Road. The adjacent natural features occur at a lower elevation than the ROW. However, it is anticipated that the relatively small amount of runoff from the ROW edge would rapidly be taken up and transpired within the densely vegetated meadow feature. This is condition is not expected to change post-development.

Therefore, hydrological inputs from the ROW to the adjacent natural features, including the nearby PSW, are considered negligible.

8.4.4 Water Quality Control

Specific water quality control measures, such as the use of oil-grit separators (OGS), are not currently proposed as part of the road improvement design. This is consistent with the existing condition. Additional water quality treatment potential, relative to the existing condition, may be realized through implementation of LID infiltration measures depending on the type of measure(s) proposed. An OGS unit may be incorporated within the LID design of the ROW if warranted through consultation with the City. Specific LID recommendations will be determined during the Detailed Design stage. Through this process it is anticipated that designs will be explored that will allow for some degree of water quality treatment by way of source-point stormwater infiltration and potentially through use of an OGS unit.

As noted above, the ROW does not contribute significant hydrological flow to the adjacent natural features. No water quality effects on the adjacent natural features are therefore anticipated as a result of the planned undertaking.

Measures must be taken during construction activities to minimize the potential for the entry of deleterious substances into the adjacent natural features west of Gordon Street. In particular, vehicular refueling must not occur within 30m of the adjacent features. The storage of any machinery, construction materials, or topsoil/fill must also be located away from the natural features. Silt fencing or other protective measures should be installed around any stockpiles that have the potential to leach deleterious substances or water-borne sediments. A Spill Response Plan should be prepared and be ready to be implemented on-site if required.

8.5 Induced Impacts

Induced impacts may occur where public use of the reconstructed Gordon Street ROW causes human-induced disturbances or stresses on adjacent natural features or existing ecological functions. For road reconstruction projects, including for the Gordon Street improvements, induced impacts associated with vehicular use of the road are often minimal or negligible, given the continuation of an existing transportation corridor land use and because significant increases in traffic volume are not anticipated as a result of the reconstruction itself. For example, wildlife occupying lands adjacent to the ROW are already habituated to human use of the corridor, including noise and vibration effects. However, induced impacts can occur when

the redesigned ROW encourages additional pedestrian use in areas adjacent to natural features, such as through additional sidewalks or multi-use trails. Impacts to wildlife road crossing and ecological linkage functions can also occur as a result of future increases in vehicular or pedestrian traffic in the redesigned ROW, regardless of whether the road redesign itself contributes to this traffic increase, or can continue to occur as an existing/ongoing impact that persists despite the ROW redesign. Measures should be taken in the ROW design to mitigate these impacts where they are identified to potentially occur.

8.5.1 Potential for Human Encroachment Effects

Potential impacts associated with human encroachment into adjacent natural features is limited to the area west of Gordon Street and south of Edinburgh Road where PSW and Significant Woodland exists near the road. Potential impacts include trampling and damage to vegetation and creation of ad hoc trails to access the natural features from the ROW, and disturbances to the wetland and woodland features as a result of the encroachment (e.g., vegetation removal, littering). Degradation of the features through activities can further promote the colonization or spread of non-native/invasive vegetation, such as European Buckthorn.

The preferred preliminary design includes construction of a new asphalt multi-use trail along the west side of Gordon Street (as well as the east side) adjacent to the significant wetland and woodland communities. No measures to inhibit public access from the multi-use trail into the adjacent features are proposed. However, a sidewalk currently exists in the location of the proposed multi-use trail along the west side of Gordon Street. NRSI is not aware of any City concerns about members of the public accessing and encroaching into the adjacent natural features from the Gordon Street ROW under the current conditions, nor did NRSI biologists observe evidence of human disturbance along this corridor. Evidence of human impacts that would warrant protective or mitigative measures has not been observed. The proposed preliminary design is therefore not expected to cause induced impacts to the adjacent features relative to existing conditions. Nonetheless, if warranted through consultation with City and GRCA staff during the Detailed Design stage, opportunities to inhibit human encroachment into these areas can be investigated in line with plans for native woody species establishment within and adjacent to the ROW in proximity to these features.

8.5.2 Impacts to Ecological Linkage and Deer Crossings

The planned redesign of the Gordon Street ROW is itself not expected to further inhibit deer road crossings or the function of the Ecological Linkage, primarily because significant increases

in vehicular traffic volume or timing of daily use patterns are not expected as a result of the redesign, and also because the minor road widening would likely have a negligible effect on a deer's decision to cross the road.

Rather, the ROW improvements offer the opportunity to further mitigate a long-standing and ongoing hazard associated with deer crossings of Gordon Street and the potential for vehicular collisions. Although the road improvements themselves will not contribute to increased traffic volumes, it is expected that vehicular use of Gordon Street will increase both as a result of new and future developments fronting onto the street, as well as background level increases caused by continual growth of the city population (IBI 2020a). The proposed ROW upgrades themselves are, in part, a response to these projected increases in vehicular use and road congestion. Without appropriate mitigation, the projected increase in vehicular use within the Gordon Street corridor may increase the potential for deer-vehicle collisions.

As stated above, consideration of suitable measures to minimize human-wildlife conflicts is required as part of public infrastructure improvements, where warranted, in accordance with OP Section 4.1.5.3 (City of Guelph 2018). As described in Section 6.1.3, two Deer Crossing locations, one of which corresponds to the Ecological Linkage, have been identified by the City in the study area and are the areas of focus for mitigation measures.

Certain measures were previously implemented as part of the previous Gordon Street reconstruction, in response to recommendations made in the EA (TSHA 2000). These measures, which were either specifically implemented to mitigate the known deer road crossing hazard, or had the unintentional/indirect effect of mitigating the hazard, including:

- Traffic calming effect imposed by the installation of traffic signals at the Gordon Street/Arkell Road intersection;
- Installation of a standard-sized static deer road crossing sign facing southbound traffic, approximately 110m north of the Gordon Street/Edinburgh Road intersection (a similar sign facing northbound traffic on Gordon Street was not observed by NRSI staff); and,
- Reduction in speed limit along this section of Gordon Street.

Due to ongoing, albeit occasional, deer road crossing activity and the continual increase in adjacent land development, human population density and traffic volumes, further measures are required to minimize deer-vehicle collisions. It should be noted, however, that no measures can

fully eliminate the deer road crossing hazard as long as deer continue to utilize the Ecological Linkage or other crossing points for habitual east-west travel.

Various deer road crossing mitigation measures have been tested and implemented with varying levels of success, as reported in the scientific literature. However, the highly developed urban environment that exists within the study area places restrictions on which methods can feasibly be implemented. Cost of construction and maintenance of the measures can also be prohibitive for a municipality. For example, based on a literature review, the use of wildlife underpasses or overpasses, combined with funnel fencing, was determined to be the only broadly accepted method that is proven to be effective at reducing deer-vehicle collisions (Glista et al. 2009, Hedlund et al. 2003). However, construction of a wildlife overpass or underpass spanning Gordon Street would require significant re-engineering of the ROW corridor to accommodate. Even if chain-link funnel fencing along property frontages/the ROW limit is not required along the east side of Gordon Street due to the funneling effects of the Ecological Linkage, the logistics and cost to construct an overpass or underpass structure are considered infeasible and unnecessary given the small number of deer that are known to cross.

Other widely used mitigation measures are less effective on their own, but when used in concert can further reduce deer-vehicle collision hazards. The following measures are recommended for implementation:

1) Replacement or retrofitting of the existing deer road crossing signage with signs that incorporate a seasonally-timed flashing amber light. Each deer crossing sign should include a small sign tab that includes the text “increased hazard when flashing”, or similar wording. The amber light would flash during the period(s) of peak deer movement. This could be the peak seasonal period (i.e., the rutting season of October-December), or the peak daily movement periods (i.e., 5:00pm-12:00am, 5:00am-8:00am; or 5:00pm-8:00am based on previous documentation of deer movement during overnight hours at Gordon Street (NRSI 2017)), or a combination of these seasonal and daily timing periods. Determination of appropriate period(s) may be confirmed in consultation with the MNRF. It is recommended that an amber light be used with the signs to more effectively attract drivers’ attention. The use of standard passive, fixed signs without lights have limited effectiveness due to drivers becoming habituated to the presence of the sign, or drivers altogether not noticing or ignoring the sign (Hedlund et al. 2003). By having the light flash only during specific times, drivers may pay more attention to the

sign and associate some significance with the fact that the light is flashing. Incorporation of the additional sign tab allows drivers to understand why the light is flashing. Consequently, the signage may be more effective at capturing drivers' attention, more drivers may take the hazard warning seriously and take responsive actions (i.e., slow down and look for deer at the side of the road).

Two of these signs should be installed: one facing southbound traffic (in place of the existing sign north of Edinburgh Road), and one facing northbound traffic (to be located south of Arkell Road at a specific location to be determined during the Detailed Design stage). These sign locations capture both Deer Crossing locations identified in the City's NHS mapping and are sufficiently set back from the crossings to allow drivers to take precautionary measures before their vehicles reach the crossings.

2) Reduce the speed limit on Gordon Street by 10km/h to a posted limit of 50km/h between an area of approximately north of Edinburgh Road to south of Arkell Road, which encompasses the two known Deer Crossing locations. The reduced speed limit zone can correspond to the area of posted deer crossing hazard signage. A lower speed limit may provide drivers slightly more time to react to deer crossing or at the side of the road, by safely slowing down. A reduced speed limit, in combination with the existing traffic calming effect of traffic lights at the Gordon Street/Arkell Road intersection to force speed reductions, can be an effective hazard reduction measure. However, the effectiveness of reduced speed limits may only be fully realized through periodic police enforcement.

   A speed limit reduction to 50km/h within the study area was also recommended for consideration by City staff due to public and City concerns with speeding, pedestrian and cyclist hazards, and conflicts with the number of driveways (IBI Group 2020a).

3) Ensure any planted roadside vegetation is of a low growth form and/or not densely planted at the Deer Crossing locations, to increase visibility of deer at the side of the road. This may be achieved through appropriately spacing street tree plantings within the ROW. Planted roadside vegetation should not be of a type that would attract deer to the roadside (see Section 9.0). Roadside planting details reflecting these requirements should be incorporated into a future Landscape Plan during Detailed Design.

4) A public communications strategy can be considered by the City to educate and inform residents about the existence of Deer Crossing locations both within the Gordon Street study area and elsewhere within the city. This communication would also serve as a caution to residents to drive with care through these areas, especially during the peak deer movement periods.

Certain other methods to control deer movement behaviour to mitigate collision hazards, such as the use of deer whistles mounted to vehicles, "flagging" (i.e., installing a rear-view silhouette of a deer with raised tail to serve as a warning to other deer), and reflectors, have been determined to be ineffective (Hedlund et al. 2003, Ujvari et al. 1998) and are not recommended for use. Deer detection systems that trigger flashing lights mounted to signs, such as through the use of infrared sensors, show promise as a potentially effective method of deer-vehicle collision mitigation. However, studies have shown some of these systems to be ineffective, such as by being triggered by movements other than those caused by deer ("false positives"). These systems require further research and testing to confirm their effectiveness before being applied widely (Huijser and McGowen 2003, Huijser et al. 2012, Hedlund et al. 2003, Gordon and Anderson 2001). Furthermore, due to the estimated low number of deer that cross Gordon Street, the use of these systems is likely cost prohibitive for use by the City.

Another means of minimizing deer-vehicle collisions on Gordon Street would be to prevent or inhibit deer access to the ROW. This may be accomplished through the installation of sufficiently high barrier fencing, including along the ROW limits on the west side of Gordon Street and at the interface with the Ecological Linkage on the east side. Chemical and odour taste repellants can also be used to deter deer from roadside or near-roadside areas (Ontario Ministry of Transportation 2006). However, this would effectively sever the Ecological Linkage, which is counter to City policy to maintain the linkage and existing deer movements, while minimizing public hazards associated with these crossings. It is understood that the City does not support measures that would prevent deer crossings of Gordon Street (L. Lefler, City of Guelph, pers. comm.). Regardless, attempts to prevent deer crossing in the study area may simply "shift the problem" to another location if deer relocate their east-west travel corridors to another road crossing location.

The four mitigation measures described above represent additional methods, beyond what was implemented in conjunction with the previous road upgrades (TSHA 2000), to mitigate hazards to motorists under future conditions in which increased traffic volumes are anticipated. These

measures will preserve the Ecological Linkage and known Deer Crossing locations that facilitate seasonal travel between traditional foraging and overwintering grounds used by the species. While the road crossing hazard to both deer and motorists cannot be completely eliminated, it is anticipated that the above measures will further lessen the risk that presently exists.

8.6 Cumulative Impacts

In order to evaluate the potential for cumulative impacts resulting from this undertaking, it is necessary to look beyond the limits of the road reconstruction to the neighbouring lands. This approach looks at the character and potential changes that are occurring or will occur in the future on adjacent lands. Cumulative impacts may arise as a result of impacts from a number of sources to add up (or combine) if they overlap in space, overlap in time, occur at some receiver spatially removed from the undertaking, or at some future point in time. Cumulative impacts may also arise from more than one development that may not actually overlap in time or space, but affects the same component of the ecosystem.

The study area corridor has become highly urbanized over the past several years, and population density and land use will continue to intensify as developments currently under construction or in the approvals process are built out over the next few years. The planned road upgrades are a response, in part, to the future projected increases in land use density, and vehicular, pedestrian, cyclist and transit-rider use of the corridor. Cumulatively, these future changes can have a negative impact on existing natural features and functions if not appropriately mitigated. Within the study area, potential natural environment receptors of these effects include the Significant Natural Areas west of Gordon Street (including the PSW, Significant Woodland, and further west, Deer Winter Congregation Area SWH and Significant Valleyland), and the Ecological Linkage and deer movement activity focused at the Deer Crossing locations.

The planned undertaking maintains an existing use within the Gordon Street transportation corridor, such as in terms of its primary function to convey vehicular, pedestrian and cyclist traffic. In this broadest sense the undertaking itself does not contribute a cumulative impact to the adjacent features since these primary functions will continue to occur as before. As stated above, provided recommended mitigation measures are implemented, direct, indirect and induced impact to the Significant Natural Area features west of Gordon Street are not anticipated.

Deer movements between lands east and west of Gordon Street have the potential to be cumulatively affected by the continual development of lands abutting their mapped crossing areas. In response to this, the Ecological Linkage has been preserved as a 20m wide movement corridor across multiple properties spanning the Torrance Creek Swamp and Hanlon Creek Swamp PSWs. This 20m wide corridor is considered sufficient to accommodate deer movements and to maintain this habitual east-west travel between key habitats (TSHA et al. 1999, NRSI 2017). Successful crossings of Gordon Street are necessary for the sustainability of this deer movement activity and access to important overwintering and foraging habitats. Maintenance of this crossing activity and Ecological Linkage must be balanced by measures to minimize motorist collision hazards. The proposed measures described in Section 8.5.2 represent enhancements to existing deer crossing safety measures, and if implemented are expected to further lessen collision risks while maintaining cross-road movement opportunities for deer, in spite of anticipated future increases in road vehicular use. This conclusion also accounts for the relatively small estimated number of deer individuals and crossing events that occur across Gordon Street, and that they primarily tend to occur outside of peak road use periods (NRSI 2017). The planned road improvements are therefore not anticipated to contribute to cumulative impacts on deer movement activities or the Ecological Linkage function.

9.0 Right of Way Plantings

The planned road works will not require construction encroachment into the adjacent natural features outside of the ROW, and provided the recommended mitigation measures are implemented, construction disturbances of the adjacent lands are not expected. Vegetative restoration of disturbed natural areas is therefore not required. However, the planned undertaking provides the opportunity to establish a diverse assemblage of tree plantings within the study area ROW, including species and planting locations that will render the trees less susceptible to road salt toxicity effects.

The road improvements also provide an opportunity to enhance the woodland and wetland buffer areas within and adjacent to the ROW, as well as areas within the ROW immediately adjacent to the buffers (i.e., the west edge of the ROW between Edinburgh Road south to the woodland buffer extent, or further south to the Ecological Linkage). Enhancement plans for lands adjacent to the ROW will require the review and approval of the GRCA. Consultation will be required with the City and GRCA during the Detailed Design stage to determine the spatial extent of enhancement areas adjacent to the ROW that are appropriate to the purposes of the road improvement undertaking. Enhancement of these areas should initially include invasive species removal or management activities to the extent determined to be necessary and feasible, and as described in an Invasive Species Management Plan prepared during the Detailed Design stage. Invasive species management should be followed by installation of native woody vegetation plantings and application of native seed mix where deemed appropriate in accordance with a restoration planting plan. Native species selection must follow City and GRCA guidelines and must include consideration for the site conditions and locational context. For example, planting considerations will differ for lands within the ROW, which must account for periodic ROW maintenance by City staff (e.g., mowing), ensuring no vegetative growth conflicts with the travelled road surface or pedestrian and cyclist infrastructure, etc. If deemed feasible and in consultation with City and GRCA staff, the planting plan can also include consideration for a design that would inhibit human access to the adjacent natural features (see Section 8.5.1), such as through the use of dense shrub plantings.

In accordance with the recommendation to maximize the visibility of deer that may approach the roadside edges, it is recommended that street tree plantings be widely spaced within the general locations of the Deer Crossings and Ecological Linkage, and that they not possess a dense or shrubby growth form, such as cedar (*Thuja* spp.) or spruce (*Picea* spp.) that could

conceal or obscure motorist views of roadside deer. Planted vegetation should also not be a species that is attractive to deer such as oaks (*Quercus* spp.), Honey Locust (*Gleditsia triacanthos*), or Common Hackberry (*Celtis occidentalis*). Instead, species that do not attract deer, such as Sycamore (*Platanus occidentalis*) and Tulip Tree (*Liriodendron tulipifera*), should be used in these areas.

See Section 6.4 of the TIPP for additional recommendations on the selection of landscape plantings within the study area ROW. ROW planting details, including species selections and locations, will be identified on a Landscape Plan to be prepared as part of the Detailed Design stage.

10.0 Monitoring

10.1 Pre-Construction

Prior to any construction activity on-site, including vegetation clearing and grubbing, on-site inspections of the following should be undertaken to ensure proper installation:

- sediment and erosion control measures (e.g., silt fencing); and
- tree and natural area protection measures, including proper installation of tree protection fencing as confirmed by a certified arborist or environmental inspector, or other construction limit fencing where tree protection fencing isn't required.

10.2 During Construction

Construction monitoring is the responsibility of the proponent and is tied to the specific undertaking. Generally, construction monitoring must occur to ensure compliance with the conditions of various permits.

- Periodic monitoring of the above measures to ensure maintenance and effectiveness.
- Pruning of any limbs or roots (of trees to be retained) damaged during construction by a Certified Arborist.
- Visual inspection of the natural area west of Gordon Street and south of Edinburgh Road, immediately outside of the ROW limits, to ensure no unauthorized construction encroachments, vegetation damage, or other disturbances caused by construction activities.
- Fueling of machinery to be undertaken at a designated location away from the adjacent natural area.
- Storage of machinery and material, fill, etc. in designated areas away from the adjacent natural area.

10.3 Post-Construction

Inspections of ROW/adjacent land plantings should be completed to ensure survival and healthy establishment. A two-year warranty is recommended for all proposed planting material. Planted material will be inspected at the end of the warranty period. Plants which, at that time, are not in healthy vigorous growing condition, to the inspector's approval, shall be replaced in

accordance with City and/or GRCA requirements. All tree staking is to be removed just prior to final inspection.

11.0 Summary and Recommendations

NRSI was retained by IBI Group, on behalf of the City of Guelph, to complete an EIS to inform the Schedule "B" Municipal Class EA for improvements to Gordon Street between Lowes Road and Landsdown Drive. The EA study area is highly urbanized, but contains City of Guelph NHS features including a portion of the Hanlon Creek Swamp PSW, Significant Woodland, and their associated buffers west of Gordon Street and south of Edinburgh Road. A 20m wide Ecological Linkage has been preserved across multiple properties, connecting the Torrance Creek Swamp and Hanlon Creek Swamp PSWs, and spans Gordon Street north of Arkell Road. Two City-mapped Deer Crossing locations are identified for Gordon Street: one in line with the Ecological Linkage and one just south of the Edinburgh Road intersection. Collectively, the PSW, Significant Woodland, their buffers, and the Ecological Linkage represent City of Guelph Significant Natural Areas within the EA study area.

Six alternative plan options were identified and evaluated, incorporating input received by City staff and members of the public. The majority of the Natural Environment sub-criteria included in the evaluation made no difference to the selection of a preferred alternative due to no or negligible anticipated impacts. Based on the one Natural Environment criterion that did differ among alternatives, Tree Removal Requirements, Option #6 ("Widen equally about existing centreline with 4m wide continuous TWLT lane and 1.8m wide boulevard cycle track and 1.5m wide sidewalks on both sides") was preferred due to the fewest number of IBI Group's estimated tree removals (4). The selected preferred preliminary design was Option #4 ("Widen existing road on west side only with 4m wide continuous TWLT lane and 3m wide multi-use trail on each side"). An estimate of 14 tree removals was associated with that option; however, when considering all criteria and received comments, it was considered the overall preferred option.

The entirety of the planned road construction will occur within the existing ROW limits, which are in a fully developed and manicured state, and no direct impacts to natural features will occur. Based on the proximity of the confirmed PSW and Significant Woodland boundaries, the ROW lands that will be disturbed for construction marginally extend into the buffers for these features. However, indirect construction-stage disturbances to the adjacent features are not anticipated provided the following measures are implemented:

- Construction works along Gordon Street south of Edinburgh Road must be completed with care not to disturb the adjacent natural features due to the close proximity of significant woodland and wetland features;

- Construction limit fencing must be installed to prevent unauthorized access to the adjacent natural features, comprising tree protection fencing, silt fencing, a combination of these, or otherwise brightly-coloured snow fencing;
- Vegetation removal must be timed to occur outside the period April 1-August 31 to avoid contravention of the *Migratory Birds Convention Act*;
- Dust suppression measures should be applied if warranted;
- Construction timing should be limited to the period 7:00am-5:00pm to avoid wildlife disturbance impacts;
- An ESC Plan and Spills Response Plan must be prepared prior to construction;
- Avoid storage of equipment, materials or soils stockpiling, or vehicle refueling, within 30m of the adjacent natural area.

Out of 55 trees requiring removal to accommodate the road works, 38 trees require compensation based on City policy. In accordance with City standard practices for tree compensation, a total of 114 trees are required as compensation plantings. Shrubs may comprise a proportion of the compensation plantings subject to City consultation. These compensation plantings should be accommodated as new street tree plantings within the ROW to the extent feasible, with other compensation plantings to be located elsewhere as determined by the City if required (e.g., within the adjacent GRCA lands as part of buffer enhancement measures).

Two potential SAR bat habitat trees were identified within the study area that are proposed for removal. Efforts should be made during the Detailed Design stage to preserve these trees if possible. Otherwise, the MECP must be consulted prior to removal to confirm any required measures to avoid impacts to SAR bats and/or to mitigate for loss of habitat.

Stormwater drainage within the ROW will continue to be directed toward the storm sewer system as currently occurs. Impervious surface area will be marginally increased through the planned infrastructure widening within the ROW. LID infiltration measures will be investigated for incorporation during the Detailed Design stage, including use of an OGS unit for additional water quality control. The planned undertaking is not expected to have any negative effect on the hydrology of the adjacent PSW or other natural features.

The minor widening of the transportation infrastructure within the ROW is not expected to have a negative effect on the likelihood of deer road crossings to access adjacent habitats, nor on the function of the Ecological Linkage itself. Despite anticipated future increases in vehicular traffic on Gordon Street, it is expected that Ecological Linkage function and deer movement activities can be maintained through implementation of the following measures, which build on previous City efforts at deer road crossing mitigation within the study area:

- Installation of enhanced deer road crossing signage, including use of a seasonally-timed flashing amber light and sign tab warning motorists of the increased deer crossing hazard;
- A reduction in the speed limit to 50km/h within a zone containing the two Deer Crossing locations and Ecological Linkage;
- Maintaining open sight lines to roadside areas around the Deer Crossing locations for motorists, such as by avoiding dense roadside vegetation plantings and avoidance of vegetation with dense growth forms, and avoiding roadside planting types that may attract deer;
- Consideration by the City to implement a public communications strategy to raise awareness about deer road crossing hazards and how to take appropriate precautions when driving through these areas.

Provided the above measures are implemented, and subject to future Detailed Design-stage requirements, it is expected that City policies regarding the need to minimize infrastructure reconstruction disturbances to the NHS, and the need to appropriately mitigate motorist-wildlife conflicts at known crossing points including the use of signage, have been appropriately satisfied.

Future requirements to be completed during the Detailed Design stage include, but may not be limited to, the following:

- Refinement of ROW disturbance limits to preserve as many boundary and private trees as possible that are currently identified for removal;
- Investigation of opportunities for LID techniques and water quality controls into the detailed design;

- Consultation with MECP, if bat cavity trees #3 and #4 cannot be preserved, to confirm required measures in accordance with the *Endangered Species Act*;
- Preparation of ESC and Spill Response Plans in consultation with the City;
- In addition to ESC fencing locations, detailed design drawings should also show the locations of tree protection fencing and locations where hand-pruning or other tree-specific mitigations are required to retain trees within the ROW;
- Preparation of a Landscape Plan that details the planned ROW landscape plantings, including compensation tree plantings, that incorporates the recommendations of the TIPP and recommendations associated with the Deer Crossing locations;
- Incorporation of opportunities within the Landscape Plan for invasive species removal and restoration of the buffer to Significant Woodland and PSW, within and adjacent to the ROW, to achieve a net ecological gain;
- Investigation of, and if feasible, incorporation of measures to inhibit public access to the adjacent NHS through landscape design and planting plans;
- Confirmation of final deer crossing signage design, including confirmation of timing periods for the flashing light and their locations within the ROW in consultation with the MNRF;
- Confirmation of the limits of a zone of speed reduction to 50km/h, if carried forward by the City;
- Preparation of a detailed public communication strategy to support implementation of deer crossing signage;
- Confirmation of a detailed Monitoring Plan in consultation with the City;
- Consultation with the GRCA during the Detailed Design stage to ensure that any permitting requirements are appropriately addressed.

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MAPS

564000 564400 564800 565200

4818800 4818400 4818000 4817600

Torrance Creek Swamp

Hanlon Creek Swamp

LYLE PL
BALFOUR CR
BATHGATE DR
HARTS LANE E
HARTS LANE W
LANDSDOWN DR
VALLEY RD
GORDON ST
DARNELL RD
CARRINGTON DR
EDDES CRES
RICKSON AVE
TRUESDALE CRES
EDINBURGH RD S
M.C.CURDY RD
CARRINGTON PL
SILVERSMITH CRT
TERRAVIEW CRES
DAWES AVE
AMOS DR
ZECCA DR
SUMMERFIELD DR
COUTTS CRT
BARD BLVD
ARKELL RD
SWW
TERRADAM CRES
WHETSTONE CR
LLAND CRES
OH
CUMMINGS CRT
MALVERN CRES
RIDGEWAY AVE
ELDERBERRY CRT
JENSEN
OAKRIDGE CRES
PINE RIDGE DR
CAMM CRES
BURKE CRT
GAW CRES
PERIWINKLE WAY
FARLEY DR
EVANS DR
PORTER CRT
REVELL DR
VAUGHAN ST
HERITAGE DR
ZESS CRT
LOWES RD
DAWN AVE

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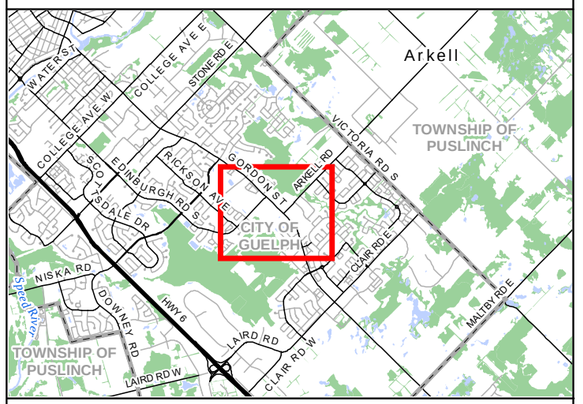
Map 1

Gordon Street, Guelph EA

Study Area



Legend

- Study Area
- Permanent Watercourse
- Regulation Limit (GRCA)

City of Guelph Natural Heritage System (boundaries approximate)

- Deer Crossing
- Restoration Area
- Significant Natural Area
- Provincially Significant Wetland (PSW)
- Ecological Linkage

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Aquatic, Terrestrial and Wetland Biologists

Project: 2252 Date: July 7, 2020	NAD83 - UTM Zone 17 Size: 11x17" **1:6,000**

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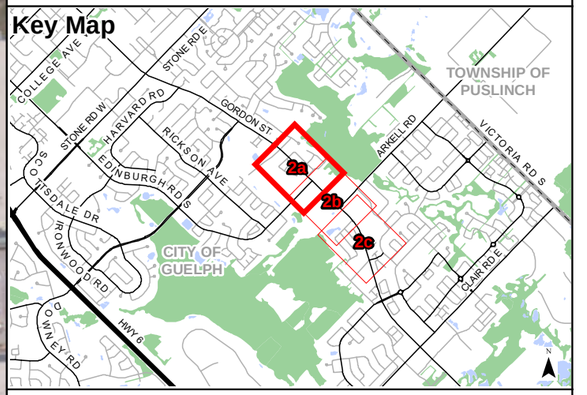
Map 2a

Gordon Street, Guelph EA

Vegetation Communities



Legend

- Right of Way
- Surveyed Wetland Boundary
- Ecological Land Classification (ELC)
- (CUM) Cultural Meadow
- (CUP3-3) Scotch Pine Coniferous Plantation Type
- (MAS) Shallow Marsh
- (MAS2-1) Cattail Mineral Shallow Marsh Type
- (SWT2-13) Non-native Mineral Thicket Swamp Type

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Project: 2252 Date: July 7, 2020	NAD83 - UTM Zone 17 Size: 11x17" **1:2,250**

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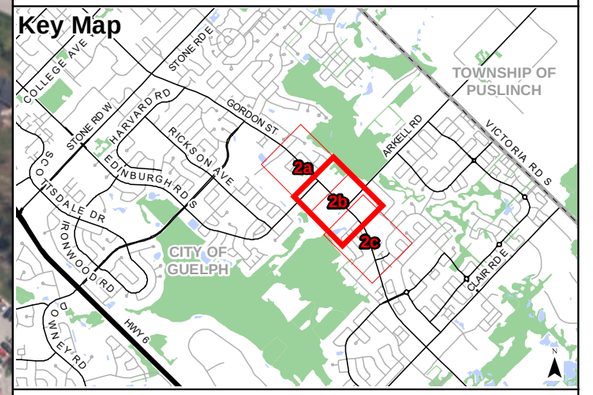
Map 2b

Gordon Street, Guelph EA

Vegetation Communities

Key Map



Legend

- Right of Way
- Surveyed Wetland Boundary
- Ecological Land Classification (ELC)
- (CUM) Cultural Meadow
- (CUP3-3) Scotch Pine Coniferous Plantation Type
- (MAS) Shallow Marsh
- (MAS2-1) Cattail Mineral Shallow Marsh Type
- (SWT2-13) Non-native Mineral Thicket Swamp Type

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Project: 2252 Date: July 7, 2020	NAD83 - UTM Zone 17 Size: 11x17" **1:2,250**

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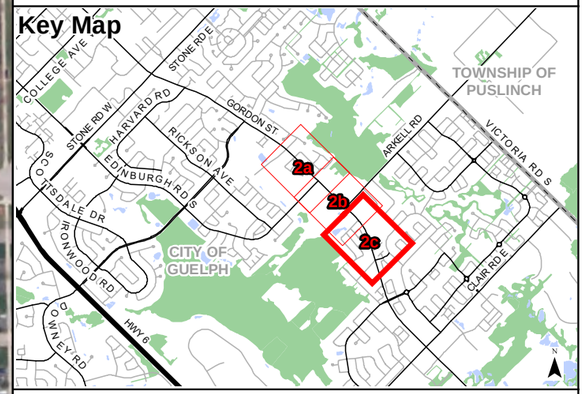
Map 2c

Gordon Street, Guelph EA

Vegetation Communities



Legend

- Right of Way
- Ecological Land Classification (ELC)
- (SWT2-13) Non-native Mineral Thicket Swamp Type

SWT2-13

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Project: 2252 Date: July 7, 2020	NAD83 - UTM Zone 17 Size: 11x17" **1:2,250**

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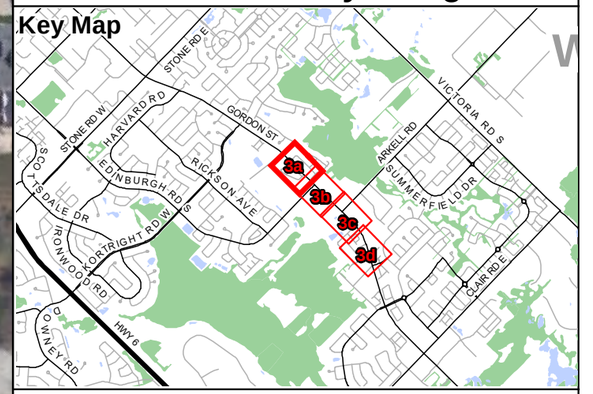
Map 3a

Gordon Street, Guelph EA

Natural Environment Constraints and Preliminary Design

Key Map



Legend

- Right of Way (ROW)
- Limit of Construction
- Preliminary Design
- Potential Bat SAR Habitat Tree
- Significant Natural Area Boundary
- Surveyed Wetland Boundary
- PSW Buffer (30m)
- Provincially Significant Wetland (PSW)
- Deer Winter Congregation SWH
- Significant Woodland
- Significant Woodland Buffer (10m)
- Deer Crossing
- Ecological Linkage

Locally Significant Species

- Sweet Gale (*Myrica gale*)

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Project: 2252 Date: July 8, 2020	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

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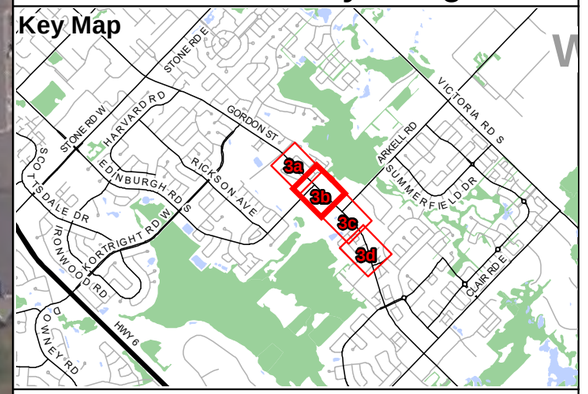
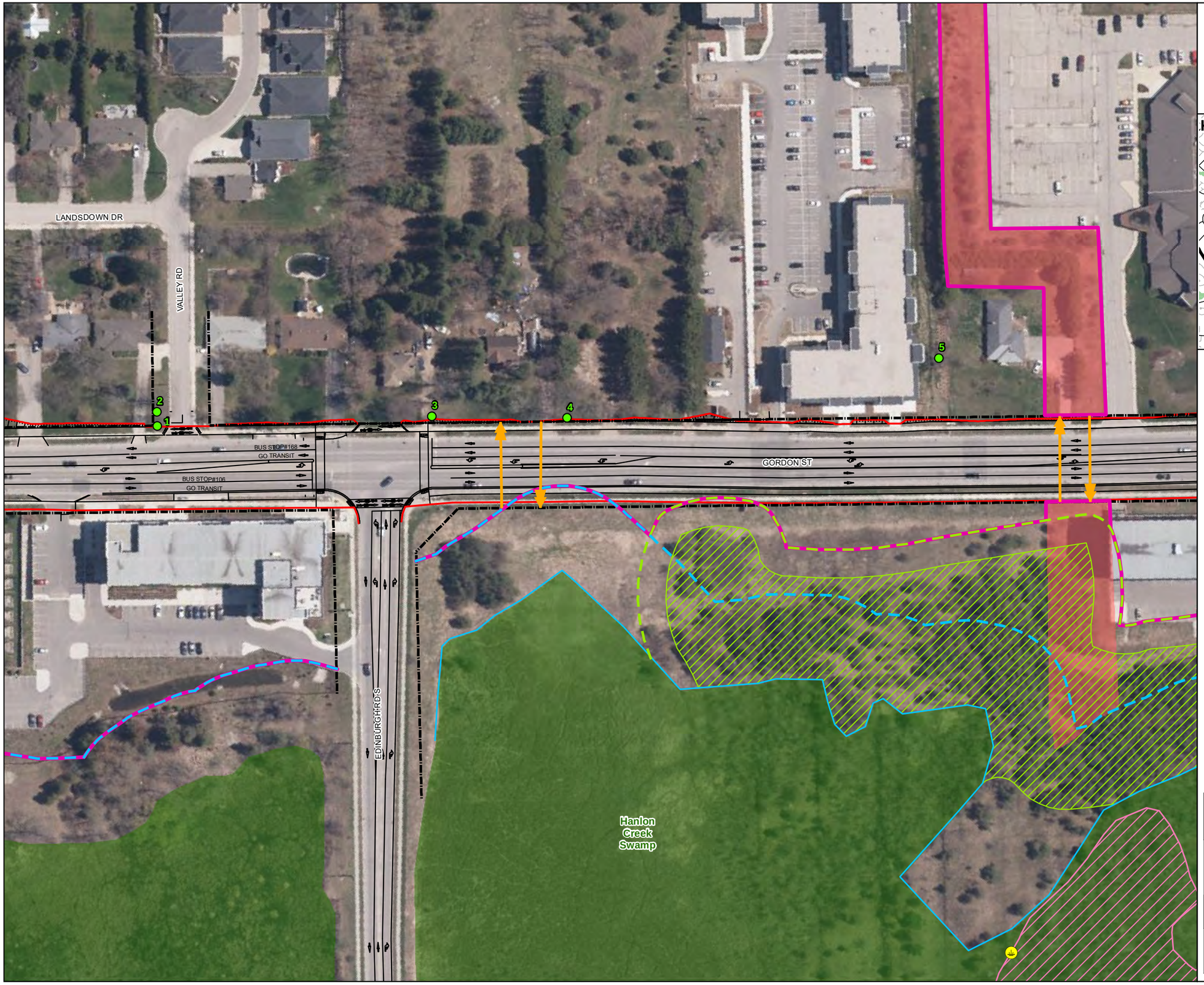
Map 3b

Gordon Street, Guelph EA

Natural Environment Constraints and Preliminary Design





Legend

- Right of Way (ROW)
- Limit of Construction
- Preliminary Design
- Potential Bat SAR Habitat Tree
- Significant Natural Area Boundary
- Surveyed Wetland Boundary
- PSW Buffer (30m)
- Provincially Significant Wetland (PSW)
- Deer Winter Congregation SWH
- Significant Woodland
- Significant Woodland Buffer (10m)
- Deer Crossing
- Ecological Linkage

Locally Significant Species

- Sweet Gale (*Myrica gale*)

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2252 Date: July 8, 2020	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

0 20 40 60 80 Metres

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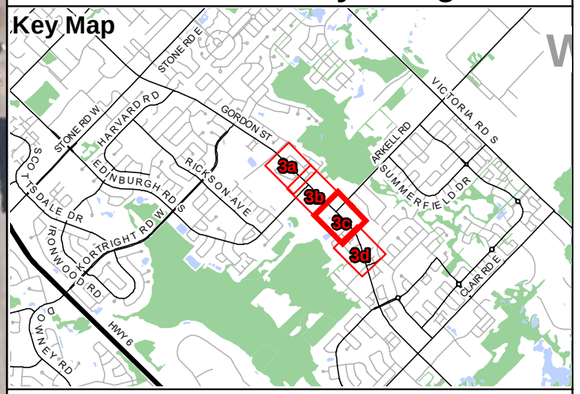
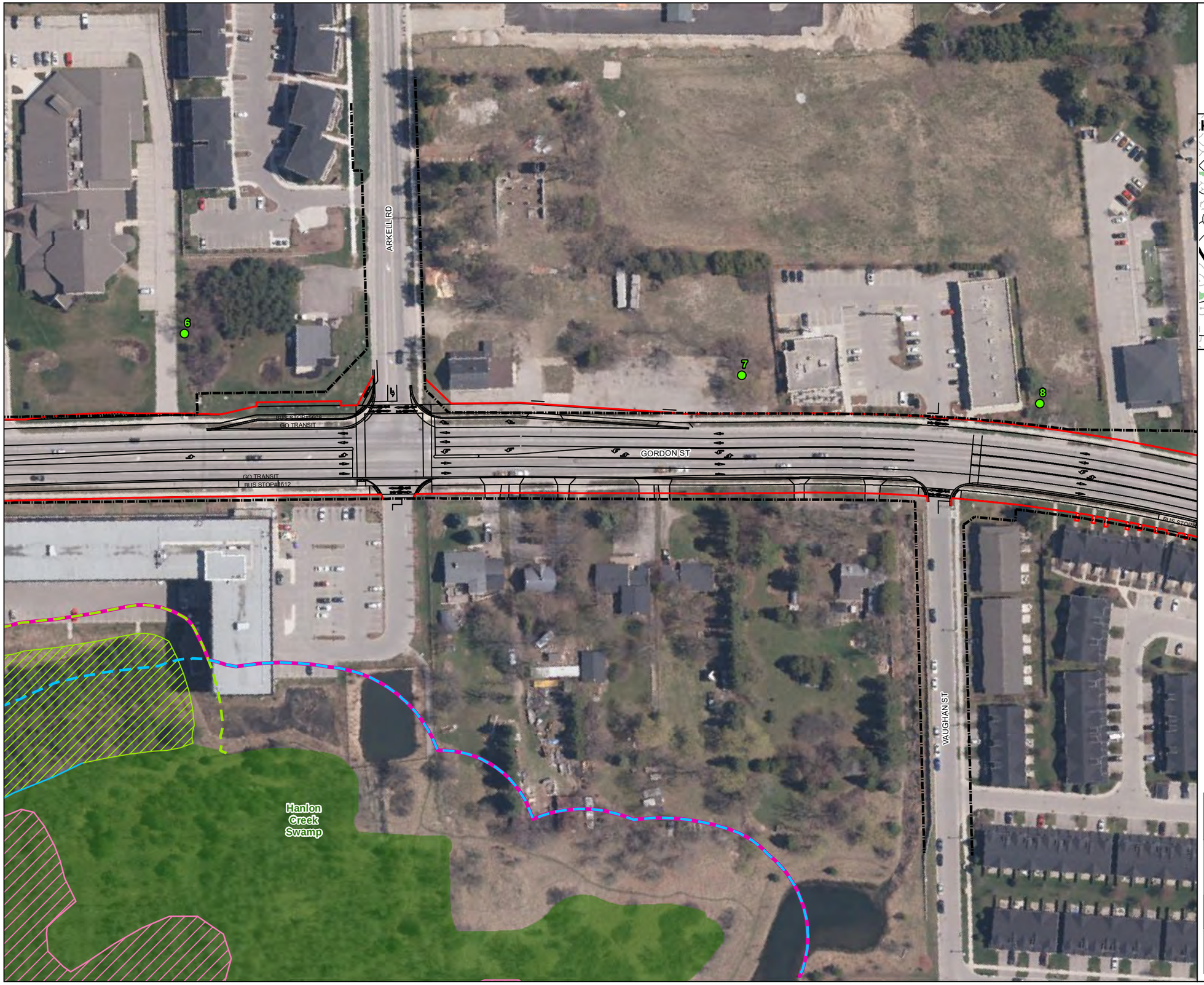
Map 3c

Gordon Street, Guelph EA

Natural Environment Constraints and Preliminary Design





Legend

- Right of Way (ROW)
- Limit of Construction
- Preliminary Design
- Potential Bat SAR Habitat Tree
- Significant Natural Area Boundary
- Surveyed Wetland Boundary
- PSW Buffer (30m)
- Provincially Significant Wetland (PSW)
- Deer Winter Congregation SWH
- Significant Woodland
- Significant Woodland Buffer (10m)
- Deer Crossing
- Ecological Linkage

Locally Significant Species

- Sweet Gale (*Myrica gale*)

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2252 Date: July 8, 2020	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

0 20 40 60 80 Metres

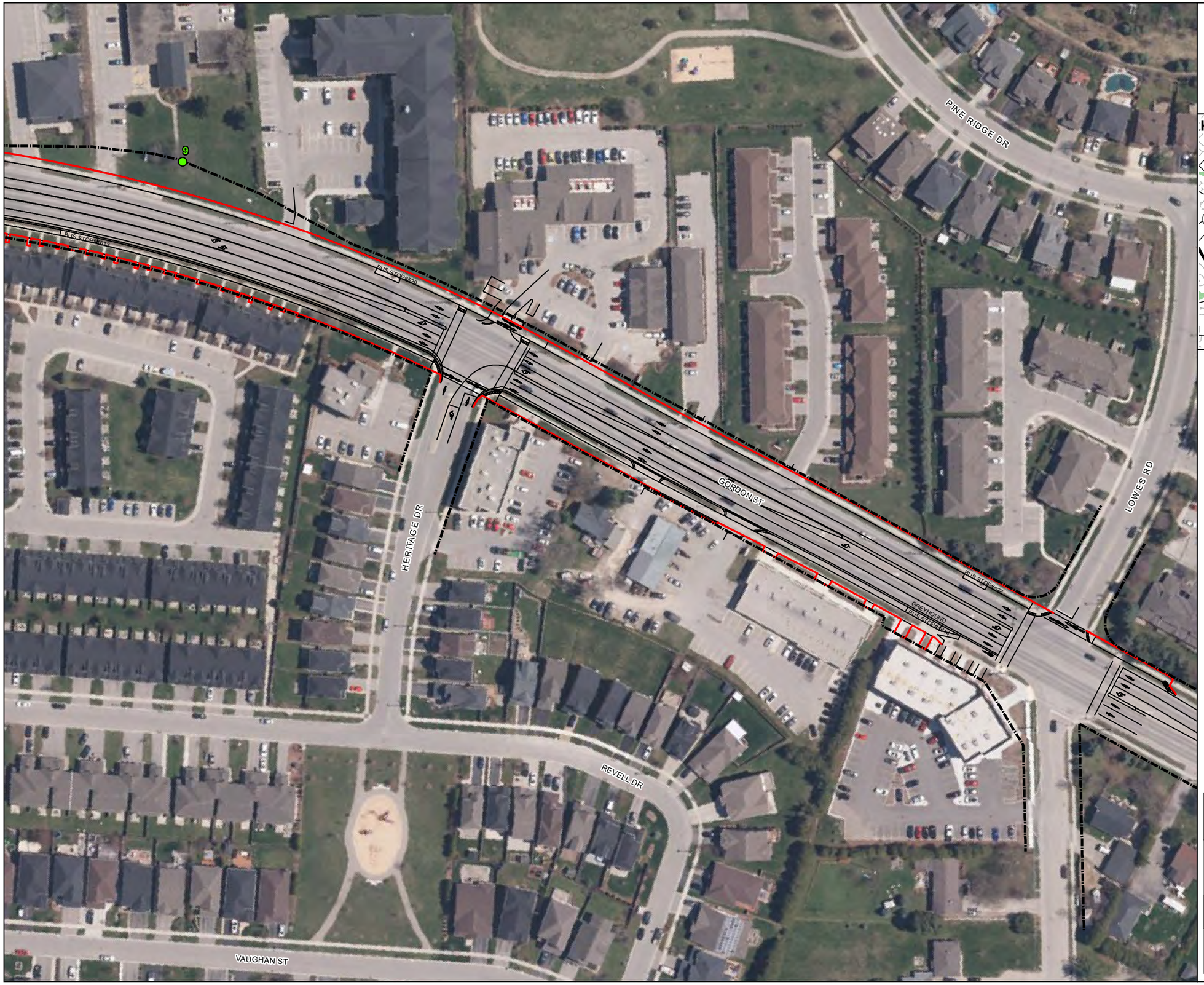
N

Path: X:\2252_GordonStEA\NRSI_2252_Map3_Constraints_3K_2020_07_08_KEF.mxd

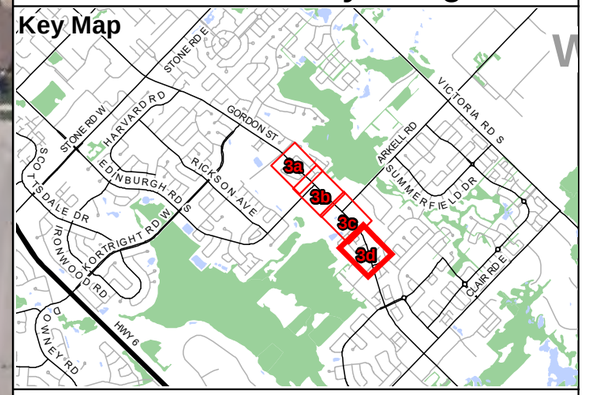
Map 3d

Gordon Street, Guelph EA

Natural Environment Constraints and Preliminary Design



Key Map



Legend

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Locally Significant Species

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NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2252 Date: July 8, 2020	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

0 20 40 60 80 Metres

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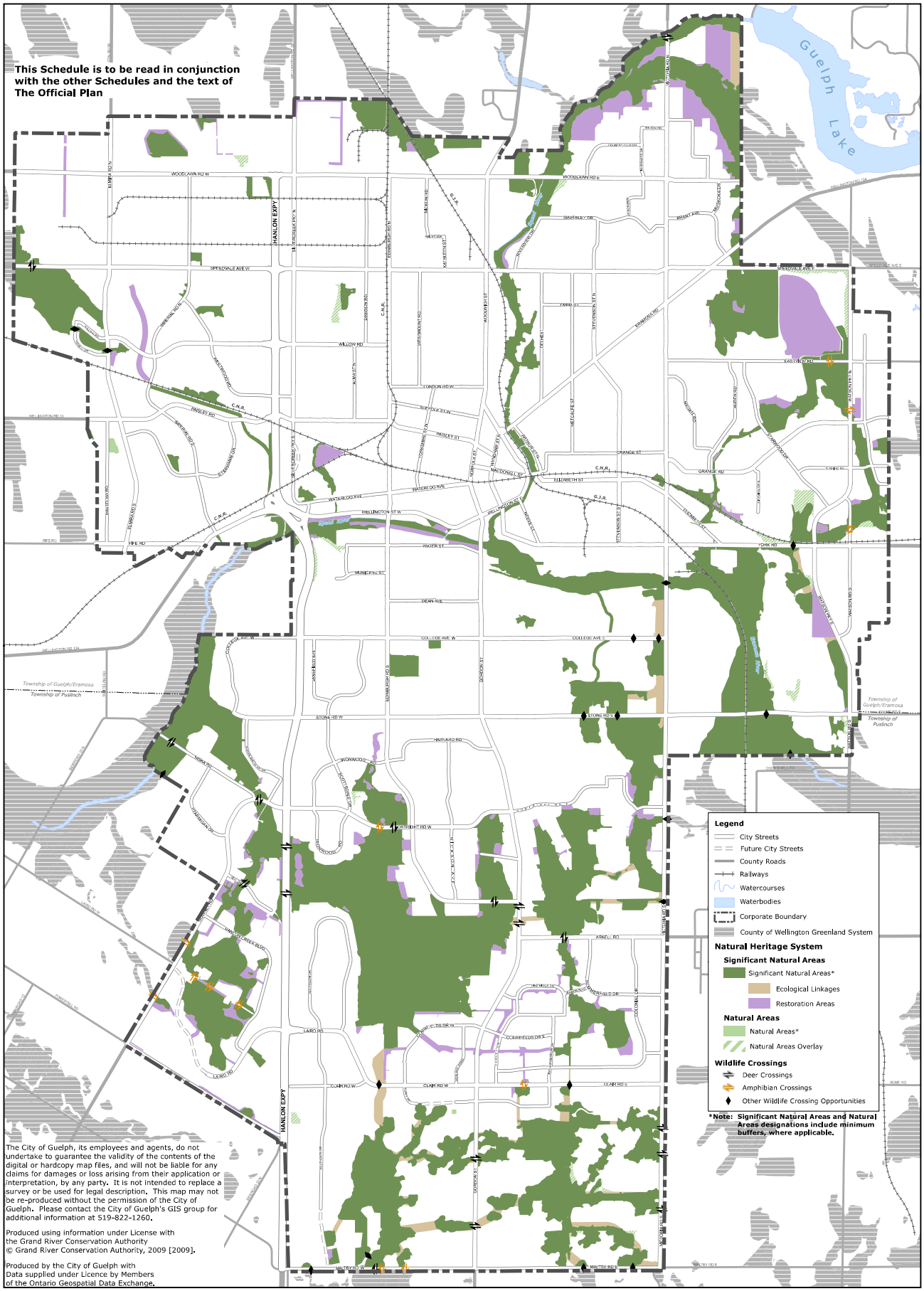
Appendix I
City of Guelph Official Plan Schedules 4, 4A, 4E



1 0.5 0 1 KM

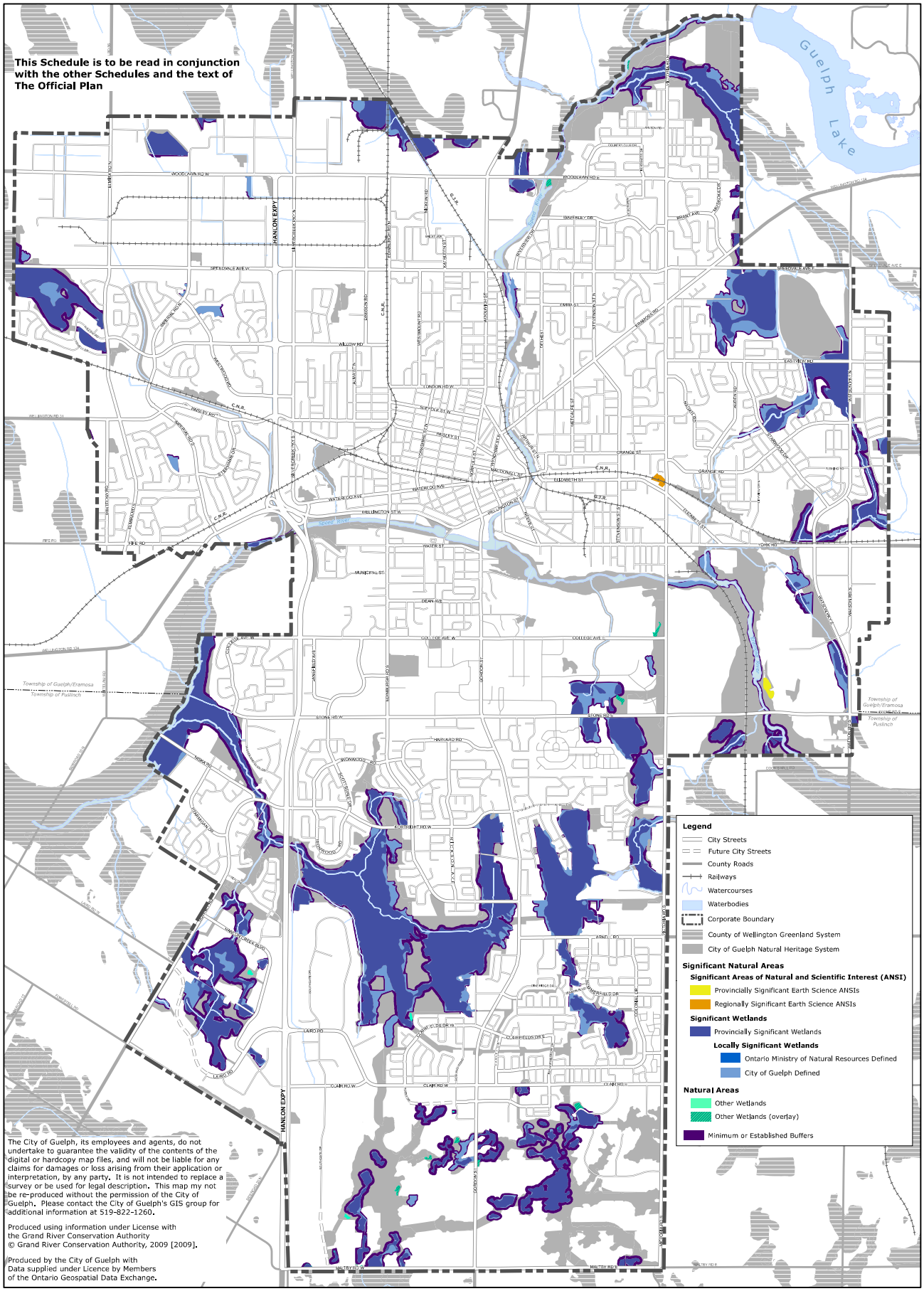
Projection: UTM 17N NAD83
Produced by the City of Guelph
Planning Services
March 2018 Consolidation

CITY OF GUELPH OFFICIAL PLAN

SCHEDULE 4: NATURAL HERITAGE SYSTEM

Natural Heritage System

CITY OF Guelph
Making a Difference



CITY OF GUELPH OFFICIAL PLAN

SCHEDULE 4A: NATURAL HERITAGE SYSTEM

ANSIs and Wetlands

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Projection: UTM 17N NAD83
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Planning Services
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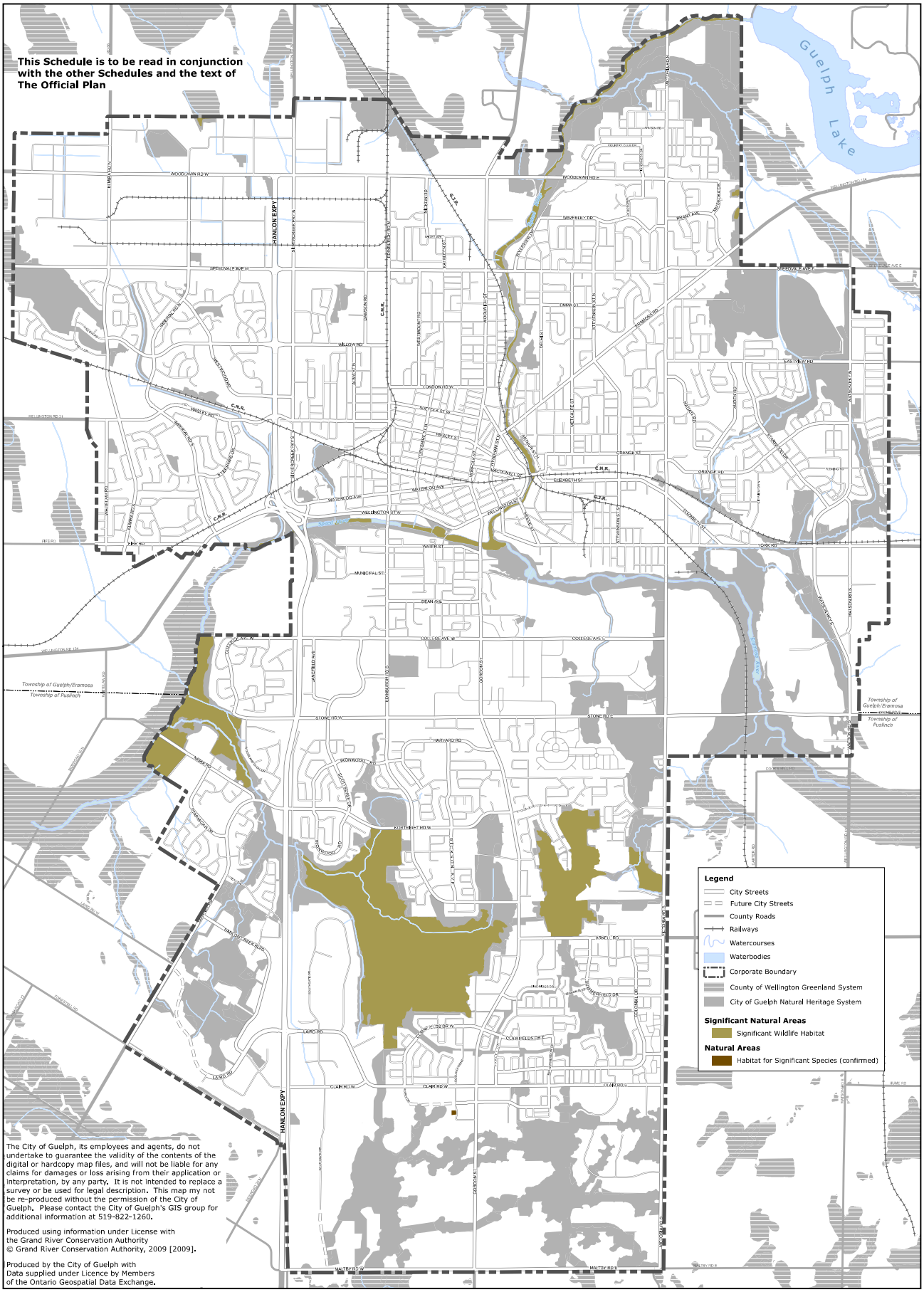

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Projection: UTM 17N NAD83
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March 2018 Consolidation

CITY OF GUELPH OFFICIAL PLAN

SCHEDULE 4E: NATURAL HERITAGE SYSTEM

Significant Wildlife Habitat & Habitat for Significant Species

CITY OF Guelph
Making a Difference

Appendix II
Species at Risk/Species of Conservation Concern Habitat Screening

Federally and Provincially Significant Species Known from the Study Area and Vicinity

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[3]	Habitat Preference[4]	Background Source	Suitable Habitat within Study Area
Vascular Flora								
Juglans cinerea	Butternut	S3?	END	E		Stream banks and swamps, as well as upland beech-maple, oak-hickory, and mixed hardwood stands	MNRF 2018	Yes
Birds								
Haliaeetus leucocephalus	Bald Eagle	S2N, S4B	SC	NAR		require large continuous area of deciduous or mixed woods around large lakes, rivers; require area of 255 ha for nesting, shelter, feeding, roosting; prefer open woods with 30 to 50% canopy cover; nest in tall trees 50 to 200m from shore; require tall, dead, partially dead trees within 400 m of nest for perching	MNRF 2018	No
Riparia riparia	Bank Swallow	S4B	THR	T		sand, clay or gravel river banks or steep riverbank cliffs; lakeshore bluffs of easily crumbled sand or gravel; gravel pits, road-cuts, grassland or cultivated fields that are close to water	MNRF 2018, 2019; BSC et al. 2008	Yes (foraging habitat only)
Hirundo rustica	Barn Swallow	S4B	THR	T		farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures for nesting; open country near body of water	BSC et al. 2008; MNRF 2018	Yes
Dolichonyx oryzivorus	Bobolink	S4B	THR	T		large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes;	BSC et al. 2008; MNRF 2018	No
Cardellina canadensis	Canada Warbler	S4B	SC	T		interior forest species; dense, mixed coniferous, deciduous forests with closed canopy, wet bottomlands of cedar or alder; shrubby undergrowth in cool moist mature woodlands; riparian habitat; usually requires at least 30 ha	MNRF 2018	No
Chaetura pelagica	Chimney Swift	S4B, S4N	THR	T		commonly found in urban areas near buildings; nests in hollow trees, crevices of rock cliffs, chimneys; highly gregarious; feeds over open water	BSC et al. 2008; MNRF 2018	Yes
Chordeiles minor	Common Nighthawk	S4B	SC	T	T	open ground; clearings in dense forests; ploughed fields; gravel beaches or barren areas with rocky soils; open woodlands; flat gravel roofs	BSC et al. 2008; MNRF 2018	Yes

Federally and Provincially Significant Species Known from the Study Area and Vicinity

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[3]	Habitat Preference[4]	Background Source	Suitable Habitat within Study Area
Sturnella magna	Eastern Meadowlark	S4B	THR	T		open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees; old orchards with adjacent, open grassy areas >10 ha in size	BSC et al. 2008; MNRF 2018	No
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC		open, deciduous, mixed or coniferous forest; predominated by oak with little understory; forest clearings, edges; farm woodlots, parks	BSC et al. 2008; MNRF 2018	Yes
Vermivora chrysoptera	Golden-winged Warbler	S4B	SC	T		early successional habitat; shrubby, grassy abandoned fields with small deciduous trees bordered by low woodland and wooded swamps; alder bogs; deciduous, damp woods; shrubbery clearings in deciduous woods with saplings and grasses; brier-woodland edges; requires >10 ha of habitat	BSC et al. 2008; MNRF 2018	Yes
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC		well-drained grassland or prairie with low cover of grasses, taller weeds on sandy soil; hayfields or weedy fallow fields; uplands with ground vegetation of various densities; perches for singing; requires tracts of grassland > 10 ha	BSC et al. 2008	No
Melanerpes erythrocephalus	Red-headed Woodpecker	S4B	SC	T	Schedule 1	open, deciduous forest with little understory; fields or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees; feeds on insects and stores nuts or acorns for winter; loss of habitat is limiting factor; requires cavity trees with at least 40 cm dbh; require about 4 ha for a territory	BSC et al. 2008; MNRF 2018	Yes
Hylocichla mustelina	Wood Thrush	S4B	SC	T		undisturbed moist mature deciduous or mixed forest with deciduous sapling growth; near pond or swamp; hardwood forest edges; must have some trees higher than 12 m	BSC et al. 2008; MNRF 2018	No
Icteria virens	Yellow-breasted Chat	S2B	END	E	Schedule 1	thickets, tall tangles of shrubbery beside streams, ponds; requires tracts of grassland >50 ha overgrown bushy clearings with deciduous thickets; nests above ground in bush, vines etc.	MNRF 2018	No
Herpetofauna								

Federally and Provincially Significant Species Known from the Study Area and Vicinity

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[3]	Habitat Preference[4]	Background Source	Suitable Habitat within Study Area
Emydoidea blandingii	Blanding's Turtle (*Great Lakes/St Lawrence pop.*)	S3	THR	T		shallow water marshes, bogs, ponds or swamps, or coves in larger lakes with soft muddy bottoms and aquatic vegetation; basks on logs, stumps, or banks	Ontario Nature 2018; MNRF 2018	No
Thamnophis sauritus septentrionalis	Eastern Ribbonsnake	S3	SC	SC		sunny grassy areas with low dense vegetation near bodies of shallow permanent quiet water; wet meadows, grassy marshes or sphagnum bogs; borders of ponds, lakes or streams	Ontario Nature 2018; MNRF 2018	Yes
Ambystoma jeffersonianum	Jefferson Salamander	S2	END	E		damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs	Ontario Nature 2018; MNRF 2018	No
Ambystoma sp.	Jefferson/Blue-spotted Salamander Complex	S2				damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs	Ontario Nature 2018	No
Graptemys geographica	Northern Map Turtle	S3	SC	SC	Schedule 1	large bodies of water with soft bottoms, and aquatic vegetation; basks on logs or rocks or on beaches and grassy edges, will bask in groups; uses soft soil or clean dry sand for nest sites; may nest at some distance from water; home range size is larger for females (about 70 ha) than males (about 30 ha) and includes hibernation, basking, nesting and feeding areas; aquatic corridors (e.g. stream) are required for movement	Ontario Nature 2018	No
Chelydra serpentina serpentina	Snapping Turtle	S3	SC	SC		permanent, semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft muddy banks or bottoms; often uses soft soil or clean dry sand on south-facing slopes for nest sites	Ontario Nature 2018; MNRF 2018; GRCA 2019	Yes
Ambystoma laterale - (2) jeffersonianum	Unisexual Ambystoma Jefferson Salamander dependent population	S2	END	E		damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs	MNRF 2018	No

Federally and Provincially Significant Species Known from the Study Area and Vicinity

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[3]	Habitat Preference[4]	Background Source	Suitable Habitat within Study Area
Pseudacris triseriata	Western Chorus Frog *(Great Lakes/St. Lawrence - Canadian Shield Population)*	S3	NAR	T	Schedule 1	roadside ditches or temporary ponds in fields; swamps or wet meadows; woodland or open country with cover and moisture; small ponds and temporary pools	Ontario Nature 2018	Yes
Mammals								
Taxidea taxus jacksoni	American Badger	S2	END	E		open grasslands and oak savannahs	MNRF 2018	Yes
Myotis leibii	Eastern Small-footed Myotis	S2S3	END			Roosts in caves, mines shafts, crevices or buildings that are in or near woodland; hibernates in cold dry caves or mines; maternity colonies in caves or buildings; forages in forests	Humphrey 2017; MNRF 2018	Yes
Myotis lucifuga	Little Brown Myotis	S3?	END	E	Schedule 1	uses caves, quarries, tunnels, hollow trees or buildings for roosting; winters in humid caves; maternity sites in dark warm areas such as attics and barns; feeds primarily in wetlands, forest edges	ECCC 2018; MNRF 2018	Yes
Myotis septentrionalis	Northern Myotis	S3	END	E	Schedule 1	hibernates during winter in mines or caves; roosts in houses, manmade structures but prefers hollow trees or under loose bark; hunts within forests, below canopy	ECCC 2018; MNRF 2018	Yes
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	Schedule 1	Open woods near water; roosts in trees, cliff crevices, buildings or caves; hibernates in damp, draft-free warm caves, mines or rock crevices	ECCC 2018; MNRF 2018	Yes
Insects								
Danaus plexippus	Monarch	S2N, S4B	SC	SC	Schedule 1	Host plants are milkweeds (*Asclepias* spp.)	MNRF 2018	Yes
Bombus affinis	Rusty-patched Bumblebee	S1	END	E	Schedule 1	can be found in open habitat such as mixed farmland, urban settings, savannah, open woods and sand dunes	MNRF 2018	Yes (however, only known from Lambton County)
Pieris virginiensis	West Virginia White	S3		SC		Host plant is Toothwort (*Cardamine* spp.)	MNRF 2018	No

[1]MNRF 2019; [2]MECP 2019; [3]Government of Canada 2019; [4]OMNR 2000

LEGEND
SRANK
S1 Critically Imperiled
S2 Imperiled
S3 Vulnerable

Federally and Provincially Significant Species Known from the Study Area and Vicinity

Scientific Name	Common Name	SRANK[1]	COSSARO[2]	COSEWIC[3]	SARA Schedule[3]	Habitat Preference[4]	Background Source	Suitable Habitat within Study Area

S4 Apparently Secure
S5 Secure
SNA Unranked
B Breeding
N Non-breeding
S#? Rank Uncertain
COSSARO/COSEWIC
END/E Endangered
THR/T Threatened
SC/SC Special Concern
NAR Not at Risk
SARA Schedule
Schedule 1 Officially Protected under SARA
Schedule 3 Special concern; may be reassessed for consideration for inclusion to Schedule 1

Appendix III
Significant Wildlife Habitat Screening

Significant Wildlife Habitat Assessment Tables

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Waterfowl Stopover and Staging Areas (Terrestrial)					
Rationale: Habitat important to migrating waterfowl.	American Black Duck Wood Duck Green-winged Teal Blue-winged Teal Mallard Northern Pintail Northern Shoveler American Wigeon Gadwall	CUM1 CUT1 - Plus evidence of annual spring flooding from melt water or run-off within these Ecosites.	Fields with sheet water during Spring (mid March to May). • Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl. • Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available[cxlviii]. Information Sources • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities (CAs) • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Field Naturalist Clubs • Ducks Unlimited Canada • 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 area of the flooded field ecosite habitat plus a 100-300m radius buffer dependent on local site conditions and adjacent land use is the significant wildlife habitat[cxlviii]. • 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). • SWHMiST[cxlix] Index #7 provides development effects and mitigation measures.	Suitable habitat not present within the study area. **Not SWH**
Wildlife Habitat: Waterfowl Stopover and Staging Areas (Aquatic)					
Rationale: Important for 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.	Canada Goose Cackling Goose Snow Goose American Black Duck Northern Pintail Northern Shoveler American Wigeon 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	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	• Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake 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: • Aggregations of 100[i] or more of listed species for 7 days[i], results in > 700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH[cxlix] • The combined area of the ELC ecosites and a 100m radius area is the SWH[cxlviii] • Wetland area and shorelines associated with sites identified within the SWHTG[cxlviii] Appendix K[cxlix] are significant wildlife habitat. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). • SWHMiST[cxlix] Index #7 provides development effects and mitigation measures.	Suitable habitat not present within the study area. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Shorebird Migratory Stopover Area					
Rationale: 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 Whimbrel	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	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 extremely important 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. Information Sources • 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"[cclxi] • SWHMiST[cxlix] Index #8 provides development effects and mitigation measures.	Suitable habitat not present within the study area. **Not SWH**
Wildlife Habitat: Raptor Wintering Area					
Rationale: Sites used by multiple species, a high number of individuals and used annually are most significant	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl Special Concern: Short-eared Owl Bald Eagle	Hawks/Owls: 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 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 wind swept with limited snow depth or accumulation. Eagle sites have open water, large trees and snags available for roosting Information Sources • OMNRF Ecologist or Biologist • Field Natural Clubs • Natural Heritage Information Center (NHIC) Raptor Winter Concentration Area • Data from Bird Studies Canada • Reports and other information available from Conservation Authorities CAs.	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 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 • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[cclxi] • SWHMiST[cxlix] Index #10 and #11 provides development effects and mitigation measures.	Suitable habitat not present within the study area. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Bat Hibernacula					
Rationale Bat hibernacula are rare habitats in 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. • 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.	Suitable habitat not present within the study area. **Not SWH**
Wildlife Habitat: Bat Maternity Colonies					
Rationale: Known locations of forested bat maternity colonies is 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 buildings[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] 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] Information Sources • 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] • SWHMiS T[cxlix] Index #12 provides development effects and mitigation measures.	Bat maternity colonies may occur within the adjacent woodland to the west. **Candidate SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Turtle Wintering Area					
Rationale: Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant	Midland Painted Turtle Special Concern: 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 also be used as over-wintering habitat.	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, cxviii]. • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. Information Sources • 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 • Natural Heritage Information Center (NHIC)	• 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. • 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.	Potential turtle overwintering habitat within the study area is limited to a stormwater pond to the west of Gordon St. However, stormwater ponds are not considered SWH. **Not SWH**
Wildlife Habitat: Snake 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 and Cave, and Alvar sites may be directly related to these habitats. Observations of 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 locations. The existence of features that go below the frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. • Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line[xliv, 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 • 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 from CAs. • Local Field naturalists and experts, as well as university herpetologists may also know where to find some of these sites. clubs • Natural Heritage Information Center (NHIC) • OMNRF ecologist or biologist may be aware of locations of wintering skinks	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. The feature in which the hibernacula is located plus a 30m buffer is the SWH[i] • 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.	Suitable snake hibernaculum habitat may exist within areas of open natural cover in the study area, to the west of Gordon St. **Candidate SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)					
Rationale: 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 populations 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. Information Sources • Reports and other information available from CAs • Ontario Breeding Bird Atlas [ccv] • Bird Studies Canada; *NatureCounts* http://www.birdscanada.org/birdmon/ • Field Naturalist clubs	Studies confirming: • Presence of 1 or more nesting sites with 8[cxlvix] 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	Suitable habitat not present within the study area. **Not SWH**
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)					
Rationale: 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 15m from ground, near the top of the tree. Information Sources • Ontario Breeding Bird Atlas[ccv], colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNR). • 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[i] 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 not present within the study area. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Ground)					
Rationale: Colonies are important to local bird populations, 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 or in low bushes in close proximity to streams and irrigation ditches within farmlands. Information Sources • Ontario Breeding Bird Atlas[ccv], 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[l]. • 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 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.	Suitable habitat not present within the study area. **Not SWH**
Wildlife Habitat: Migratory Butterfly Stopover Areas					
Rationale: Butterfly stopovers areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.	Painted Lady Red Admiral Special Concern: Monarch	Combination of ELC Community Series: Need to have present one Community Series from each landclass: Field: CUM CUS CUT Forest: FOC FOM FOD CUP Anecdotally, a candidate sight 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.] Information Sources • 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/day[xxxvii], 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.	The study area is not within 5km of Lake Ontario. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Landbird Migratory Stopover Areas					
Rationale: Sites with a high diversity of species as well as high number are most significant	All migratory songbirds. Canadian Wildlife Service Ontario website: http://www.on.ec.gc.ca/wildlife_e.html 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[i] in size and within 5km [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]. Information Sources • Bird Studies Canada • Ontario Nature • Local birders and naturalist club • Ontario Important Bird Areas (IBA) Program	Studies confirm: • Use of the woodlot 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.	The study area is not within 5km of Lake Ontario. **Not SWH**
Wildlife Habitat: Deer Yarding Areas					
Rationale: Winter habitat for deer is considered to be the main factor for northern deer populations. In winter, deer congregate in "yards" to 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.	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. Or these ELC Ecosites: CUP2 CUP3 FOD3 CUT	• 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 to these areas in early winter and generally, when snow depths reach 20cm, most of the deer will have moved here. If the snow is light and fluffy, deer may continue to use this area until 30cm 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.	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, i]. • Deer Yards are mapped by OMNRF District offices. Locations of Core or Stratum 1 and Stratum 2 Deer yards considered 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.	Deer yarding areas are not mapped by the MNRF within the study area vicinity. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Deer Winter Congregation Areas					
Rationale: 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 50ha 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 Eco-region 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. Information Sources • 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 MNR[i]. • 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 of 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.	Deer winter congregation areas are mapped by the MNRF extending to just within 120m of the Gordon St. ROW associated with the Hanlon Creek Swamp PSW, and are mapped nearby to the east (Torrance Creek Swamp PSW). This SWH has been identified by the City in Schedule 4E of the Official Plan **Confirmed SWH**

Significant Wildlife Habitat Assessment Tables

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rare Vegetation Community[1]	Candidate SWH			Confirmed SWH	Study Area
	ELC Ecosite Codes[1]	Habitat Description[1]	Detailed Information and Sources[1]	Defining Criteria[1]	Assessment Details
Cliff 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 on their website • Local 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.	Vegetation community not present within study area. **Not SWH**
Sand Barrens					
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 SBS1 SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always <60%.	Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. They have little or no soil and the underlying rock protrudes through the surface. 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 than 60%.	Any sand barren area, >0.5ha in size. Information Sources • OMNRF Districts. • Natural Heritage Information Center (NHIC) has location information 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 exotics)[i]. • SWHMiST[cxlix] Index #20 provides development effects and mitigation measures.	Vegetation community not present within study area. **Not SWH**

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rare Vegetation Community[1]	Candidate SWH			Confirmed SWH	Study Area
	ELC Ecosite Codes[1]	Habitat Description[1]	Detailed Information and Sources[1]	Defining Criteria[1]	Assessment Details
Alvar					
Rationale: Alvars are extremely rare habitats in Ecoregion 6E. Most alvars in Ontario are in Ecoregion 6E and 7E. Alvars in 6E are small and highly localized just north of the Palaeozoic-Precambrian contact.	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2 Five Alvar Indicator Species: 1) Carex crawei 2) Panicum philadelphicum 3) Eleochairs compressa 4) Scutellaria parvula 5) Trichostema branchiatum These indicator species are very specific to Alvars within Ecoregion 6E	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 indicator plant. Undisturbed alvars can be phyto- and zoo geographically 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].	An Alvar site > 0.5 ha in size[lxxv]. Information Sources • Alvars of Ontario (2000), Federation of Ontario Naturalists[lxxvi]. • Ontario Nature – Conserving Great Lakes Alvars[ccviii]. • Natural Heritage Information Center (NHIC) has location information on their website • Field Naturalist clubs • Conservation Authorities	Field studies 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 exotics 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.	Vegetation community not present within study area. **Not SWH**
Old Growth Forest					
Rationale: 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 Stands areas 30ha or greater in size or with at least 10 ha interior habitat assuming 100m buffer at edge of forest Í. Information Sources • OMNRF Forest Resource Inventory mapping • OMNRF Forester, Ecologist or Biologist • Field Local naturalist clubs • Conservation Authorities • Sustainable Forestry License (SFL) companies will possibly know locations through field operations. • Municipal forestry departments	Field Studies will determine: • If dominant trees species of the ecosite are >140 years old, then stand is Significant Wildlife Habitat[cxlviii] • The stand will have experienced no recognizable forestry activities[cxlviii] • The area of Forest Ecosites combined to make up the stand is the SWH. • Determine ELC Vegetation Type for forest stand[lxxviii] • SWHDSS[cxlix] Index #23 provides development effects and mitigation measures.	Vegetation community not present within study area. **Not SWH**

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rare Vegetation Community[1]	Candidate SWH			Confirmed SWH	Study Area
	ELC Ecosite Codes[1]	Habitat Description[1]	Detailed Information and Sources[1]	Defining Criteria[1]	Assessment Details
Savannah					
Rationale: 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%.	• 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. Information Sources • Natural Heritage Information Center (NHIC) has location information on their website • OMNRF Ecologists • Field naturalists clubs • Conservation Authorities	Field studies confirm one or more of the Savannah indicator species listed in[lxxv] 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 exotics sp.). • SWHMiST[cxlix] Index #18 provides development effects and mitigation measures.	Vegetation community not present within study area. **Not SWH**
Tallgrass Prairie					
Rationale: Tallgrass Prairies are extremely rare habitats in Ontario.	TPO1 TPO2	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover.	• 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. Information Sources • OMNR Districts • Natural Heritage Information Center (NHIC) has location information available on their website • Field naturalists clubs • Conservation Authorities	Field studies confirm one or more of the Prairie indicator species listed in[lxxv] 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 exotics). • SWHMiST[cxlix] Index #19 provides development effects and mitigation measures.	Vegetation community not present within study area. **Not SWH**

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rare Vegetation Community[1]	Candidate SWH			Confirmed SWH	Study Area
	ELC Ecosite Codes[1]	Habitat Description[1]	Detailed Information and Sources[1]	Defining Criteria[1]	Assessment Details
Other Rare Vegetation Communities					
Rationale: 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 OMNR/NHIC will have up to date listing for rare vegetation communities. Information Sources • Natural Heritage Information Center (NHIC) has location information available on their website • OMNRF Districts • Field naturalists 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.	No other rare vegetation communities are present within the study area. **Not SWH**

Significant Wildlife Habitat Assessment Tables

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Waterfowl Nesting Area					
Rationale: 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 120m[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 120m of each individual wetland where waterfowl nesting is known to occur[cxlix]. • Upland areas should be at least 120m wide so that predators such as raccoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites. Information Sources • 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 CAs	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 120m[cxlviii] from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWHMiST[cxlix] Index #25 provides development effects and mitigation measures.	Woodland and open habitat adjacent to wetland to the west of Gordon St. may provide suitable waterfowl nesting habitat. **Candidate SWH**
Wildlife Habitat: Bald Eagle and Osprey Nesting, Foraging and Perching Habitat					
Rationale: Nest sites are fairly uncommon in Eco-region 6E 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). Information Sources • 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 • Sustainable Forestry License (SFL) companies will identify additional nesting locations through field operations. • Check the Ontario Breeding Bird Atlas[ccv] or Rare Breeding Birds in Ontario for species documented • Reports and other information available from CAs. • 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 300m radius around the nest or the contiguous woodland stand is the SWHccvii, maintaining undisturbed shorelines with large trees within this area is important[cxlviii]. • For a Bald Eagle the active nest and a 400-800m 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 foraging habitat[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. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #26 provides development effects and mitigation measures	Suitable perching, nesting and foraging habitat in proximity to aquatic foraging habitat is not present within the study area. **Not SWH**

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Woodland Raptor Nesting Habitat					
Rationale: 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[lxxxviii, 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 Cooper's 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. Information Sources • OMNRF • 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 CAs	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 28ha area of habitat is the SWH[ccvii]. • 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 effects and mitigation measures.	Suitable habitat not present within the study area. **Not SWH**
Wildlife Habitat: Turtle Nesting Area					
Rationale: These habitats are rare and when identified will often be the only breeding site for local populations of turtles	Midland Painted Turtle Special Concern: 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 BOO1 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. Information Sources • 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 Center (NHIC) • Field Naturalist clubs and landowners	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH[i] • 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 dependent 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[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 provides development effects and mitigation measures for turtle nesting habitat.	Suitable turtle nesting habitat may exist within open areas to the west of Gordon St., within or adjacent to the wetland habitat. **Candidate SWH**

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Seeps and Springs					
Rationale: 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] Information Sources • Topographical Map • Thermography • Hydrological surveys conducted by CAs 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 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	Forested tributary headwater areas not present within the study area. **Not SWH**
Wildlife Habitat: Amphibian Breeding Habitat (Woodland)					
Rationale: These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations.	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	All Ecosites associated with these ELC Community Series: FOC FOM FOD 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.	• 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)[cbooxii, lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx] Some small 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] Information Sources • 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	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 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 woodland 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 the be included in the habitat. • SWHMiST[cxlix] Index #14 provides development effects and mitigation measures.	Suitable amphibian breeding habitat occurs within wetland located west of Gordon St. **Candidate SWH**

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Amphibian Breeding Habitat (Wetland)					
Rationale: These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Tree frog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog 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 >500m2 (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[clxxxiv]. • 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. Information Sources • 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 CAs.	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 and with at least 20 individuals (adults or eggs masses)[lxxi, lxxiii], 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 spring March to 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.	Wetland habitats of this category not present within the study area. **Not SWH**
Woodland Area-Sensitive Bird Breeding Habitat					
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.	Yellow-Bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren Special Concern: Cerulean Warbler Canada Warbler	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, cxxv, cxxvi, cxxxvii, cxxxviii, cxxxix, cxl, cxli, cxlii, cxliii, cxliv, cxlv, cxlvi, cl, cli, clii, cliii, cliv, clv, clvii, clviii, clix] • Interior forest habitats are at least 200m from forest edge habitat. Information Sources • 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 greatest value to interior species • Reports and other information available from CAs.	• Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. • Note: any site with breeding 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.	An eastern fringe of larger contiguous woodland to the west of Gordon St. extends into the study area limits. However, the edge habitat present within the study area limits would not support woodland area-sensitive bird breeding habitat. **Not SWH**

Significant Wildlife Habitat Assessment Tables

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Marsh Bird Breeding Habitat					
Rationale: Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Gallinule 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. Information Sources • Contact OMNRF, wetland evaluations are a good source of information. • Field naturalist clubs • Natural Heritage Information Center (NHIC) Records • Reports and other information available from CAs. • Ontario Breeding Bird Atlas[ccv]	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or 1 pair of Sandhill Cranes; or breeding by any combination of 5 or more of the listed species[i]. • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH[i]. • 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.	Meadow marsh habitat extends within the study area limits. However, significant breeding habitat for the target species is unlikely to occur within the study area limits. **Not SWH**
Wildlife Habitat: Open Country Bird Breeding Habitat					
Rationale: This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow Special Concern: Short-eared Owl	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 being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years)[i]. 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. Information Sources • Agricultural land classification maps, Ministry of Agriculture. • Ask local birders • Ontario Breeding Bird Atlas[ccv]	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 Owl is to be considered 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.	Large areas of suitable habitat are not present within the study area. **Not SWH**

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Shrub/Early Successional Bird Breeding Habitat					
Rationale: 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.	Indicator spp.: Brown Thrasher Clay-coloured Sparrow Common spp.: Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher Special Concern: Yellow-breasted Chat Golden-winged Warbler	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[cbxiv] 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)[j]. Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species [cbxiii]. Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. Information Sources • Agricultural land classification maps Ministry of Agriculture Local bird clubs • Ontario Breeding Bird Atlas[ccv] • Reports and other information available from CAs	Field Studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species[j]. • A field 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 • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #33 provides development effects and mitigation measures.	Large areas of suitable habitat are not present within the study area. **Not SWH**
Wildlife Habitat: Terrestrial Crayfish					
Rationale: Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare. [ccii]	Chimney or Digger Crayfish: (*Fallicambarus fodiens*) Devil Crawfish or Meadow Crayfish: (*Cambarus Diogenes*)	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM	Wet meadow and edges of shallow marshes (no minimum size) identified 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. Information Sources • 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 marsh meadow or 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 during in temporary or permanent water Note the presence of burrows or chemistry 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.	Terrestrial crayfish habitat may occur within or adjacent to the wetland habitat to the west of Gordon St. **Candidate SWH**

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Special Concern and Rare Wildlife Species					
Rationale: 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]. Information Sources • Natural Heritage Information Centre (NHIC) will have the 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[ccv] • 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 to 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	Suitable habitat for the following SCC, that are not otherwise addressed by another SWH category, is present within the study area: - Common Nighthawk - Red-headed Woodpecker **Candidate SWH**

Significant Wildlife Habitat Assessment Tables

Table 5. Characteristics of Animal Movement Corridors for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: 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 Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper 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 [clxxiv, clxxv, clxxvi, clxxvii, clxxviii, clxxix, clxxx, clxxxi]. 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[i]. Information Sources • MNRF District Office • Natural Heritage Information Center NHIC • Reports and other information available from CAs • 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. Cooridors 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.	Provincially significant amphibian breeding habitat corridors do not cross the study area. **Not SWH**
Wildlife Habitat: Deer Movement Corridors					
Rationale: 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[i]. • 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). Information Sources • MNRF District Office • Natural Heritage Information Center (NHIC) • Reports and other information available from CAs • 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 yard 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.	Provincially significant deer movement corridors do not cross the study area. **Not SWH**

Appendix IV
Plant Species Recorded within the Study Area

Vascular Plant Species Reported From the Study Area

Scientific Name	Common Name	CC	CW	Weed	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[3]	City of Guelph[4]	NRSI Observed				
										MAS2-1	CUP3-3	SWT2-13	CUM	ROW/ Developed
Pteridophytes	**Ferns & Allies**													
Equisetaceae	**Horsetail Family**													
Equisetum arvense	Field Horsetail	0	0		S5						X			
Equisetum sp.	Horsetail/Scouring-rush									X			X	
Gymnosperms	**Conifers**													
Cupressaceae	**Cypress Family**													
Thuja occidentalis	White Cedar	4	-3		S5								X	X
Pinaceae	**Pine Family**													
Larix laricina	Tamarack	7	-3		S5							X	X	
Picea abies	Norway Spruce		5	-1	SE3									X
Picea glauca	White Spruce	6	3		S5						X	X	X	
Picea pungens	Colorado Spruce			NA	SE1									X
Pinus nigra	Austrian Pine		-5	-1	SE2									X
Pinus strobus	Eastern White Pine	4	3		S5									X
Pinus sylvestris	Scots Pine		5	-3	SE5						X	X	X	
Dicotyledons	**Dicots**													
Apiaceae	**Carrot or Parsley Family**													
Daucus carota	Wild Carrot		5	-2	SE5						X	X	X	
Cicuta maculata	Spotted Water-hemlock	6	-5		S5					X				
Asteraceae	**Composite or Aster Family**													
Achillea millefolium ssp. millefolium	Common Yarrow		3	-1	SE?					X	X	X	X	
Ambrosia artemisiifolia	Common Ragweed	0	3		S5									X
Cirsium arvense	Canada Thistle		3	-1	SE5									X
Cirsium vulgare	Bull Thistle		4	-1	SE5							X	X	
Erigeron annuus	Daisy Fleabane	0	1		S5									X
Euthamia graminifolia	Flat-topped Bushy Goldenrod	2	-2		S5							X		
Solidago altissima var. altissima	Tall Goldenrod	1	3		S5									X
Solidago canadensis	Canada Goldenrod	1	3		S5					X	X			X
Sonchus arvensis ssp. arvensis	Field Sow-thistle				SE5						X			X
Taraxacum officinale	Common Dandelion		3	-2	SE5						X	X	X	X
Tragopogon dubius	Doubtful Goat's-beard		5	-1	SE5									X
Tussilago farfara	Coltsfoot		3	-2	SE5									X
Betulaceae	**Birch Family**													
Alnus incana spp. rugosa	Speckled Alder	6	-5		S5									X
Betula nigra	River Birch													X
Betula papyrifera	White Birch		2		S5						X	X	X	
Caprifoliaceae	**Honeysuckle Family**													
Lonicera tatarica	Tartarian Honeysuckle		3	-3	SE5						X			
Fabaceae	**Pea Family**													
Gleditsia triacanthos var. inermis	Thornless Honey Locust													X
Lotus corniculatus	Bird's-foot Trefoil		1	-2	SE5									X

Medicago lupulina	Black Medick		1	-1	SE5									X
Melilotus alba	White Sweet-clover		3	-3	SE5								X	
Trifolium pratense	Red Clover		2	-2	SE5									X
Trifolium repens	White Clover		2	-1	SE5									X
Vicia cracca	Tufted Vetch		5	-1	SE5						X		X	
Grossulariaceae	**Currant Family**													
Ribes americanum	Wild Black Currant	4	-3		S5					X				
Lamiaceae	**Mint Family**													
Leonurus cardiaca ssp. cardiaca	Common Motherwort		5	-2	SE5					X	X			
Prunella vulgaris ssp. vulgaris	Common Heal-all		0	-1	SE3						X	X	X	
Myricaceae	**Wax-myrtle Family**													
Myrica gale	Sweet Gale	6	-5		S5				SG	X				
Oleaceae	**Olive Family**													
Fraxinus americana	White Ash	4	3		S5									X
Fraxinus pennsylvanica	Green Ash	3	-3		S5							X		
Fraxinus excelsior	European Ash				SE2									X
Syringa reticulata	Japanese Silk Lilac													X
Syringa vulgaris	Common Lilac		5	-2	SE5									X
Plantaginaceae	**Plantain Family**													
Plantago lanceolata	Ribgrass		0	-1	SE5									X
Plantago major	Common Plantain		-1	-1	SE5								X	X
Ranunculaceae	**Buttercup Family**													
Ranunculus acris	Tall Buttercup		-2	-2	SE5					X	X	X	X	
Rhamnaceae	**Buckthorn Family**													
Rhamnus cathartica	European Buckthorn		3	-3	SE5					X	X	X	X	X
Frangula alnus	Glossy Buckthorn		-1	-3	SE5					X	X	X	X	
Rosaceae	**Rose Family**													
Fragaria virginiana	Wild Strawberry				S5					X		X	X	
Argentia anserina ssp. anserina	Silverweed	5	-4		S5							X	X	
Malus baccata	Siberian Crabapple				SE1									X
Pyrus calleryana 'Chanticleer'	Chanticleer Pear													X
Rubiaceae	**Madder Family**													
Galium palustre	Marsh Bedstraw	5	-5		S5					X		X	X	
Salicaceae	**Willow Family**													
Populus balsamifera ssp. balsamifera	Balsam Poplar	4	-3		S5					X			X	
Populus tremuloides	Trembling Aspen	2	0		S5					X		X	X	
Salix discolor	Pussy Willow	3	-3		S5							X		
Salix fragilis	Crack Willow		-1	-3	SE5									X
Violaceae	**Violet Family**													
Viola cucullata	Marsh Blue Violet	5	-5		S5					X		X		
Monocotyledons	**Monocots**													
Poaceae	**Grass Family**													
Bromus inermis ssp. inermis	Awnless Brome		5	-3	SE5						X		X	X

Dactylis glomerata	Orchard Grass		3	-1	SE5						X			
Phalaris arundinacea	Reed Canary Grass	0	-4		S5						X	X	X	X
Phleum pratense	Timothy		3	-1	SE5									X
Poa pratensis ssp. pratensis	Kentucky Bluegrass	0	1		S5									X
Typhaceae	**Cattail Family**													
Typha angustifolia	Narrow-leaved Cattail	3	-5		S5					X				
Typha latifolia	Broad-leaved Cattail	3	-5		S5					X		X		
Aceraceae	**Maple Family**													
Acer ginnala	Amur Maple		5	-2	SE1									X
Acer negundo	Manitoba Maple	0	-2		S5									X
Acer platanoides	Norway Maple		5	-3	SE5									X
Acer X freemanii	Freeman's Maple													X
Acer saccharum ssp. saccharum	Sugar Maple	4	3		S5									X
Acer saccharinum	Silver Maple	5	-3		S5									X
Dipsacaceae	**Teasel Family**													
Dipsacus fullonum ssp. sylvestris	Wild Teasel		5	-1	SE5									X
Oxalidaceae	**Wood Sorrel Family**													
Oxalis stricta	Upright Yellow Wood-sorrel	0	3		S5									X
Celastraceae	**Staff-tree Family**													
Euonymus alata	Winged Spindle Tree		5	-1	SE2									X
Juglandaceae	**Walnut Family**													
Juglans nigra	Black Walnut	5	3		S4									X
Tiliaceae	**Linden Family**													
Tilia cordata	Small Leaf Linden				SE1									X

[1]MNRF 2019a, [2]MECP 2019, [3]Government of Canada 2019, [4]City of Guelph 2012

Appendix V
Bird Species Reported from the Study Area Vicinity

Bird Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[4]	City of Guelph Status[5]	OBBA[6] 17NJ61	NRSI Observed
Anatidae	**Ducks, Geese & Swans**							
Branta canadensis	Canada Goose	S5					CO	
Aix sponsa	Wood Duck	S5					CO	
Anas rubripes	American Black Duck	S4					CO	
Anas platyrhynchos	Mallard	S5					CO	
Phasianidae	**Partridges, Grouse & Turkeys**							
Bonasa umbellus	Ruffed Grouse	S4					CO	
Meleagris gallopavo	Wild Turkey	S5					PO	
Podicipediformes	**Grebes**							
Podilymbus podiceps	Pied-billed Grebe	S4B, S4N					PO	
Columbidae	**Pigeons & Doves**							
Columba livia	Rock Pigeon	SNA					CO	
Zenaida macroura	Mourning Dove	S5					CO	
Cuculiformes	**Cuckoos & Anis**							
Coccyzus americanus	Yellow-billed Cuckoo	S4B				X	PO	
Coccyzus erythropthalmus	Black-billed Cuckoo	S5B				X	PO	
Caprimulgidae	**Goatsuckers**							
Chordeiles minor	Common Nighthawk	S4B	SC	SC	Schedule 1		PO	
Apodidae	**Swifts**							
Chaetura pelagica	Chimney Swift	S4B, S4N	THR	T	Schedule 1		PO	
Trochilidae	**Hummingbirds**							
Archilochus colubris	Ruby-throated Hummingbird	S5B					CO	
Rallidae	**Railes, Gallinules & Coots**							
Rallus limicola	Virginia Rail	S5B					PR	
Porzana carolina	Sora	S4B					PR	
Charadriidae	**Plovers**							
Charadrius vociferus	Killdeer	S5B, S5N					CO	
Scolopacidae	**Waders**							
Gallinago delicata	Wilson's Snipe	S5B					PO	
Scolopax minor	American Woodcock	S4B					PR	
Actitis macularia	Spotted Sandpiper	S5					PR	
Ardeidae	**Herons & Bitterns**							
Botaurus lentiginosus	American Bittern	S4B				X	PR	
Ardea herodias	Great Blue Heron	S4B				X	PO	

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[4]	Guelph Status[5]	17NJ61	NRSI Observed
Butorides virescens	Green Heron	S4B				X	PR	
Cathartidae	**Vultures**							
Cathartes aura	Turkey Vulture	S5B					PR	X
Accipitridae	**Hawks, Kites, Eagles & Allies**							
Accipiter striatus	Sharp-shinned Hawk	S5	NAR			X	PO	
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR		X	CO	
Buteo platypterus	Broad-winged Hawk	S5B				X	PR	
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR			CO	
Strigidae	**Typical Owls**							
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR			PR	
Bubo virgianus	Great Horned Owl	S4					CO	
Asio otus	Long-eared Owl	S4				X	PR	
Alcedinidae	**Kingfishers**							
Megaceryle alcyon	Belted Kingfisher	S4B				X	PR	
Picidae	**Woodpeckers**							
Melanerpes erythrocephalus	Red-headed Woodpecker	S4B	SC	END	Schedule 1		PR	
Melanerpes carolinus	Red-bellied Woodpecker	S4				X	PR	
Dryobates pubescens	Downy Woodpecker	S5					CO	
Dryobates villosus	Hairy Woodpecker	S5				X	PR	
Colaptes auratus	Northern Flicker	S4B				X	CO	
Dryocopus pileatus	Pileated Woodpecker	S5				X	CO	
Falconidae	**Caracaras & Falcons**							
Falco sparverius	American Kestrel	S4				X	CO	
Tyrannidae	**Tyrant Flycatchers**							
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC		X	PR	
Empidonax alnorum	Alder Flycatcher	S5B					PR	
Empidonax traillii	Willow Flycatcher	S5B				X	PR	
Empidonax minimus	Least Flycatcher	S4B				X	PO	
Sayornis phoebe	Eastern Phoebe	S5B					CO	
Myiarchus crinitus	Great Crested Flycatcher	S4B					CO	
Tyrannus tyrannus	Eastern Kingbird	S4B				X	CO	
Vireonidae	**Vireos**							
Vireo solitarius	Blue-headed Vireo	S5B				X	PR	
Vireo gilvis	Warbling Vireo	S5B					CO	
Vireo olivaceus	Red-eyed Vireo	S5B					CO	
Corvidae	**Crows & Jays**							
Cyanocitta cristata	Blue Jay	S5					CO	
Corvus brachyrhynchos	American Crow	S5B					CO	X
Alaudidae	**Larks**							
Eremophila alpestris	Horned Lark	S5B					PR	

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[4]	Guelph Status[5]	17NJ61	NRSI Observed
Hirundinidae	**Swallows**							
Tachycineta bicolor	Tree Swallow	S4B					CO	
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B					PR	
Riparia riparia	Bank Swallow	S4B	THR	T		X	CO	
Petrochelidon pyrrhonota	Cliff Swallow	S4B				X	PR	
Hirundo rustica	Barn Swallow	S4B	THR	T			CO	
Paridae	**Chickadees & Titmice**							
Poecile atricapillus	Black-capped Chickadee	S5					CO	
Sittidae	**Nuthatches**							
Sitta canadensis	Red-breasted Nuthatch	S5				X	CO	
Sitta carolinensis	White-breasted Nuthatch	S5					PO	
Certhiidae	**Creepers**							
Certhia americana	Brown Creeper	S5B				X	PO	
Troglodytidae	**Wrens**							
Troglodytes aedon	House Wren	S5B					CO	
Troglodytes hiemalis	Winter Wren	S5B				X	CO	
Cistothorus platensis	Sedge Wren	S4B	NAR	NAR		X	PO	
Cistothorus palustris	Marsh Wren	S4B					PO	
Mussciciapidae	**Old world Flycatchers**							
Turdidae	**Thrushes**							
Sialia sialis	Eastern Bluebird	S5B	NAR	NAR			CO	
Catharus fuscescens	Veery	S4B				X	CO	
Hylocichla mustelina	Wood Thrush	S4B	SC	T		X	CO	
Turdus migratorius	American Robin	S5B					CO	
Mimidae	**Mockingbirds, Thrashers & Allies**							
Dumetella carolinensis	Gray Catbird	S4B					CO	
Toxostoma rufum	Brown Thrasher	S4B				X	PR	
Mimus polyglottos	Northern Mockingbird	S4				X	PR	
Sturnidae	**Starlings**							
Sturnus vulgaris	European Starling	SNA					CO	X
Bombycillidae	**Waxwings**							
Bombycilla cedrorum	Cedar Waxwing	S5B					PR	
Passeridae	**Old World Sparrows**							
Passer domesticus	House Sparrow	SNA					CO	
Fringillidae	**Finches & Allies**							
Carpodacus mexicanus	House Finch	SNA					CO	X
Carpodacus purpureus	Purple Finch	S4B					PO	
Spinus pinus	Pine Siskin	S4B				X	CO	
Spinus tristis	American Goldfinch	S5B					PR	

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[4]	City of Guelph Status[5]	17NJ61	NRSI Observed
Parulidae	**Wood Warblers**							
Seiurus aurocapillus	Ovenbird	S4B				X	PR	
Parkesia noveboracensis	Northern Waterthrush	S5B					PR	
Vermivora chrysoptera	Golden-winged Warbler	S4B	SC	T	Schedule 1		PR	
Vermivora cyanoptera	Blue-winged Warbler	S4B				X	CO	
Mniotilta varia	Black-and-white Warbler	S5B				X	PR	
Oreothlypis ruficapilla	Nashville Warbler	S5B					PO	
Geothylpis philadelphia	Mourning Warbler	S4B					PO	
Geothylpis trichas	Common Yellowthroat	S5B					PR	
Setophaga ruticilla	American Redstart	S5B				X	PO	
Setophaga petechia	Yellow Warbler	S5B					CO	
Setophaga pensylvanica	Chestnut-sided Warbler	S5B					PR	
Setophaga pinus	Pine Warbler	S5B				X	CO	
Setophaga coronata	Yellow-rumped Warbler	S5B					PO	
Setophaga virens	Black-throated Green Warbler	S5B				X	CO	
Emberizidae	**New World Sparrows & Allies**							
Pipilo erythrophthalmus	Eastern Towhee	S4B				X	PR	
Spizella passerina	Chipping Sparrow	S5B					CO	
Spizella pallida	Clay-colored Sparrow	S4B					CO	
Spizella pusilla	Field Sparrow	S4B				X	CO	
Pooecetes gramineus	Vesper Sparrow	S4B				X	PO	
Passerculus sandwichensis	Savannah Sparrow	S4B				X	CO	
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC		X	PR	
Melospiza melodia	Song Sparrow	S5B					CO	X
Melospiza georgiana	Swamp Sparrow	S5B					CO	
Zonotrichia albicollis	White-throated Sparrow	S5B					PR	
Cardinalidae	**Cardinals, Grosbeaks & Allies**							
Piranga olivacea	Scarlet Tanager	S4B				X	PO	
Cardinalis cardinalis	Northern Cardinal	S5					CO	
Pheucticus ludovicianus	Rose-breasted Grosbeak	S4B				X	CO	
Passerina cyanea	Indigo Bunting	S4B					CO	
Icteridae	**Blackbirds**							
Dolichonyx oryzivorus	Bobolink	S4B	THR	T	No Schedule		CO	
Agelaius phoeniceus	Red-winged Blackbird	S4					CO	
Sturnella magna	Eastern Meadowlark	S4B	THR	T	No Schedule		CO	
Quiscalus quiscula	Common Grackle	S5B					CO	
Molothrus ater	Brown-headed Cowbird	S4B					CO	
Icterus spurius	Orchard Oriole	S4B				X	CO	
Icterus galbula	Baltimore Oriole	S4B				X	CO	

[1]MNRF 2019a; [2]MECP 2019; [3],[4]Government of Canada 2019; [5]City of Guelph 2012; [6]BSC et al. 2008

Appendix VI
Herpetofauna Species Reported from the Study Area Vicinity

Reptile and Amphibian Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[4]	City of Guelph Status[5]	Ontario Reptile and Amphibian Atlas[6] (17NJ61)
Turtles							
Chelydra serpentina serpentina	Snapping Turtle	S3	SC	SC	Schedule 1		X
Chrysemys picta marginata	Midland Painted Turtle	S5		SC			X
Emydoidea blandingii	Blanding's Turtle (*Great Lakes/St Lawrence population*)	S3	THR	T	Schedule 1		X
Graptemys geographica	Northern Map Turtle	S3	SC	SC	Schedule 1		X
Trachemys scripta elegans	Red-eared Slider	SNA					X
Snakes							
Lampropeltis triangulum	Eastern Milksnake	S4	NAR	SC	Schedule 1		X
Thamnophis sauritus septentrionalis	Eastern Ribbonsnake	S3	SC	SC	Schedule 1		X
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5					X
Salamanders							
Ambystoma jeffersonianum	Jefferson Salamander	S2	END	E	Schedule 1		X
Ambystoma sp.	Jefferson/Blue-spotted Salamander C	S2					X
Ambystoma laterale	Blue-spotted Salamander	S4				X	X
Hemidactylium scutatum	Four-toed Salamander	S4	NAR	NAR		X	X
Notophthalmus viridescens viridesce	Red-spotted Newt	S5				X	X
Toads and Frogs							
Anaxyrus americanus	American Toad	S5					X
Hyla versicolor	Tetraploid Gray Treefrog	S5					X
Lithobates clamitans melanota	Northern Green Frog	S5					X
Lithobates septentrionalis	Mink Frog	S5				X	X

[1]MNRF 2019a; [2]MECP2019; [3],[4]Government of Canada 2019; [5]City of Guelph 2012; [6]Ontario Nature 2019

Appendix VII
Mammal Species Reported from the Study Area Vicinity

Mammal Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[3]	City of Guelph Status[4]	Mammal Atlas[5] (17NJ61)
Didelphimorphia	**Opossums**						
Didelphis virginiana	Virginia Opossum	S4					X
Insectivora	**Shrews and Moles**						
Blarina brevicauda	Northern Short-tailed Shrew	S5					X
Condylura cristata	Star-nosed Mole	S5					X
Sorex cinereus	Masked Shrew	S5					X
Sorex fumeus	Smoky Shrew	S5					X
Chiroptera	**Bats**						
Eptesicus fuscus	Big Brown Bat	S4					X
Lasiurus borealis	Eastern Red Bat	S4					X
Myotis lucifugus	Little Brown Myotis	S4	END	E	Schedule 1		X
Lagomorpha	**Rabbits and Hares**						
Lepus europaeus	European Hare	SNA					X
Sylvilagus floridanus	Eastern Cottontail	S5					X
Rodentia	**Rodents**						
Castor canadensis	Beaver	S5					X
Erethizon dorsatum	Porcupine	S5					X
Glaucomys sabrinus	Northern Flying Squirrel	S5				X	X
Marmota monax	Woodchuck	S5					X
Microtus pennsylvanicus	Meadow Vole	S5					X
Mus musculus	House Mouse	SNA					X
Ondatra zibethicus	Muskrat	S5					X
Peromyscus leucopus	White-footed Mouse	S5					X
Peromyscus maniculatus	Deer Mouse	S5					X
Rattus norvegicus	Norway Rat	SNA					X
Sciurus carolinensis	Eastern Gray Squirrel	S5					X
Tamiasciurus hudsonicus	Red Squirrel	S5					X
Tamias striatus	Eastern Chipmunk	S5					X
Zapus hudsonius	Meadow Jumping Mouse	S5					X
Carnivora	**Carnivores**						

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[3]	City of Guelph Status[4]	Mammal Atlas[5] (17NJ61)
Canis latrans	Coyote	S5					X
Mephitis mephitis	Striped Skunk	S5					X
Mustela erminea	Ermine	S5					X
Mustela vison	American Mink	S4					X
Procyon lotor	Northern Raccoon	S5					X
Vulpes vulpes	Red Fox	S5					X
Artiodactyla	**Deer and Bison**						
Odocoileus virginianus	White-tailed Deer	S5					X

[1]MNRF 2019a; [2]MECP 2019; [3]Government of Canada 2019; [4]City of Guelph 2012; [5]Dobbyn 1994

Appendix VIII
Butterfly Species Reported from the Study Area Vicinity

Butterfly Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule3	City of Guelph Status[4]	TEA Atlas[5] (17NJ61)
Hesperiidae	**Skippers**						
Anatrytone logan	Delaware Skipper	S4				X	X
Ancyloxypha numitor	Least Skipper	S5					X
Carterocephalus palaemon	Arctic Skipper	S5					X
Erynnis baptisiae	Wild Indigo Duskywing	S4				X	X
Erynnis juvenalis	Juvenal's Duskywing	S5					X
Erynnis lucilius	Columbine Duskywing	S4					X
Euphyes conspicua	Black Dash	S3					X
Euphyes vestris	Dun Skipper	S5					X
Pholisora catullus	Common Sootywing	S4					X
Poanes hobomok	Hobomok Skipper	S5					X
Polites mystic	Long Dash Skipper	S5					X
Polites peckius	Peck's Skipper	S5					X
Polites themistocles	Tawny-edged Skipper	S5					X
Pompeius verna	Little Glassywing	S4				X	X
Thymelicus lineola	European Skipper	SNA					X
Wallengrenia egeremet	Northern Broken Dash	S5					X
Papilionidae	**Swallowtails**						
Papilio canadensis	Canadian Tiger Swallowtail	S5					X
Papilio cresphontes	Giant Swallowtail	S4					X
Papilio glaucus	Eastern Tiger Swallowtail	S5					X
Papilio polyxenes	Black Swallowtail	S5					X
Pieridae	**Whites and Sulphurs**						
Colias eurytheme	Orange Sulphur	S5					X
Colias philodice	Clouded Sulphur	S5					X
Pieris oleracea	Mustard White	S4					X
Pieris rapae	Cabbage White	SNA					X
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**						
Callophrys augustinus	Brown Elfin	S5					X
Celastrina sp.	Azure sp.						X
Cupido comyntas	Eastern Tailed Blue	S5					X

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule3	City of Guelph Status[4]	TEA Atlas[5] (17NJ61)
Feniseca tarquinius	Harvester	S4					X
Glaucopsyche lygdamus	Silvery Blue	S5					X
Lycaena hyllus	Bronze Copper	S5					X
Satyrium acadica	Acadian Hairstreak	S4					X
Satyrium calanus	Banded Hairstreak	S4					X
Nymphalidae	**Brush-footed Butterflies**						X
Aglais milberti	Milbert's Tortoiseshell	S5					X
Asterocampa clyton	Tawny Emperor	S2S3					X
Boloria bellona	Meadow Fritillary	S5					X
Cercyonis pegala	Common Wood-Nymph	S5					X
Coenonympha tullia	Common Ringlet	S5					X
Danaus plexippus	Monarch	S2N, S4B	SC	E	Schedule 1		X
Euphydryas phaeton	Baltimore Checkerspot	S4					X
Lethe anthedon	Northern Pearly-Eye	S5					X
Lethe eurydice	Eyed Brown / Northern Eyed	S5					X
Limenitis archippus	Viceroy	S5					X
Limenitis arthemis arthemis	White Admiral/Banded Purple	S5					X
Limenitis arthemis astyanax	Red-spotted Purple	S5					X
Megisto cymela	Little Wood-Satyr	S5					X
Nymphalis antiopa	Mourning Cloak	S5					X
Nymphalis l-album	Compton Tortoiseshell	S5					X
Phyciodes cocyta	Northern Crescent	S5					X
Phyciodes tharos	Pearl Crescent	S4					X
Polygonia comma	Eastern Comma	S5					X
Polygonia comma	Eastern Comma/Hop	S5					X
Polygonia interrogationis	Question Mark	S5					X
Speyeria cybele	Great Spangled Fritillary	S5					X
Vanessa atalanta	Red Admiral	S5					X
Vanessa cardui	Painted Lady	S5					X
Vanessa virginiensis	American Lady	S5					X

[1]MNRF 2019a; [2]MECP 2019; [3]Government of Canada 2019; [4]City of Guelph 2012; [5]MacNaughton et al. 2019

Appendix IX
Odonate Species Reported from the Study Area Vicinity

Dragonfly and Damselfly Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule3	City of Guelph Status[4]	Odonate Atlas[5]
Calopterygidae	**Broadwinged Damselflies**						
Calopteryx aequabilis	River Jewelwing	S5					X
Calopteryx maculata	Ebony Jewelwing	S5					X
Hetaerina americana	American Rubyspot	S4					X
Lestidae	**Spreadwings**						
Lestes congener	Spotted Spreadwing	S5					X
Lestes disjunctus	Common Spreadwing	S5					X
Lestes dryas	Emerald Spreadwing	S5					X
Lestes eurinus	Amber-winged Spreadwing	S3					X
Lestes rectangularis	Slender Spreadwing	S5					X
Lestes unguiculatus	Lyre-tipped Spreadwing	S5					X
Coenagrionidae	**Narrow-winged Damselflies**						
Argia apicalis	Blue-fronted Dancer	S4					X
Argia fumipennis violacea	Violet Dancer	S5					X
Argia moesta	Powdered Dancer	S5					X
Enallagma annexum	Northern Bluet	S4					X
Enallagma antennatum	Rainbow Bluet	S4					X
Enallagma aspersum	Azure Bluet	S3					X
Enallagma carunculatum	Tule Bluet	S5					X
Enallagma carunculatum x civile							X
Enallagma civile	Familiar Bluet	S5					X
Enallagma ebrium	Marsh Bluet	S5					X
Enallagma exsulans	Stream Bluet	S5					X
Enallagma signatum	Orange Bluet	S4					X
Enallagma vernale	Spring Northern Bluet	S4					X
Ischnura posita	Fragile Forktail	S4					X
Ischnura verticalis	Eastern Forktail	S5					X
Nehalennia irene	Sedge Sprite	S5					X
Aeshnidae	**Darners**						
Aeshna canadensis	Canada Darner	S5					X
Aeshna constricta	Lance-tipped Darner	S5					X
Aeshna interrupta	Variable Darner	S5					X

Aeshna tuberculifera	Black-tipped Darner	S4					X
Aeshna umbrosa	Shadow Darner	S5					X
Aeshna verticalis	Green-striped Darner	S3					X
Anax junius	Common Green Darner	S5					X
Basiaeschna janata	Springtime Darner	S5					X
Boyeria vinosa	Fawn Darner	S5					X
Rhionaeschna mutata	Spatterdock Darner	S1					X
Gomphidae	**Clubtails**						
Arigomphus villosipes	Unicorn Clubtail	S2S3					X
Phanogomphus exilis	Lancet Clubtail	S5					X
Phanogomphus graslinellu	Pronghorn Clubtail	S3					X
Phanogomphus lividus	Ashy Clubtail	S4					X
Phanogomphus spicatus	Dusky Clubtail	S5					X
Ophiogomphus rupinsulens	Rusty Snaketail	S4					X
Cordulegasteridae	**Spiketails**						
Cordulegaster sp.	Spiketail sp.						X
Corduliidae	**Emeralds**						
Cordulia shurtleffii	American Emerald	S5					X
Dorocordulia libera	Racket-tailed Emerald	S5					X
Epitheca canis	Beaverpond Baskettail	S5					X
Epitheca cynosura	Common Baskettail	S5					X
Epitheca pinceps	Prince Baskettail	S5					X
Epitheca spinigera	Spiny Baskettail	S5					X
Somatochlora tenebrosa	Clamp-tipped Emerald	S2S3					X
Somatochlora williamsoni	Williamson's Emerald	S4				X	X
Libellulidae	**Skimmers**						
Celithemis elisa	Calico Pennant	S5					X
Erythemis simplicicollis	Eastern Pondhawk	S5					X
Ladona julia	Chalk-fronted Corporal	S5				X	X
Leucorrhinia frigida	Frosted Whiteface	S5				X	X
Leucorrhinia intacta	Dot-tailed Whiteface	S5					X
Leucorrhinia proxima	Red-waisted (Belted) Whiteface	S5				X	X
Libellula luctuosa	Widow Skimmer	S5					X
Libellula pulchella	Twelve-spotted Skimmer	S5					X
Libellula quadrimaculata	Four-spotted Skimmer	S5					X
Pachydiplax longipennis	Blue Dasher	S5					X

Pantala flavescens	Wandering Glider	S4					X
Perithemis tenera	Eastern Amberwing	S4				X	X
Plathemis lydia	Common Whitetail	S5					X
Sympetrum internum	Cherry-faced Meadowhawk	S5					X
Sympetrum obtrusum	White-faced Meadowhawk	S5					X
Sympetrum semicinctum	Band-winged Meadowhawk	S4					X
Sympetrum vicinum	Yellow-legged (Banded) Meadowhawk	S5					X
Tramea lacerata	Black Saddlebags	S4					X

[1]MNRF 2019a; [2]MECP 2019; [3]Government of Canada 2019; [4]City of Guelph 2012; [5]MNRF 2019b

Appendix X
Evaluation of Design Plan Alternatives (IBI Group 2020b)

Table 1.2 – Evaluation of Design Plan Alternatives						
NOTE: ALL ALTERNATIVES INCLUDE WIDENING, A CENTRE TWO WAY LEFT TURN LANE AND MEDIAN ISLANDS AT INTERSECTIONS						
EVALUATION CRITERIA	**PLAN OPTION NO. 1** **WIDENING EQUALLY ABOUT EXISTING CENTRELINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED**	**PLAN OPTION NO. 2** **WIDENING EQUALLY ABOUT EXISTING** **CENTERLINE WITH 5m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED**	**PLAN OPTION NO. 3** **WIDENING EQUALLY ABOUT EXISTING** **CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE** **& 3m MULTI-USE TRAIL ON EACH SIDE**	**PLAN OPTION NO. 4** **WIDEN EXISTING ROAD ON WEST SIDE ONLY WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 3m MULTI-USE TRAIL ON EACH SIDE**	**PLAN OPTION NO. 5** **WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m SEPARATED BIKE LANES & 1.50m SIDEWALKS ON BOTH SIDES**	**PLAN OPTION NO. 6** **WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m BLVD. CYCLE TRACK & 1.5 m SIDEWALKS ON BOTH SIDES***
LEGEND:	**LEAST PREFERRED ○ (0 Pts.) ◔ (1 Pts.) ◑ (2 Pts.) ◕ (3 Pts.) MOST PREFERRED ● (4 Pts.)**					
1. Traffic Capacity, Operations, Safety						
Existing Traffic How does the alternative serve the current volume of vehicular, pedestrian and cycling traffic?	● A widened Gordon Street including on road cycling and sidewalk on east and west side will serve the current vehicle, pedestrian and cycling needs. (See Active Transportation factors for further evaluation.)	● A widened Gordon Street including on road cycling and sidewalk on east and west side will serve the current vehicle, pedestrian and cycling needs. (See Active Transportation factors for further evaluation.)	● A widened Gordon Street including multi-use trail on east and west side will serve the current vehicle, pedestrian and cycling needs. (See Active Transportation factors for further evaluation.)	● A widened Gordon Street including multi-use trail on east and west side will serve the current vehicle, pedestrian and cycling needs. (See Active Transportation factors for further evaluation.)	● A widened Gordon Street including separated bike path on east and west side will serve the current vehicle, pedestrian and cycling needs. (See Active Transportation factors for further evaluation.)	● A widened Gordon Street including boulevard cycle track and separate sidewalk on east and west side will serve the current vehicle, pedestrian and cycling needs. (See Active Transportation factors for further evaluation.)
Forecasted Traffic/Transportation Network Does the alternative efficiently and safely handle the forecasted traffic?	● Four (4) through lanes plus turn lanes will handle forecasted traffic volumes to 2031.					
Safety Does the alternative address identified traffic safety issues along the corridor or at specific locations?	● Centre two-way left turn lane provided in all locations except near intersections, where dedicated turn lanes are provided. Centre turn lane will permit more efficient turning to and from adjacent properties and will reduce overall through lane congestion during the peak periods. Extended vehicle storage length will allow for more efficient traffic operations. Additional signal timing optimization will further improve intersection operations. Widening and reconstruction of roadway to address pavement condition.					
Access Management What effect will the alternative have on traffic access to properties fronting on Gordon Street?	● All existing accesses maintained with full left and right turn access by means of a centre two-way left turn lane, including those near intersections where shorter median islands will be installed. Centre raised island median is required to accommodate traffic signal poles and minimize turning conflicts near intersections/traffic signals.					

Table 1.2 – Evaluation of Design Plan Alternatives

NOTE: ALL ALTERNATIVES INCLUDE WIDENING, A CENTRE TWO WAY LEFT TURN LANE AND MEDIAN ISLANDS AT INTERSECTIONS

EVALUATION CRITERIA	PLAN OPTION NO. 1 WIDENING EQUALLY ABOUT EXISTING CENTRELINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED	PLAN OPTION NO. 2 WIDENING EQUALLY ABOUT EXISTING CENTERLINE WITH 5m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED	PLAN OPTION NO. 3 WIDENING EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 3m MULTI-USE TRAIL ON EACH SIDE	PLAN OPTION NO. 4 WIDEN EXISTING ROAD ON WEST SIDE ONLY WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 3m MULTI-USE TRAIL ON EACH SIDE	PLAN OPTION NO. 5 WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m SEPARATED BIKE LANES & 1.50m SIDEWALKS ON BOTH SIDES	PLAN OPTION NO. 6 WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m BLVD. CYCLE TRACK & 1.5 m SIDEWALKS ON BOTH SIDES*
LEGEND:	**LEAST PREFERRED ○ (0 Pts.) ◔ (1 Pts.) ◑ (2 Pts.) ◕ (3 Pts.) MOST PREFERRED ● (4 Pts.)**					
Active Transportation: **Transit** How does the alternative serve future transit needs?	◑ Transit service is maintained but roadside is shared with cyclists. Potential conficts between cyclist and transit vehicles are a noted concern.	◑ Transit service is maintained but roadside is shared with cyclists. Potential conficts between cyclist and transit vehicles are a noted concern.	● Transit service is maintained and cyclist are moved to a shared multi-use trail on boulevard.	● Transit service is maintained and cyclist are moved to a shared multi-use trail on boulevard.	○ Transit service is maintained but roadside is shared with cyclists. Potential conficts between cyclist and transit vehicles are a noted concern. Access to transit stops is a noted concern and this option is least preferred by Transit.	○ Transit service is maintained but roadside is shared with cyclists. Potential conficts between cyclist and transit users are a noted concern. Access to transit stops is a noted concern and this option is least preferred by Transit.
Cycling How does the alternative serve future cycling needs?	○ On Road cycling is preserved. Conflicts between cyclist and vehicular traffic.	○ On Road cycling is preserved. Conflicts between cyclist and vehicular traffic.	◕ Separate cycling is provided. Potential conflicts between cyclist and pedestrians are a noted concern.	◕ Separate cycling is provided. Potential conflicts between cyclist and pedestrians are a noted concern.	◑ Separated cycling facility is provided. Potential conflicts between cyclist and transit patrons are a noted concern.	◑ Separated cycling facility is provided. Potential conflicts between cyclist and transit patrons are a noted concern.
Pedestrians How does the alternative serve future pedestrian traffic needs?	● Basic sidewalk is maintained.	● Basic sidewalk is maintained.	◑ Shared Multi-use trail is provided. Potential conflicts between cyclist and pedestrians are a noted concern.	◑ Shared Multi-use trail is provided. Potential conflicts between cyclist and pedestrians are a noted concern.	● Basic sidewalk provided.	● Basic sidewalk provided.
Emergency Services How does the alternative improve Emergency Service Response times?	● Emergency response times will improve due to additional Two way left turn lane and related reductions in conflict, delays and congestion. Centre lane provides bypass lane potential for emergency vehicles.					
Traffic Score	26 Points	26 Points	29 Points	29 Points	26 Points	26 Points

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EVALUATION CRITERIA	**PLAN OPTION NO. 1** **WIDENING EQUALLY ABOUT EXISTING CENTRELINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED**	**PLAN OPTION NO. 2** **WIDENING EQUALLY ABOUT EXISTING** **CENTERLINE WITH 5m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED**	**PLAN OPTION NO. 3** **WIDENING EQUALLY ABOUT EXISTING** **CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE** **& 3m MULTI-USE TRAIL ON EACH SIDE**	**PLAN OPTION NO. 4** **WIDEN EXISTING ROAD ON WEST SIDE ONLY WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 3m MULTI-USE TRAIL ON EACH SIDE**	**PLAN OPTION NO. 5** **WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m SEPARATED BIKE LANES & 1.50m SIDEWALKS ON BOTH SIDES**	**PLAN OPTION NO. 6** **WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m BLVD. CYCLE TRACK & 1.5 m SIDEWALKS ON BOTH SIDES***
LEGEND:	**LEAST PREFERRED ○ (0 Pts.) ◔ (1 Pts.) ◑ (2 Pts.) ◕ (3 Pts.) MOST PREFERRED ● (4 Pts.)**					
2. Natural Environment						
Aquatic Habitat, Fisheries, and Surface Water How does the alternative affect the aquatic life and aquatic habitats contained within the various watercourses crossing Gordon Street?	◑ There are no existing watercourses, culvert crossings or bridges requiring widening or replacement within the study area. Impact on fisheries is not anticipated.					
Terrestrial Habitat (Natural) How would the alternative affect existing vegetation (i.e. trees & woodlots) and bird/animal habitat within the project area?	◑ No impacts to significant woodland areas or vegetation communities. Vegetation removal is limited to cultural woodland or cultural thicket communities and landscape trees.					
Floodplain What effect would the alternative have on the flood plain of various watercourses?	◑ No impacts on the flood plain are anticipated for any of the alternatives.					
Wetlands What impacts does the alternative have on any evaluated wetlands within the project area? Possible wellhead protection area	Alternative ◑ does not encroach on wetlands adjacent to the corridor. Hydrogeological impacts, if any, are similar for all alternatives, and can be mitigated.					

Table 1.2 – Evaluation of Design Plan Alternatives

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LEGEND:	**LEAST PREFERRED ○ (0 Pts.) ◔ (1 Pts.) ◑ (2 Pts.) ◕ (3 Pts.) MOST PREFERRED ● (4 Pts.)**					
Trees (Landscaping) Are there any impacts to existing tree plantings and tree canopy within the project area?	◕ Eight (8) Trees are directly impacted and will need to be replaced.	◑ Sixteen (16) Trees are directly impacted and will need to be replaced.	◑ Eleven (11) Trees are directly impacted and will need to be replaced.	◑ Fourteen (14) Trees are directly impacted and will need to be replaced.	◔ Twenty One (21) Trees are directly impacted and will need to be replaced.	● Four (4) Trees are directly impacted and will need to be replaced.
Wildlife What are the effects of the alternative on "Species At Risk/Endangered Species" within the project area?	◑ Enhancement, advanced warning, and improved awareness of the existing deer crossing must be addressed in the development of detailed design for the project. Each of the alternatives has a very similar impact on the deer crossing location. All options will require mitigation of impacts within the Gordon Street corridor and surrounding area, if the area natural area (woodlot, wetland, habitat, stream bed, etc.) is disturbed in any way during construction mitigation will be required.					
Property Contamination Are there any known or potentially contaminated sites that require further investigation?	◑ There are no known environmentally impacted lands affected by any of the proposed options. No contaminated properties have been identified in the City's past studies. Additional ESA's should be undertaken where potential environmental impacts are suspected and based on historic land uses.					
Storm Water Management Are stormwater management ponds required and will water Quality and Quantity be controlled?	● No storm water management (SWM) ponds will be included but oil/grit separators are planned as well as Low Impact Development (LID) measures where they can be accommodated. This same condition exists for all of the alternatives. Sediment controls on existing storm sewers will be required.					
Natural Environment Score	19 Points	18 Points	18 Points	18 Points	17 Points	20 Points

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LEGEND:	**LEAST PREFERRED ○ (0 Pts.) ◔ (1 Pts.) ◑ (2 Pts.) ◕ (3 Pts.) MOST PREFERRED ● (4 Pts.)**					
3. Social Environment						
Heritage and Archaeological Impacts What impact does the alternative have on the following; Built Heritage Resources and Features, Cultural Heritage Landscapes and Archaeological Impacts?	◑ No anticipated impacts on matters of heritage interest.					
Cultural & Recreational Are there any cultural or recreational institutions with the project area that may be affected by this alternative?	◑ No cultural and recreational facilities are directly affected by any of the alternatives.					
Business Impacts How will the alternative affect existing businesses, and how will businesses be affected during construction?	◑ Temporary access impacts will be experienced during construction of curbs, sidewalks/Trail and driveway restorations. There will be short term disruption during construction but access will be maintained.				◔ Additional impacts will be experienced during construction due to second curb construction and paving operations.	◑ Temporary access impacts will be experienced during construction of curbs, sidewalks/Trail and driveway restorations but access will be maintained.
	Property near southeast corner of Gordon/Arkell is impacted by all alternatives. Less congestion may improve overall future access to businesses.					

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LEGEND:	**LEAST PREFERRED ○ (0 Pts.) ◔ (1 Pts.) ◑ (2 Pts.) ◕ (3 Pts.) MOST PREFERRED ● (4 Pts.)**					
Construction Impacts Is it constructible and how long will construction take?	◑ Traffic will be able to be maintained by constructing the west side, then the east side (or vice versa) while maintaining traffic on existing pavement or newly constructed pavement. Construction will likely proceed in stages (i.e. between major intersection possibly one block at a time), with construction taking approximately 3 months for each stage.				◔ Additonal separate paving will take longer to construct than the other single pathway alternatives. Possibly one block at a time), with construction taking approximately 3 months year for each stage.	◑ Traffic will be able to be maintained by constructing the west side, then the east side (or vice versa) while maintaining traffic on existing pavement or newly constructed pavement. Possibly one block at a time with construction taking approximately 3 months for each stage.
Streetscaping Can the alternative incorporate streetscaping features to maintain and enhance the character of the community?	◑ Opportunities for Streetscaping exist within the designated road allowance including plantings, decorative paving materials, decorative streetlights, etc.				◔ Less space available for landscape enhancements due to total boulevard pavement widths	◔ Less space available for landscape enhancements due to total boulevard pavement widths

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EVALUATION CRITERIA	PLAN OPTION NO. 1 WIDENING EQUALLY ABOUT EXISTING CENTRELINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED	PLAN OPTION NO. 2 WIDENING EQUALLY ABOUT EXISTING CENTERLINE WITH 5m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED	PLAN OPTION NO. 3 WIDENING EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 3m MULTI-USE TRAIL ON EACH SIDE	PLAN OPTION NO. 4 WIDEN EXISTING ROAD ON WEST SIDE ONLY WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 3m MULTI-USE TRAIL ON EACH SIDE	PLAN OPTION NO. 5 WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m SEPARATED BIKE LANES & 1.50m SIDEWALKS ON BOTH SIDES	PLAN OPTION NO. 6 WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m BLVD. CYCLE TRACK & 1.5 m SIDEWALKS ON BOTH SIDES*
LEGEND:	**LEAST PREFERRED ○ (0 Pts.) ◔ (1 Pts.) ◑ (2 Pts.) ◕ (3 Pts.) MOST PREFERRED ● (4 Pts.)**					
Private Property Impacts • How does the alternative impact the residential and commercial properties along the corridor? • How much property will be required?	● Property is required to accommodate sidewalk encroachments and develop a dedicated right turn lane storage and taper at the southeast corner of Gordon/Arkell. This alternative requires additional land from the properties at 1354, 1417, 1419, 1448 Gordon Street and SE corner Lowes, Solstice Condos. **190 m2**	◔ Property is required to accommodate sidewalk encroachments and develop a dedicated right turn lane storage and taper at the southeast corner of Gordon/Arkell. This alternative requires additional land from the properties at 1354, 1388, 1408, 1417, 1419, 1448 Gordon Street and SE corner Lowes, Solstice Condos. **414 m2**	◕ Property is required to accommodate sidewalk encroachments and develop a dedicated right turn lane storage and taper at the southeast corner of Gordon/Arkell. This alternative requires additional land from the properties at 1354, 1388, 1417, 1419, 1448 Gordon Street and SE corner Lowes, Solstice Condos. **254 m2**	● Property is required to accommodate sidewalk encroachments and develop a dedicated right turn lane storage and taper at the southeast corner of Gordon/Arkell. This alternative requires additional land from the properties at 1354, 1417, 1419, 1448 Gordon Street and SE corner Lowes. **218 m2**	◑ Property is required to accommodate sidewalk encroachments and develop a dedicated right turn lane storage and taper at the southeast corner of Gordon/Arkell. This alternative requires additional land from the properties at 1354, 1388, 1408, 1448 Gordon Street and SE corner Lowes, Solstice Condos. **369 m2**	○ Property is required to accommodate sidewalk encroachments and develop a dedicated right turn lane storage and taper at the southeast corner of Gordon/Arkell. This alternative requires additional land from the properties at 1354, 1388, 1408, 1417, 1419, 1448 Gordon Street and SE corner Lowes. **445 m2**
Air Quality & Noise What effect does the alternative have on air quality and noise within the project area?	◑ A reduction in overall traffic delay and related vehicle idling will result in reduced exhaust air emissions and, as a result, should provide improved overall Air quality. Predicted Noise levels will increase due to projected traffic volume and will increase only marginally as a result of road widening. Anticipated increase in noise levels for the design horizon is 1 to 2 dB.					
Social Score	16 Points	13 Points	15 Points	16 Points	11 Points	11 Points

Table 1.2 – Evaluation of Design Plan Alternatives						
NOTE: ALL ALTERNATIVES INCLUDE WIDENING, A CENTRE TWO WAY LEFT TURN LANE AND MEDIAN ISLANDS AT INTERSECTIONS						
EVALUATION CRITERIA	**PLAN OPTION NO. 1** **WIDENING EQUALLY ABOUT EXISTING CENTRELINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED**	**PLAN OPTION NO. 2** **WIDENING EQUALLY ABOUT EXISTING** **CENTERLINE WITH 5m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED**	**PLAN OPTION NO. 3** **WIDENING EQUALLY ABOUT EXISTING** **CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE** **& 3m MULTI-USE TRAIL ON EACH SIDE**	**PLAN OPTION NO. 4** **WIDEN EXISTING ROAD ON WEST SIDE ONLY WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 3m MULTI-USE TRAIL ON EACH SIDE**	**PLAN OPTION NO. 5** **WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m SEPARATED BIKE LANES & 1.50m SIDEWALKS ON BOTH SIDES**	**PLAN OPTION NO. 6** **WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m BLVD. CYCLE TRACK & 1.5 m SIDEWALKS ON BOTH SIDES***
LEGEND:	**LEAST PREFERRED ○ (0 Pts.) ◔ (1 Pts.) ◑ (2 Pts.) ◕ (3 Pts.) MOST PREFERRED ● (4 Pts.)**					
4. Costs						
Utility Impacts What would be the extent of impacts on existing utilities that must be relocated and/or protected to construct the alternative?	● Hydro/Communication poles on both sides of Gordon Street. Approximately 19 Hydro poles will have to be relocated under this alternative at approx. cost of approx. $380,000.00.	◔ Hydro/Communication poles on both sides of Gordon Street. Approximately 23 Hydro poles will have to be relocated under this alternative at approx. cost of approx. $460,000.00.	◑ Hydro/Communication poles on both sides of Gordon Street. Approximately 14 Hydro poles will have to be relocated under this alternative at approx. cost of approx. $280,000.00	◕ Hydro/Communication poles on both sides of Gordon Street. Approximately 9 Hydro poles will have to be relocated under this alternative at approx. cost of approx. $180,000.00	◔ Hydro/Communication poles on both sides of Gordon Street. Approximately 20 Hydro poles will have to be relocated under this alternative at approx. cost of approx. $400,000.00.	○ Hydro/Communication poles on both sides of Gordon Street. Approximately 12 Hydro poles will have to be relocated under this alternative at approx. cost of approx. $240,000.00.
	Traffic Signals Poles at Intersections along Gordon Street. Approximately 7 traffic signal poles will have to be relocated under this alternative at approx. cost of approx. $210,000.00.	Traffic Signals Poles at Intersections along Gordon Street. Approximately 11 traffic signal poles will have to be relocated under this alternative at approx. cost of approx. $330,000.00.	Traffic Signals Poles at Intersections along Gordon Street. Approximately 9 traffic signal poles will have to be relocated under this alternative at approx. cost of approx. $270,000.00.	Traffic Signals Poles at Intersections along Gordon Street. Approximately 11 traffic signal poles will have to be relocated under this alternative at approx. cost of approx. $330,000.00.	Traffic Signals Poles at Intersections along Gordon Street. Approximately 9 traffic signal poles will have to be relocated under this alternative at approx. cost of approx. $270,000.00.	Traffic Signals Poles at Intersections along Gordon Street. Approximately 8 traffic signal poles will have to be relocated under this alternative at approx. cost of approx. $240,000.00.
	Street Light Poles along Gordon Street. Approximately 11 street light poles will have to be relocated under this alternative at approx. cost of approx. $165,000.00.	Street Light Poles along Gordon Street. Approximately 21 street light poles will have to be relocated under this alternative at approx. cost of approx. $315,000.00.	Street Light Poles along Gordon Street. Approximately 14 street light poles will have to be relocated under this alternative at approx. cost of approx. $210,000.00.	Street Light Poles along Gordon Street. Approximately 22 street light poles will have to be relocated under this alternative at approx. cost of approx. $330,000.00.	Street Light Poles along Gordon Street. Approximately 15 street light poles will have to be relocated under this alternative at approx. cost of approx. $225,000.00.	Street Light Poles along Gordon Street. Approximately 16 street light poles will have to be relocated under this alternative at approx. cost of approx. $240,000.00.

Table 1.2 – Evaluation of Design Plan Alternatives

NOTE: ALL ALTERNATIVES INCLUDE WIDENING, A CENTRE TWO WAY LEFT TURN LANE AND MEDIAN ISLANDS AT INTERSECTIONS

EVALUATION CRITERIA	PLAN OPTION NO. 1 WIDENING EQUALLY ABOUT EXISTING CENTRELINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED	PLAN OPTION NO. 2 WIDENING EQUALLY ABOUT EXISTING CENTERLINE WITH 5m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED	PLAN OPTION NO. 3 WIDENING EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 3m MULTI-USE TRAIL ON EACH SIDE	PLAN OPTION NO. 4 WIDEN EXISTING ROAD ON WEST SIDE ONLY WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 3m MULTI-USE TRAIL ON EACH SIDE	PLAN OPTION NO. 5 WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m SEPARATED BIKE LANES & 1.50m SIDEWALKS ON BOTH SIDES	PLAN OPTION NO. 6 WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m BLVD. CYCLE TRACK & 1.5 m SIDEWALKS ON BOTH SIDES*
LEGEND:	**LEAST PREFERRED ○ (0 Pts.) ◔ (1 Pts.) ◑ (2 Pts.) ◕ (3 Pts.) MOST PREFERRED ● (4 Pts.)**					
Impacts on Underground Utilities?	◑ No significant impacts to existing mainline underground gas lines, watermains, sewers or communications cables, anticipated other than many minor relocations, adjustments to manholes, etc. Other costs accounted for in quantifications below.					
Initial Capital Cost What is the estimated initial capital cost of the alternative? (including utility relocations and property acquisition/ decommissioning) **Road length for estimating purposes from Landsdown Drive to Lowes Road is 1,400m.**	Preliminary Cost Estimate including the following: ◑ • Property Acquisition • Utility Relocations • Road and Drainage Works • Signals/Illumination • Roadside Protection and Line Markings. • Landscaping • Sidewalks <u>Construction Impacts</u> • Catch Basin - New - 19 • CB Manholes - New - 2 • Catch Basin - Relocate - 13 • Manhole – Relocate - 1 • MH Replace Frame and Lid - 21 • MH Adjust Frame and Lid - 3 • Tree Removals - 20 • Relocate Hydrants - 3 • Hydro Poles - 19 • Traffic Signal Poles - 7 • Street Lights - 11	Preliminary Cost Estimate including the following: ○ • Property Acquisition • Utility Relocations • Road and Drainage Works • Signals/Illumination • Roadside Protection and Line Markings. • Landscaping • Sidewalks <u>Construction Impacts</u> • Catch Basin - New - 19 • CB Manholes - New - 2 • Catch Basin-Relocate - 13 • Manhole – Relocate - 1 • MH Replace Frame and Lid - 21 • MH Adjust Frame and Lid - 3 • Tree Removals - 20 • Relocate Hydrants - 3 • Hydro Poles - 23 • Traffic Signal Poles - 11 • Street Lights - 21	Preliminary Cost Estimate including the following: ◕ • Property Acquisition • Utility Relocations • Road and Drainage Works • Signals/Illumination • Roadside Protection and Line Markings. • Landscaping • Multi-Use Trail <u>Construction Impacts</u> • Catch Basin - New - 19 • CB Manholes - New - 2 • Catch Basin-Relocate - 13 • Manhole – Relocate - 1 • MH Replace Frame and Lid - 21 • MH Adjust Frame and Lid - 3 • Tree Removals - 20 • Relocate Hydrants - 3 • Hydro Poles - 14 • Traffic Signal Poles - 9 • Street Lights - 14	Preliminary Cost Estimate including the following: ● • Property Acquisition • Utility Relocations • Road and Drainage Works • Signals/Illumination • Roadside Protection and Line Markings. • Landscaping • Multi-Use Trail <u>Construction Impacts</u> • Catch Basin - New - 2 • CB Manholes - New - 8 • Catch Basin-Relocate - 2 • Manhole- Relocate - 1 • MH Replace Frame and Lid - 20 • MH Adjust Frame and Lid - 3 • Tree Removals - 20 • Relocate Hydrants - 3 • Hydro Poles - 9 • Traffic Signal Poles - 11 • Street Lights - 22	Preliminary Cost Estimate including the following: ◔ • Property Acquisition • Utility Relocations • Road and Drainage Works • Signals/Illumination • Roadside Protection and Line Markings. • Landscaping • Sidewalks/Separated Bike Lane <u>Construction Impacts</u> • Catch Basin-New - 19 • CB Manholes-New - 2 • Catch Basin-Relocate - 13 • Manhole- Relocate - 1 • MH Replace Frame and Lid -21 • MH Adjust Frame and Lid - 3 • Tree Removals - 20 • Relocate Hydrants - 3 • Hydro Poles - 20 • Traffic Signal Poles - 9	Preliminary Cost Estimate including the following: ◕ • Property Acquisition • Utility Relocations • Road and Drainage Works • Signals/Illumination • Roadside Protection and Line Markings. • Landscaping • Sidewalks/Cycle Track <u>Construction Impacts</u> • Catch Basin - New - 20 • CB Manholes - New - 5 • Catch Basin-Relocate - 4 • Manhole – Relocate - 0 • MH Replace Frame and Lid - 21 • MH Adjust Frame and Lid - 8 • Tree Removals - 8 • Relocate Hydrants - 4 • Hydro Poles - 12 • Traffic Signal Poles - 8 • Street Lights - 16

Table 1.2 – Evaluation of Design Plan Alternatives						
NOTE: ALL ALTERNATIVES INCLUDE WIDENING, A CENTRE TWO WAY LEFT TURN LANE AND MEDIAN ISLANDS AT INTERSECTIONS						
EVALUATION CRITERIA	**PLAN OPTION NO. 1** **WIDENING EQUALLY ABOUT EXISTING CENTRELINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED**	**PLAN OPTION NO. 2** **WIDENING EQUALLY ABOUT EXISTING** **CENTERLINE WITH 5m WIDE CONTINUOUS LEFT TURN LANE WITH EXISTING SIDEWALKS AND ON STREET BIKE LANES MAINTAINED**	**PLAN OPTION NO. 3** **WIDENING EQUALLY ABOUT EXISTING** **CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE** **& 3m MULTI-USE TRAIL ON EACH SIDE**	**PLAN OPTION NO. 4** **WIDEN EXISTING ROAD ON WEST SIDE ONLY WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 3m MULTI-USE TRAIL ON EACH SIDE**	**PLAN OPTION NO. 5** **WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m SEPARATED BIKE LANES & 1.50m SIDEWALKS ON BOTH SIDES**	**PLAN OPTION NO. 6** **WIDEN EQUALLY ABOUT EXISTING CENTERLINE WITH 4m WIDE CONTINUOUS LEFT TURN LANE & 1.80m BLVD. CYCLE TRACK & 1.5 m SIDEWALKS ON BOTH SIDES***
LEGEND:	**LEAST PREFERRED ○ (0 Pts.) ◔ (1 Pts.) ◑ (2 Pts.) ◕ (3 Pts.) MOST PREFERRED ● (4 Pts.)**					
	Sub-TOTAL (Excl. HST) **$1,456,000.00 plus $755,000 for Hydro, street light pole and Traffic signals relocations and $102,000 in Property Costs.**	**Sub-TOTAL (Excl. HST)** **$1,610,000.00 plus $1,105,000 for Hydro, street light pole and Traffic signals relocations and $223,000 in Property Costs.**	**Sub-TOTAL (Excl. HST)** **$1,260,000.00 plus $760,000 for Hydro, street light pole and Traffic signals relocations and $137,000 in Property Costs.**	**Sub-TOTAL (Excl. HST)** **$924,000.00 plus $840,000 for Hydro, street light pole and Traffic signals relocations and $117,000 in Property Costs.**	• Street Lights - 15 **Sub-TOTAL (Excl. HST)** **$1,918,000.00 plus $895,000 for Hydro, street light pole and Traffic signals relocations and $199,000 in Property Costs.**	**Sub-TOTAL (Excl. HST)** **$1,246,000.00 plus $720,000 for Hydro, street light pole and Traffic signals relocations and $239,000 in Property Costs.**
	TOTAL (Excl.HST) **$2,382,000.00**	**TOTAL (Excl.HST)** **$3,023,000.00**	**TOTAL (Excl.HST)** **$2,279,000.00**	**TOTAL (Excl.HST)** **$2,104,000.00**	**TOTAL (Excl.HST)** **$2,759,000.00**	**TOTAL (Excl.HST)** **$2,255,000.00**
Operations and maintenance costs	● Status Quo held on Maintenance Costs.	◕ Slightly wider pavement increases replacement costs from Option 1.	◑ Slightly higher cost relative to current condition. Wider path for snow clearing. Greater replacement cost.	◑ Slightly higher cost relative to current condition. Wider path for snow clearing. Greater replacement cost.	◔ Significantly Higher cost relative to current condition. Wider path for snow clearing.	○ Significantly Higher cost relative to current condition. Separated path for snow clearing increases winter maintenance costs. Greater replacement cost.
Total Cost Score	12 Points	6 Points	9 Points	11 Points	5 Points	5 Points
Total Overall Score	73 Points	63 Points	71 points	74 Points	59 Points	62 Points
Overall Ranking	**2**	**4**	**3**	**1**	**6**	**5**
Public preference based on Open House feedback	**0%**	**14%**	**22%**	**28%**	**17%**	**Not Presented at PIC#1**

Note: * 1.5 m width is current published City minimum width and is acknowledged/retained where sidewalks are being maintained.

Appendix XI
Preliminary Design (IBI Group 2020c)

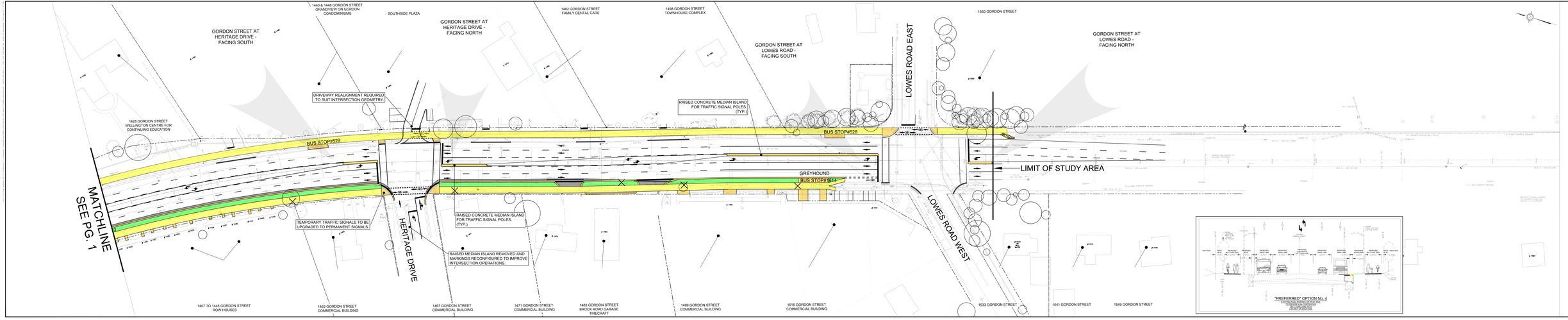
LEGEND
EXISTING STORM SEWERS
EXISTING SANITARY SEWERS
EXISTING WATERMAIN
PROPOSED CONCRETE CURBS AND SIDEWALK
PROPOSED GRASS BOULEVARD
PROPOSED ASPHALT MULTI-USE TRAIL
ROAD WIDENING
INVENTORIED TREES (SEE REPORT)
TREE REMOVALS

City of Guelph
TRANSPORTATION SERVICES

GORDON STREET
SCHEDULE "B"
CLASS ENVIRONMENTAL ASSESSMENT

4.0m CONTINUOUS LEFT TURN LANES
EDINBURGH RD. TO STATION 5+470±

SCALE:	CONSULTANT DRAWING No.
1:250	117734EA
DATE DRAWN: 2019-10-01	CITY CONTRACT No.
DRAWN BY: DPR	PG. 1 OF 2


GORDON STREET AT HERITAGE DRIVE - FACING SOUTH
1440 & 1448 GORDON STREET GRANDVIEW ON GORDON CONDOMINIUMS
SOUTHSIDE PLAZA
GORDON STREET AT HERITAGE DRIVE - FACING NORTH
1492 GORDON STREET FAMILY DENTAL CARE
1498 GORDON STREET TOWNHOUSE COMPLEX
GORDON STREET AT LOWES ROAD - FACING SOUTH
LOWES ROAD EAST
1550 GORDON STREET
GORDON STREET AT LOWES ROAD - FACING NORTH
DRIVEWAY REALIGNMENT REQUIRED TO SUIT INTERSECTION GEOMETRY.
RAISED CONCRETE MEDIAN ISLAND FOR TRAFFIC SIGNAL POLES. (TYP.)
1428 GORDON STREET WELLINGTON CENTRE FOR CONTINUING EDUCATION
BUS STOP#529
BUS STOP#528
GREYHOUND
BUS STOP# 1614
LIMIT OF STUDY AREA
MATCHLINE SEE PG. 1
TEMPORARY TRAFFIC SIGNALS TO BE UPGRADED TO PERMANENT SIGNALS.
HERITAGE DRIVE
RAISED CONCRETE MEDIAN ISLAND FOR TRAFFIC SIGNAL POLES. (TYP.)
RAISED MEDIAN ISLAND REMOVED AND MARKINGS RECONFIGURED TO IMPROVE INTERSECTION OPERATIONS.
LOWES ROAD WEST
1407 TO 1445 GORDON STREET ROW HOUSES
1453 GORDON STREET COMMERCIAL BUILDING
1457 GORDON STREET COMMERCIAL BUILDING
1471 GORDON STREET COMMERCIAL BUILDING
1483 GORDON STREET BROCK ROAD GARAGE TIRECRAFT
1499 GORDON STREET COMMERCIAL BUILDING
1515 GORDON STREET COMMERCIAL BUILDING
1533 GORDON STREET
1541 GORDON STREET
1549 GORDON STREET
"PREFERRED" OPTION No. 4
TWO-WAY LEFT TURN LANE
WITH RAISED MEDIAN ISLANDS
LEFT TURN LANE
RAISED MEDIAN ISLAND

KEY PLAN - Scale: NOT TO SCALE
LEGEND
EXISTING STORM SEWER
EXISTING SANITARY SEWER
EXISTING WATERMAIN
PROPOSED CONCRETE CURB AND GUTTER
PROPOSED GRASS BOULEVARD
PROPOSED ASPHALT RESURFACING
ROAD WIDENING
EXISTING TREE TO BE REMOVED
TREE REMOVALS
ROADWAY AND CITY SERVICES
1. CITY OF GUELPH STANDARDS AND SPECIFICATIONS
2. OPSS.MUNI 310 - PAVEMENT MARKING
3. OPSS.MUNI 313 - TEMPORARY CONDITIONS
4. OPSS.MUNI 314 - TRAFFIC CONTROL
ROAD SECTIONS
1:50 HORIZONTAL
1:50 VERTICAL
THE DRAWINGS AT YOUR DISPOSAL INCORPORATE INFORMATION PROVIDED BY OTHERS. WHILE EVERY REASONABLE EFFORT HAS BEEN MADE TO ENSURE THE ACCURACY OF THE INFORMATION, NO GUARANTEE IS MADE AS TO ITS ACCURACY. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING UTILITIES AND SHALL ASSUME ALL LIABILITY FOR SUCH DAMAGE.
1 ISSUED TO: JP JANUARY 23
NO. DATE DESCRIPTION BY CHKD
CITY OF GUELPH
TRANSPORTATION SERVICES
GORDON STREET SCHEDULE 'B' CLASS ENVIRONMENT ASSESSMENT
4.5m CONTINUOUS LEFT TURN LANE STA. 0+470.0 TO LOWES RD.
SCALE: 1:250
DATE: 2019 JANUARY 23
DESIGNED: AW
DRAWN: AW
CHECKED: JP
DATE: JAN
GUELPH PROJECT NO.: 11734EA
CITY DRAWING NO.:
SHEET NO.: PG. 2 OF 2