Ninth Line (Eglinton Avenue West to Derry Road West), Mississauga Environmental Assessment and Preliminary Design

Natural Environment Assessment

Prepared for:

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Aquatic, Terrestrial and Wetland Biologists

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1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained by HDR, on behalf of the City of Mississauga, to complete a Natural Environment Assessment (NEA) to inform the Municipal Class Environmental Assessment (EA) and Preliminary Design for improvements to Ninth Line from Eglinton Avenue West to Derry Road West. Roadway improvements are required to address projected traffic capacity deficiencies associated with future population growth and development of lands to the immediate west. These undeveloped adjacent lands are known as the "Ninth Line Lands" and have been the subject of various studies to inform land development strategies. These include the ongoing Ninth Line Lands Scoped Subwatershed Study. The Natural Heritage System within the Ninth Line Lands has been characterized and mapped as part of the subwatershed study, as described in the Phase 1 Background Report and Study Area Characterization (AFW 2015). Various natural features and ecological functions were identified within the Ninth Line Lands that have direct bearing on the Ninth Line EA and Preliminary Design. The subwatershed study Phase 1 was followed by Phase 2 (Impact Assessment and Management Strategy (AFW 2017)), which provided a high-level assessment of impacts associated with future land uses and introduced a planned Natural Heritage System (NHS) to offset these impacts and to provide an overall enhancement to the ecological value of the lands. A subsequent subwatershed study Phase 3 report (Implementation and Monitoring) has been prepared in draft (Wood 2020). The subwatershed study has also been highly integrated with the ongoing Class EA for the Ontario Ministry of Transportation's (MTO) planned Highway 407 Transitway, which will traverse the Ninth Line Lands paralleling Highway 407.

The past and ongoing studies, as well as property-level assessments being undertaken in support of future land development applications within the Ninth Line Lands, have been referred to in informing the NEA. This has included consideration for planned future land developments within the Ninth Line Lands and associated alterations (e.g., removals, relocations) to the existing natural environment features where they are of relevance to the Ninth Line road improvement EA. Pertinent results from these earlier studies have been summarized in this report. In completion of this NEA, NRSI has also completed additional field investigations to update and refine the subwatershed study natural environment findings for the purposes of the Ninth Line EA.

For the purposes of this report, the "study area" represents the section of Ninth Line between Eglinton Avenue West and Derry Road West, and adjacent lands within 120m of this road

section. The study area represents a stark division between the highly developed and urbanized lands to the east, and the predominantly open and undeveloped Ninth Line Lands to the west. The study area contains a mix of natural and culturally-influenced features, and due to the existing landscape characteristics, these features are primarily to the west of Ninth Line. Natural features within the Ninth Line Lands mainly comprise cultural meadows, meadow marsh and shallow marsh wetlands, and isolated woodlands. These features have been subject to ecological disturbance and fragmentation, and have been highly influenced by past anthropogenic land uses and alterations (e.g., construction of Highway 407 and stormwater management (SWM) ponds). Much of these lands are traversed by the East Lisgar Branch of Sixteen Mile Creek. This report refers to Ninth Line as running in a north-south orientation; therefore, true northeast = “east”, true southwest = “west”, etc. See Map 1 for an illustration of the study area limits.

This report summarizes background information on natural heritage features within the study area as well as the results of field surveys completed to accurately characterize the existing natural environment conditions. The detailed characterization was used to update and refine the analysis of natural feature significance and sensitivity completed for the Ninth Line Lands but with a focus on the features and ecological functions of relevance to the road EA and Preliminary Design. This analysis was completed with consideration for applicable City, Regional and Provincial policies and legislation as well as the regulations and associated policies of Credit Valley Conservation (CVC) and Conservation Halton. An impact assessment has been completed based on details of the selected Preliminary Design for the road improvements. The impact assessment incorporates an analysis of direct impacts (i.e., impacts within the footprint of the planned undertaking), as well as indirect impacts (e.g., due to road runoff/SWM and water quality mitigation). General recommendations pertaining to ecological restoration and enhancement opportunities and monitoring have also been provided. These recommendations are to be reviewed and refined as required based on the subsequent detailed design of the road improvements.

This NEA study has been completed in conjunction with a Tree Protection Plan (TPP), which is presented under separate cover. Pertinent results from the tree inventory and TPP have been summarized in this report.

2.0 Background Information Review and Significant Habitat Screening

2.1 Background Information Secondary Sources

A review of existing natural heritage information was completed to identify key natural heritage features and species that are known or have potential to occur within the study area. Requests for background information were sent to the Ontario Ministry of Natural Resources and Forestry (MNRF) Aurora District, Conservation Halton and CVC. Relevant background information for the study area was received from Conservation Halton on April 22, 2020, and from CVC on May 15, 2020.

Background information relevant to the study area was also collected and reviewed from sources including the following:

- Land Information Ontario Natural Heritage Make-a-Map base mapping and Natural Heritage Information Centre (NHIC) online database (MNRF 2020);
- Region of Peel Official Plan (2018);
- City of Mississauga Official Plan (2019);
- CVC online regulation mapping (CVC 2020a);
- Conservation Halton online mapping (Conservation Halton 2020a);
- *Ninth Line Lands Scoped Subwatershed Study Phase 1: Background Report, Study Area Characterization* (AFW 2015);
- *Ninth Line Lands Scoped Subwatershed Study Phase 2: Impact Assessment and Management Strategy* (AFW 2017);
- *Scoped Environmental Impact Study, Southern Parcel, Ninth Line Lands* (Savanta 2020);
- Department of Fisheries and Oceans Canada (DFO) Species at Risk Mapping (DFO 2019);
- Atlas of the Mammals of Ontario (Dobbyn 1994);
- Ontario Reptile and Amphibian Atlas (Ontario Nature 2019);
- Ontario Breeding Bird Atlas (BSC et al. 2008);
- eBird (eBird 2020); and,
- iNaturalist (iNaturalist 2020).

2.2 Significant Species Habitat Screening

Species at Risk (SAR) are those listed on the Species at Risk in Ontario List (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. Species listed as Endangered or Threatened are protected under the *Endangered Species Act* (ESA), which includes protection to 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 2020), 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 Significant Wildlife Habitat (SWH) (OMNR 2010), which is afforded protection under the Provincial Policy Statement (OMMAH 2020) and municipal 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 and adjacent to the subject property 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 review of recent satellite imagery of the study area lands. The results of this significant species habitat screening are described in the context of SAR and SCC in Sections 4.4 and 4.5, below.

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

comparison of MNRF criteria outlined for Ecoregion 7E, in which the study area is located, against habitats known to occur in the study area. The results of the SWH screening are described in Section 4.5.

3.0 Relevant Policies, Regulations and Planning Studies

3.1 Peel Region Official Plan Policies

The study area contains lands that were historically located within the eastern limits of Halton Region (Town of Milton), but in 2010 were allocated to Peel Region (City of Mississauga). This recent change in administrative jurisdiction has not yet been captured in the Peel Region Official Plan (OP) mapping. For example, Schedule D of the Peel Region OP (2018) refers to the lands west of Ninth Line as falling within the Region of Halton OP as the Ninth Line Corridor Policy Area, and that the policies of the Region of Halton and Town of Milton currently apply to these lands. However, Regional Official Plan Amendment (ROPA) 33, "*an amendment to include the Ninth Line Lands in the Regional urban boundary and establish an updated planning framework*", identifies that OP Schedule A is to be amended to add the Core Areas of the Greenlands System designation to reflect identified natural areas in the Ninth Line Lands.

Section 2.3.2.2 of the Regional OP defines Core Areas to include features such as, but not limited to, core woodlands, significant habitats of threatened or endangered species, and core valley and stream corridors. As per Section 2.3.2.6, development and site alteration within Core Areas is prohibited except for certain activities including "essential infrastructure exempted, pre-approved or authorized under an environmental assessment process". These exceptions are subject to demonstration that:

- there are no reasonable alternative locations outside of the Core Area,
- that development and site alteration is directed away from the Core Area feature to the extent possible,
- that impact to the Core Area feature is minimized, and
- that any impact to the feature or its functions that cannot be avoided be mitigated through restoration or enhancement to the greatest extent possible (Region of Peel 2018).

3.2 City of Mississauga Official Plan Policies

The Green System in Mississauga comprises the Natural Heritage System, the Urban Forest, Natural Hazard Lands, and Parks and Open Spaces. The City's Natural Heritage System is itself comprised of Significant Natural Areas, Natural Green Spaces, Special Management Areas, Residential Woodlands, and Linkages (City of Mississauga 2020).

Significant Natural Areas are areas that meet one or more of several criteria listed in Section 6.3.12 of the OP, including but not limited to “environmentally sensitive or significant areas”, habitat for Threatened or Endangered species, fish habitat, SWH, Significant Woodlands and Significant Wetlands. Section 6.3.12.(f) lists criteria that define Significant Woodlands, while subsection (g) lists criteria to identify City-designated Significant Wetlands. The OP defines “environmentally sensitive or significant areas” as “places where ecosystem functions or features warrant special protection”, and may include but are not limited to unique plant or animal populations and concentrations of ecological functions. These areas are inventoried and designated by conservation authorities and the provincial government (City of Mississauga 2020).

OP Section 6.3.14 lists criteria that define Natural Green Spaces. These include, but are not limited to, woodlands that are >0.5ha but don’t meet the requirements of a Significant Woodland, and wetlands that do not fulfill the requirements of a Significant Wetland (City of Mississauga 2020).

Schedule 3 of the City’s OP identifies the presence of one feature within the study area that is designated as a “Significant Natural Area and Natural Green Space” (Appendix I). This feature is located east of Ninth Line and north of Britannia Road West, and conforms to a large SWM block (known as the Osprey Marsh SWM complex) that services the adjacent residential lands. As described under the policies contained within Section 6.3 of the City OP (2020), the mapped study area feature is inferred to represent a form of “Natural Green Space”. Development and site alteration within these features is prohibited unless it has been demonstrated that there will be no negative impact to the natural features and their ecological functions, and opportunities for their protection, restoration, enhancement and expansion have been identified. This may be demonstrated through completion of a study in accordance with the requirements of the *Environmental Assessment Act* (City of Mississauga 2020).

Lands to the west of Ninth Line, abutting the Highway 407 lands, are also mapped as “Natural Hazards” on Schedule 3. These hazards are associated with the Sixteen Mile Creek tributary (known as the East Lisgar Branch) that flows within that area. Development and site alteration are generally directed outside of Natural Hazard lands except for a few permitted use exceptions.

Municipal Official Plan Amendment #90 was introduced to create a new Neighbourhood Character Area for the Ninth Line Lands, remove the Special Study Area designation over the lands, and to apply land use designations to the lands including “Greenlands”.

3.3 Conservation Authority Regulations and Policies

The study area contains the watershed boundary dividing the jurisdictional authorities of CVC and Conservation Halton. A southern portion of the study area falls within the CVC jurisdiction while the remainder to the north falls within Conservation Halton’s. Consequently, the policies and regulations of both conservation authorities must be addressed in completion of the undertaking.

Portions of the study area are regulated by the CVC’s and Conservation Halton’s *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation* (Ontario Regulations 160/06 and 162/06, respectively). Development and site alteration within the regulated lands is prohibited unless permitted by the applicable conservation authority under the policies of its regulation. Regulated features within the study area include floodplain, stable top-of-bank, wetland and meander belt hazards, and their regulatory safety allowances, associated with the Sixteen Mile Creek tributaries and headwater drainage features (Conservation Halton 2020a, CVC 2020a).

CVC policies ensure that measures are taken to protect, restore and enhance the natural heritage system in the implementation of transportation infrastructure planning and construction. CVC policy objectives for infrastructure planning are described in Section 5.2 of the CVC’s *Watershed Planning and Regulation Policies* (2010). Guiding policies include, but are not limited to, CVC’s recommendation that infrastructure projects include the preparation of comprehensive environmental studies, that they appropriately consider natural features and areas, and that they incorporate sustainable management practices such as the use of Low Impact Development methods. CVC’s general policies, as stated in Section 7.1, include the recognition that certain types of development or interference, such as infrastructure, must be located within regulated features. These measures may be permitted provided they have been addressed through an EA or similar study, and it has been demonstrated that the interference is acceptable such that negative impacts, such as to the conservation of land, will not occur (CVC 2010). More detailed infrastructure policies are described in Section 7.2.6, which include infrastructure design and construction measures that must be taken to avoid negative effects on regulated features.

Conservation Halton regulates all watercourses, valleylands, wetlands, Lake Ontario and Hamilton Harbour shoreline and hazardous lands, as well as lands adjacent to these features. The study area contains tributaries of the East Lisgar Branch of Sixteen Mile Creek and the flooding and erosion hazards associated with these watercourses. The area also contains wetlands of various sizes. Conservation Halton regulates a distance of 15m from the greater of the limit of flooding or erosion hazards; 120m from the limit of wetlands that are greater than 2ha in size or that are provincially significant; and 30m from all other wetlands. Permission is required from Conservation Halton to undertake development within their regulated area. Areas of flood water "spill" that extend outside of a floodplain are also subject to Conservation Halton policies and permitting requirements.

Conservation Halton's Policies and Guidelines for the *Administration of Ontario Regulation 162/06 and Land Use Planning Policy Document* (2020) similarly identifies various policies governing the planning and construction of public infrastructure such as transportation systems within regulated areas. Various detailed policies are included in Section 2.48 and include, among several others, that the need for the project has been demonstrated and that there is no reasonable alternative, that the area of disturbance will be kept to a minimum, and that habitat connectivity and wildlife movement be incorporated into the planning, design and construction practices of all works (Conservation Halton 2020b).

3.4 Provincial Policy Statement

The Provincial Policy Statement (OMMAH 2020) provides direction on matters of provincial interest with respect to land use planning and developments that are subject to the provincial *Planning Act*. It supports improved land use planning and management, contributing toward a more effective and efficient land use planning system while protecting resources of provincial interest including, but not limited to, the natural environment. Section 2.1 of the Provincial Policy Statement identifies policies for the protection of Natural Heritage; these policies should serve as guidance in the design of the proposed road improvements. Of relevance to this project and its study area natural features are the following policies:

- Section 2.1.5:
    - Development and site alteration shall not be permitted in:
        - Significant Woodlands in Ecoregion 7; or
        - Significant Wildlife Habitat

unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

- Section 2.1.6:
    - Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.
- Section 2.1.7:
    - Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.
- Section 2.1.8:
    - Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.5 and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

Policies of the Provincial Policy Statement are also reflected in the policies of CVC and Conservation Halton identified above (e.g., Conservation Halton 2020b).

3.5 Ninth Line Lands Scoped Subwatershed Study

The Ninth Line Lands Scoped Subwatershed Study was initiated in 2014 by the City of Mississauga to establish a land use framework, and to guide future growth and development within the Ninth Line Lands. This study was used to define and establish the development constraints and opportunities on the lands with consideration for various conditions include terrestrial and aquatic ecology, hydrology, stream morphology, and hydrogeology (Wood 2020).

The subwatershed study comprises three phases; Phases 1 and 2 have been completed (AFW 2015, 2017), while the Phase 3 subwatershed study report has been completed in draft at the time of writing (Wood 2020). Phase 1 focused on study area characterization and included a comprehensive review of existing background information, supplemented by a suite of field surveys, to accurately map and describe the existing terrestrial and aquatic natural features and their ecological functions within the Ninth Line Lands. The Phase 2 study incorporated an assessment of impacts associated with the anticipated land use changes. A major component

of this assessment involved integration with the findings of the Highway 407 Transitway Environmental Project Report (Parsons 2020), which includes assessment of a section of transitway that will traverse much of the Ninth Line Lands, paralleling Highway 407. The Highway 407 Transitway study, including its contributing aquatic and terrestrial technical studies (LGL 2020a, b), have been undertaken by the MTO concurrently with the subwatershed study. The Phase 2 subwatershed study also introduced a conceptual Natural Heritage System to be created within the Ninth Line Lands. The Natural Heritage System would serve as a means of mitigating and compensating for the anticipated direct and indirect impacts to existing natural features while providing an overall enhancement to the ecological quality and functionality of the Ninth Line Lands relative to existing conditions. Phase 3 of the study identifies a detailed implementation and monitoring plan for the Ninth Line Lands and its Natural Heritage System development.

The results of the subwatershed study have been reviewed to ensure that the Ninth Line EA NEA recognizes the anticipated future land use changes, anticipated natural environment impacts and planned management strategies for integration with Ninth Line road improvement planning.

4.0 Fieldwork Methodology

Terrestrial and aquatic 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 nine site visits were completed between March and June 2020. Field investigations focused on areas within and immediately adjacent to the Ninth Line ROW that were most likely to be potentially impacted by the proposed undertaking, but included lands further removed from the road within the Ninth Line Lands as could be observed from the ROW boundary. An exception to this was the City-owned Fresh-Moist Sugar Maple-Hardwood Deciduous Forest (FOD6-5), located opposite the end of Erin Centre Boulevard, which NRSI biologists were able to fully access. A summary of the completed fieldwork tasks is provided below.

Vegetation Community Mapping and Species Inventories

Vegetation communities within the study area were previously mapped by NRSI for the purposes of the Ninth Line Lands Scoped Subwatershed Study using the Ecological Land Classification (ELC) system for southern Ontario (Lee et al. 1998). An NRSI biologist completed a site-level review of the ELC mapping that was of relevance to the EA and made refinements where considered necessary. Updates to vegetation community mapping were completed on June 9 and 10, 2020. Mapping was completed for features on the west side of the road only due to the lack of natural features on the urbanized east side of the road. A comprehensive inventory of vascular flora was completed to inform the ELC vegetation community classifications. The vegetation inventory work included an emphasis on the identification of any federally, provincially, or regionally significant vegetation species within the study area.

Tree Inventory

All trees ≥10cm diameter-at-breast-height (DBH) within the study area ROW, including intersecting roads to a distance of approximately 15m from Ninth Line, were inventoried and assessed for health condition by Certified Arborists on March 17, and April 2, 7, 8, and 9, 2020. 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;
- Diameter-at-breast-height (DBH) (cm);

- crown radius (m);
- general health (excellent, good, fair, poor, very poor);
- potential for structural failure (low, medium, high); and,
- 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 Arborists. See the TPP for this Class EA (NRSI 2021) for additional discussion about the tree inventory methodology.

Bat Habitat Tree Assessment

An inspection of trees within the study area ROW was completed in conjunction with the tree inventory to determine the presence of suitable snags or cavity trees that may provide bat roosting or maternity colony habitat. 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 2017). The assessment was completed during the leaf-off period to optimize biologists' view of the trees to identify potential roosting habitat features. This information was collected to assess the potential occurrence of SAR habitat for Little Brown Myotis and Northern Myotis. Any suitable habitat trees were described in detail and GPS-georeferenced in conjunction with the tree inventory work.

Aquatic Habitat Assessment

An NRSI aquatic biologist completed a survey on May 28, 2020 to characterize the aquatic habitats within the watercourses or drainage features that crossed under Ninth Line. These included two features that were previously mapped as part of the Ninth Line Lands Subwatershed Study (referred to as NLT-1 and an un-named feature herein referred to as "Drainage Feature B") as well as another previously un-mapped drainage feature ("Drainage Feature C") as shown on Map 2.

During these assessments, the following information was recorded:

- riparian and aquatic vegetation;
- channel dimensions;

- general bank stability;
- cover type and quality;
- substrate type;
- flow conditions; and
- water temperature.

Breeding Bird Surveys

Two early morning breeding bird surveys were completed on June 10 and 25, 2020 in accordance with Ontario Breeding Bird Atlas (OBBA) protocol (BSC 2001). Surveys were completed between a half-hour before sunrise and 10:00am and were timed to occur at least 10 days apart. Surveys were completed through the completion of 10-minute point counts with additional species recorded between point counts when encountered. See Map 2 for the point count locations. Standard breeding evidence codes were recorded based on OBBA protocol. Culverts under Ninth Line were inspected for the presence of bird nesting where suitable nesting habitat existed.

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 Sections 6.4 and 6.5. This included searches for features such as potential snake hibernaculum access structures or terrestrial crayfish chimneys. Assessments of significant wildlife habitat suitability were made based on the natural feature characterization (see Sections 6.4 and 6.5).

Incidental Observations

During the field work program, all incidental observations of mammals, herpetofauna, butterflies and odonates (dragonflies and damselflies) were documented on all field visits. This included direct observations of individuals, as well as signs of wildlife presence (i.e. tracks, scat, dens, nests, etc.).

5.0 Existing Conditions

5.1 Soils, Terrain and Drainage

The general surficial geological setting of the Ninth Line Lands was reported to be sandy silt till (Halton Till) of varying thicknesses, underlain by shales of the Queenston Formation. An overburden layer ranging between 4-28m thick was described as primarily comprising clayey silty and sand till, underlain at a few locations by layers of sand over shale bedrock. Discontinuous lenses of sand could be found within the overburden layer (AFW 2015). Thicker overburden in the southern portion of the subwatershed study area was attributed to the existence of the Trafalgar Moraine in this area. Soils within the Ninth Line Lands corridor were described as primarily clay loam and silty clay loam. The infiltration capacity of these soils is limited due to their relatively low hydraulic conductivity (AFW 2015).

The road EA study area is located within the Peel Plain and South Slope Physiographic Region, transitioning into the Trafalgar Moraine at the south end. The Peel Plain comprises a gently sloping topography toward the south, becoming increasingly flat. The topography of the Ninth Line Lands study area was described as being relatively flat, ranging between approximately 190-200m above sea level (AFW 2015).

Surface drainage within the road EA study area is ultimately directed toward the East Lisgar Branch of Sixteen Mile Creek, which runs north-south through the Ninth Line Lands to the west. Approximately opposite the intersection of Ninth Line and Tacc Drive, the East Lisgar Branch turns westwards where it flows under Highway 407 and further to the west. Three watercourses/drainage features cross under Ninth Line from east to west, ultimately emptying into the East Lisgar Branch (see Map 1). These include Drainage Features B and C, as well as the watercourse referred to in the Ninth Line Lands subwatershed study as NLT-1 (AFW 2017). As described further in Section 5.3, although a cross-culvert is located under Ninth Line at Drainage Feature D, an NRSI aquatic biologist did not observe evidence of a flow channel on the east side of Ninth Line. Rather, it was observed that Drainage Feature D was collecting ROW runoff and directing it westwards from the west side of the ROW. Because Drainage Features B, C and D are not regulated by Conservation Halton, they are referred to as “drainage features” and not watercourses to ensure consistency with other EA studies. Within the study area, only NLT-1 is a regulated feature that crosses Ninth Line, and is thus referred to as a watercourse. All of the watercourses/drainage features have been constructed or highly altered

to drain surface runoff from the residential lands to the east, and to direct stormwater toward the SWM facilities to the west.

5.2 Terrestrial Features

5.2.1 Vegetation Communities

Natural features are exclusively located to the west of Ninth Line within the study area. These lands are dominated by open cultural meadow, SWM ponds, and anthropogenic land uses. Smaller areas of woodland and wetland (mainly meadow marsh) are also located within the Ninth Line Lands to the west. The Ninth Line Lands are currently in a state of transition between former agricultural land uses and rural residential properties toward new developments that are currently under construction or recently completed, or are in planning stages. The Ninth Line Lands were previous characterized through the completion of ELC for the purposes of the subwatershed study (AFW 2015); this in turn represented an update of earlier ELC mapping completed for the Ninth Line Corridor Study (NSE 2012).

See Map 2 for updated vegetation community mapping for the EA study area. Table 2 presents a summary of the vegetation communities mapped within the study area. These community types have been previously described through past studies (NSE 2012, AFW 2015), and the current conditions are largely consistent with the exception of the following:

- The woodland opposite the Ninth Line intersection with Erin Centre Boulevard was revised from Dry-Fresh Sugar Maple Deciduous Forest (FOD5) to Fresh-Moist Sugar Maple-Hardwood Deciduous Forest (FOD6-5);
- Lands that were previously Mineral Cultural Meadow (CUM1) now contain a large, recently-built community centre complex (approximately between the intersections with Burdette Terrace and Tacc Drive);
- The woodland opposite Osprey Boulevard was revised from Fresh-Moist Green Ash-Hardwood Lowland Deciduous Forest (FOD7-2) to Mineral Cultural Woodland/Fresh-Moist Green Ash-Hardwood Lowland Deciduous Forest complex (CUW1/FOD7-2);
- Certain portions of lands previously mapped as CUM1 are now mapped as Annual Row Crop agricultural field (OAGM1); and,
- An area of CUM1 just south of the intersection with Beacham Street, as previously mapped, is now mapped as an anthropogenic development.

Most other revisions made to the subwatershed study ELC mapping were further removed from the Ninth Line ROW and are less applicable to the EA.

Table 1. Vegetation communities identified within the study area.

ELC Ecosite Type	ELC Description
Cultural	
CUM1	Mineral Cultural Meadow
CUM1-1	Dry-Moist Old Field Meadow
CUT	Cultural Thicket
CUP1	Deciduous Plantation
CUP3-9	Norway Spruce Coniferous Plantation
CUW1	Mineral Cultural Woodland
H1-H6	Hedgerow
Woodland	
FOD6-4	Fresh-Moist Sugar Maple-White Elm Deciduous Forest
FOD6-5	Fresh-Moist Sugar Maple-Hardwood Deciduous Forest
FOD7-2	Fresh-Moist Green Ash-Hardwood Lowland Deciduous Forest
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest
Wetland	
MAM2	Graminoid Mineral Meadow Marsh
MAM2-2	Reed Canary Grass Graminoid Mineral Meadow Marsh
MAS2-1	Cattail Mineral Shallow Marsh
SWD2-2	Green Ash Mineral Deciduous Swamp
SWD3	Maple Mineral Deciduous Swamp
SWD3-3	Swamp Maple Mineral Deciduous Swamp
SWD4	Mineral Deciduous Swamp
SWT2	Mineral Thicket Swamp
Open Water	
OAO	Open Aquatic
Agriculture	
OAGM1	Annual Row Crops

5.2.2 Vascular Flora

In total, 174 plant species were inventoried within the study area. A complete list of these species is provided in Appendix II. Natural vegetative growth was primarily located within the natural vegetation communities west of Ninth Line. The majority of the inventoried species are urban-tolerant and reflective of disturbed or culturally-influenced conditions. The coefficient of conservatism (CC) is a value ranging from 0 (low) to 10 (high), which is based on a species' tolerance of disturbance and fidelity to a specific habitat integrity (Oldham et al. 1995). Higher values are assigned to species that have specific environmental growing requirements and are less tolerant of disturbance. The majority of the study area natural communities had relatively low average CC values (e.g., average CC of 0.41 for the Mineral Cultural Meadow (CUM1) communities; average CC of 1.1 for the Cultural Thicket and Mineral Thicket Swamp

(CUT/SWT2) communities). By contrast, the average CC value for the deciduous forest (FOD), deciduous swamp (SWD) and hedgerow features was a relatively higher 3.54. Furthermore, the FOD/SWD/hedgerow features collectively contained only 16.0% non-native species among the total inventoried species in those communities. This is in contrast to the relatively high proportions of non-native species growth found within the CUM1 (68.3%), CUT/SWT2 (48.0%) and Mineral Cultural Woodland (CUW1) (47.8%) communities. These results suggest the relatively good ecological condition of the more mature woodland features within the study area, juxtaposed against the highly culturally-influenced and disturbed conditions of the early successional meadow, thicket and young woodland features west of Ninth Line. Some of these lands have been left to naturally regenerate from past agricultural land uses in just the past few years, and are thus dominated by opportunistic pioneer vegetation species.

The majority of the wetland features that occur immediately west of the ROW, comprising meadow marsh (MAM) with some shallow marsh (MAS), also exhibit evidence of cultural origins or influence. These communities, along with open water pond features (OA), collectively had an average CC value of 1.77, indicative of a species assemblage that is generalist and disturbance-tolerant. Of the species inventoried within these features, 32.0% were non-native. By contrast, the small deciduous swamp features, such as those found as inclusions within the Fresh-Moist Sugar Maple-Hardwood Deciduous Forest (FOD6-5) were characterized by species that are less disturbance-tolerant. Wetland features located further west of the road that are directly associated with the East Lisgar Branch watercourse channel and ponds were not directly investigated through this work.

Four species were inventoried that had relatively high CC values (i.e., >6): Wood Anemone (*Anemone quinquefolia*), Tuckerman's Sedge (*Carex tuckermanii*), Wild Leek (*Allium tricoccum*), and Michigan Lily (*Lilium michiganense*), all of which have a CC value of 7 (Oldham et al. 1995). All four of these species were inventoried within the woodland features of the study area. These species have a higher fidelity to the specific conditions provided by their habitats and are less tolerant to anthropogenic disturbances.

No federally or provincially significant species were inventoried within the study area. Eleven (11) regionally significant species were inventoried, as listed below.

Table 2. Regionally significant species inventoried within the study area.

Common Name	Latin Name	Peel Region Significance (Varga 2000)	Observation Location
Spotted Geranium	*Geranium maculatum*	U – Uncommon native species	FOD6-5, FOD6-4
Common Evening-primrose	*Oenothera biennis*	U – Uncommon native species	CUM1; throughout study area
Old-field Cinquefoil	*Potentilla simplex*	U – Uncommon native species	FOD6-5, CUM1
Cleavers	*Galium aparine*	R4 – Rare native species; known from 4 stations	FOD6-5, CUW1/FOD7-2
Blunt-leaved Bedstraw	*Galium obtusum*	U – Uncommon native species	FOD6-5
Peach-leaved Willow	*Salix amygdaloides*	R6 – Rare native species; known from 6 stations	CUW1, MAM, MAS and OAO features; multiple locations in wetlands and wetland edges
Sandbar Willow	*Salix interior*	R5 – Rare native species; known from 5 stations	CUT/SWT, MAM, MAS and OAO features; multiple locations in wetlands and wetland edges
Tuckerman's Sedge	*Carex tuckermanii*	R6 – Rare native species; known from 6 stations	SWD3 inclusions of the FOD6-5 woodland
Great Duckweed	*Spirodela polyrhiza*	U – Uncommon native species	MAS2-1, MAM2; within watercourse/drainage features
Michigan Lily	*Lilium michiganense*	U – Uncommon native species	FOD6-5 incl. the SWD3 inclusions

One of the inventoried species that is listed as regionally significant (Varga 2000), White Spruce (*Picea glauca*) is considered non-significant where it occurs in the study area, due to these comprising planted individuals.

The Phase 1 Subwatershed Study identified the presence of one provincially significant vegetation species, Kentucky Coffee-tree (*Gymnocladus dioicus*), located in a meadow feature south of Britannia Road. However, because these comprised planted individuals and were not naturally occurring, they were not considered significant in this context (AFW 2015).

Field surveys completed for the Subwatershed Study also inventoried several regionally significant vegetation species (AFW 2015). These included six species listed above: Spotted Geranium, Common Evening-primrose, Cleavers, Sandbar Willow, Tuckerman's Sedge, and Michigan Lily. However, the Subwatershed Study did not specify the locations of these regionally significant species, and the other significant species inventoried for the Subwatershed Study were not documented during the EA fieldwork.

5.2.3 Tree Inventory

In total, 983 trees were inventoried, comprising 40 species. Of the trees inventoried and assessed, 274 (28%) are native species and 699 (71%) are non-native, while 10 were not identified to the species level. The large proportion of non-native trees can be attributed to landscaping/streetscaping choices favouring commonly available and commonly planted species, performing desirable functions of street trees. For example, some species selected exhibit high salt tolerance and some effective screening of adjacent yards. Approximately 90% of trees inventoried are public trees within the right-of-way (ROW) or trees of shared ownership, overlapping public and private property. Colorado Spruce (*Picea pungens*) accounts for 52% of trees inventoried and is found in long rows, mostly along linear municipal landscaping easements along the east ROW limits. Norway Maple (*Acer platanoides*) occurs next most frequently, with 50 individuals. More than 75% of trees inventoried are landscape trees planted along the east side of the Ninth Line ROW.

See the TPP (NRSI 2021) for additional details about the tree inventory results.

5.2.4 Birds

In total, 90 bird species have been recorded in the vicinity of the study area (up to 10km) (BSC et al. 2008). Forty-one (41) bird species were recorded in the study area during bird surveys. Of these, 37 displayed some evidence of breeding within the study area. Refer to Appendix III 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).

Species at Risk Birds

Three bird SAR were observed during field surveys: Barn Swallow (*Hirundo rustica*), Bobolink (*Dolichonyx oryzivorus*), and Eastern Meadowlark (*Sturnella magna*). One bird SCC, Eastern Wood-Pewee (*Contopus virens*), was also observed within the study area. These observations are further summarized below.

Barn Swallow was observed at seven out of the 10 breeding bird point count stations; only at stations BMB-001, BMB-009 and BMB-010 were they not observed. Barn Swallows were observed during both breeding bird surveys at stations BMB-007 and BMB-008, indicating evidence of probable breeding in the immediate vicinities of those point count stations. Evidence of possible nesting was observed on a house located at 6314 Ninth Line. However, based on Google Streetview imagery, the house at that address was demolished as of

September 2020. Barn Swallows are known to travel up to 500m from their nesting site (Heagy et al. 2014) and likely travel widely over the open lands for foraging purposes. No confirmed nesting sites were observed. However, several structures exist within the Ninth Line Lands that provide suitable nesting habitat, including occupied and unoccupied houses, sheds, and work trailers. At most stations, Barn Swallows were observed singly or in small groups foraging over the open lands west of Ninth Line. Up to four Barn Swallows were observed, at BMB-007, while in most other cases either only one or two individuals were observed at a station. Most individuals were seen flying over open meadow, meadow marsh or agricultural fields. At BMB-002, two individuals were seen foraging over a SWM pond.

Two male Bobolinks were recorded within a large Mineral Cultural Meadow (CUM1) located between BMB-008 and BMB-009 during two surveys: a vegetation inventory completed on June 9 and a breeding bird survey completed on June 10. However, Bobolinks were not recorded within this meadow during the second breeding bird survey completed on June 25. Because the two observations on June 9 and 10 were not at least 10 days apart, their observations represent evidence of only “possible” breeding within the meadow based on the OBBA criteria (BSC 2001). During the June 25 breeding bird survey, three male Bobolinks were observed within a large CUM1 area to the west of the BMB-007 survey station. Bobolinks were not documented in that location during the June 9-10 surveys, suggesting evidence of “possible” breeding at this CUM1 location. However, due to the relative proximity of the two meadow areas in which Bobolinks were observed between the two breeding bird surveys (approximately 600m), and because the two observation areas are connected by a contiguous area of CUM1 that likely provides suitable habitat, the observations can collectively be considered “probable” evidence of Bobolink breeding within this larger CUM1 area between stations BMB-007 and BMB-008/BMB-009.

One singing male Eastern Meadowlark was observed within the CUM1 located between BMB-008 and BMB-009 during the June 10 breeding bird survey, as well as incidentally during the vegetation inventory completed during June 9-10. This was the same meadow area that two male Bobolinks were observed on those dates as stated above. However, Eastern Meadowlark was not recorded during the June 25 breeding bird survey. The June 10 observation therefore represents evidence of “possible” breeding by the species within the CUM1 feature.

Results from Background Studies

The Ninth Line Lands Subwatershed Study also identified three bird SAR: Barn Swallow, Bobolink and Eastern Meadowlark. Barn Swallows were observed foraging widely over the open features of the Ninth Line Lands. Nesting was confirmed in one barn; however, it was located north of Derry Road West and outside of the EA study area (AFW 2015). Environmental Impact Study (EIS) field surveys completed in 2019 for the property located at 5150 Ninth Line confirmed the presence of Barn Swallow nesting within a barn on that property, where two active nests were observed. This barn was proposed to be removed as part of site development, with Barn Swallow nesting habitat being compensated for in accordance with Ontario Regulation 242/08 (Savanta 2020). It is currently unknown whether the barn structure is still standing; however, it is well removed from the Ninth Line ROW and will not be impacted by the planned road works.

Within the EA study area, territorial male Bobolinks were also found during subwatershed study fieldwork within the same meadow features that they were documented in during the EA field investigations (AFW 2015). During breeding bird surveys completed in 2018-2019 as part of the Highway 407 Transitway Transit Project Assessment Process (TPAP), Bobolink was observed within CUM1 just south of Britannia Road, approximately opposite the Ninth Line intersections with Freeman Terrace and Manatee Way. Bobolink was observed with the highest breeding evidence of “singing male”, representing “possible” evidence of breeding, across all sites where it was observed in that project’s study area (LGL 2020b, BSC 2001).

Eastern Meadowlark was only observed north of the EA study area during subwatershed study field surveys (AFW 2015). Among bird SAR, only Barn Swallow and Bobolink were observed during the 2012 Ninth Line Corridor Study (NSE 2012). Eastern Meadowlark was observed with “probable” breeding evidence, based on evidence of a breeding territory, during field surveys completed for the Highway 407 Transitway TPAP. However, this “probable” level of breeding evidence is the highest level recorded among all breeding bird stations where it was recorded during that project, and it is not known what the breeding evidence level was (possible vs. probable) within the EA study area location specifically. Eastern Meadowlark was observed within CUM1 south of Britannia Road, between the area opposite the Ninth Line intersections with McDowell Drive and Lacman Trail (LGL 2020b).

Species of Conservation Concern Birds

One singing male Eastern Wood-Pewee was recorded within the Fresh-Moist Sugar Maple-Hardwood Deciduous Forest (FOD6-5) at station BMB-001 during both breeding bird surveys as well as incidentally during the vegetation inventory. This represents evidence of "probable" breeding by the species within the FOD6-5 woodland community. During both breeding bird surveys, the singing male was estimated to be located approximately centrally within the woodland.

Results from Background Studies

Within the EA study area, the Subwatershed Study (AFW 2015) also documented the presence of Eastern Wood-Pewee within the FOD6-5 woodland, where evidence of a breeding territory was identified. The subwatershed study breeding bird surveys completed in 2014 also documented the presence of Wood Thrush within the FOD6-5 woodland. However, based on 2019 breeding bird surveys completed at 5150 Ninth Line, which included bird observations and vocalizations within the adjacent FOD6-5 woodland, Wood Thrush was not documented (Savanta 2020).

During 2018-2019 breeding bird surveys completed for the Highway 407 Transitway TPAP (LGL 2020b), Eastern Wood-Pewee was recorded within the northernmost unit of the Fresh-Moist Sugar Maple-White Elm Deciduous Forest (FOD6-4) located at the north end of the EA study area. Across all breeding bird stations during that project, Eastern Wood-Pewee was recorded with a highest breeding evidence level of "probable" breeding (based on evidence of breeding territories); however, the breeding evidence level at the FOD6-4 feature specifically is not known.

Other Bird Species

One additional notable species, Ruffed Grouse (*Bonasa umbellus*), was observed within the FOD6-5 woodland with "possible" evidence of breeding due to an individual being observed during a single survey. This species nests in hardwood or aspen stands with open understories and dense overstorey coverage (Rusch et al. 2020). The FOD6-5 woodland likely represents the only suitable habitat for the species in the study area. The remainder of the observed species are relatively common, with secure populations in Ontario. Several species occupy the open meadow and agricultural portions of the study area, such as Savannah Sparrow (*Passerculus sandwichensis*) and Eastern Kingbird (*Tyrannus tyrannus*), while other observed

species occupy the woodland or woodland edge features, such as Red-eyed Vireo (*Vireo olivaceus*), American Redstart (*Setophaga ruticilla*), and White-breasted Nuthatch (*Sitta carolinensis*). A small number of species were associated with the meadow marsh and shallow marsh features, such as Common Yellowthroat (*Geothylpis trichas*) and Swamp Sparrow (*Melospiza georgiana*). The majority of observed species are urban-tolerant and widely found within human-occupied and developing landscapes.

5.2.5 Herpetofauna

In total, 26 reptile and amphibian species have been recorded within the vicinity (up to 10km) of the study area (Ontario Nature 2019). No herpetofauna species were observed incidentally during site investigations. A complete list of all herpetofauna species known from the study area is provided in Appendix IV.

Results from Background Studies

Within the EA study area, the Ninth Line Lands Scoped Subwatershed Study only recorded calling anurans (frogs and toads) within the FOD6-5 woodland feature during anuran call surveys. The FOD6-5 woodland contains small Maple Mineral Deciduous Swamp (SWD3) inclusions (Map 2). Amphibian calling activity was observed to be low at this site, with no more than three calling anurans recorded. Northern Leopard Frog and American Bullfrog were also recorded incidentally during subwatershed study field surveys, although their specific locations were not identified (AFW 2015). The FOD6-5 woodland and its SWD3 inclusions were subsequently surveyed for calling anurans for the 5150 Ninth Line EIS. Only one species, Gray Treefrog, was recorded within the feature. It was recorded at a low level of calling activity (calling code 1; up to eight calling individuals recorded during a single survey) (Savanta 2020). Anuran surveys completed for the Highway 407 Transitway TPAP (LGL 2020b) also found a low level of anuran breeding activity in the study area, with a maximum of Calling Code 1 recorded at a SWM pond opposite the Ninth Line intersection with Brinwood Gate where Green Frog (*Lithobates clamitans*) was recorded.

Based on the Phase 1 subwatershed study (AFW 2015), only one snake species, Eastern Gartersnake (*Thamnophis sirtalis sirtalis*) was observed within the study area. Eastern Gartersnake is a common species with a secure population in Ontario (MNRF 2020). The subwatershed study noted that "*several old foundations were observed adjacent to agricultural lands*" throughout the Ninth Line Lands, and that these may provide suitable overwintering

habitat for snakes. No such suitable habitat such as old stone foundations were observed within or immediately adjacent to the Ninth Line ROW that may be impacted by the undertaking.

The subwatershed study documented a single turtle species, Midland Painted Turtle (*Chrysemys picta marginata*), within SWM ponds adjacent to Highway 407 (AFW 2015). These ponds are well removed from the Ninth Line ROW. No turtles were observed during the Ninth Line Corridor Study (NSE 2012).

5.2.6 Mammals

In total, 31 mammal species have been documented within the vicinity (up to 10km) of the study area (Dobbyn 1994). Five mammal species (Eastern Cottontail (*Sylvilagus floridanus*), Meadow Vole (*Microtus pennsylvanicus*), Muskrat (*Ondatra zibethicus*), Eastern Gray Squirrel (*Sciurus carolinensis*), and Eastern Chipmunk (*Tamias striatus*)) were observed during site investigations. A complete list of all mammal species known from the study area is provided in Appendix V.

Species at Risk Mammals

During the tree inventory, NRSI documented four trees with cavity features that could potentially provide bat maternity roosting habitat. Each of these four trees (#755, 844, 845, 893) are at the frontage of residential properties along the west side of Ninth Line, outside of natural features. These four trees are labelled as Potential Bat Habitat Trees A, B, C and D, respectively, on Map 2. Table 3 provides detailed information about each identified cavity tree.

Table 3. Potential Bat Habitat Trees Inventoried Within the Study Area

Cavity Tree ID	TIPP Tree ID No.	Species	DBH (cm)	Overall Condition	Potential for Structural Failure Rating
A	755	Golden Weeping Willow	66.8	Fair	Possible
B	844	Horsechestnut	47.7	Fair	Probable
C	845	Horsechestnut	38.0	Dead	Probable
D	893	Willow species	85.0	Fair	Possible

Results from Background Studies

No significant mammal species were documented as part of earlier survey work within the study area (AFW 2015, NSE 2012, Savanta 2020, LGL 2020b).

5.2.7 Insects

In total, 63 butterfly species and 42 odonate species are known from the study area vicinity (up to 10km) (MacNaughton et al. 2020). No butterfly or odonate species were recorded during site investigations. See Appendices VI and VII for a list of butterflies and odonates, respectively, known from the study area vicinity.

One butterfly SCC, Monarch (*Danaus plexippus*), was documented within the Ninth Line Lands during earlier surveys (AFW 2015, NSE 2012). Monarch was observed on several occasions foraging within the open meadows and was considered likely to be breeding in areas containing milkweed (*Asclepias* spp.). No SAR or SCC odonates were identified during the earlier studies (AFW 2015, NSE 2012).

5.3 Aquatic Features

5.3.1 Aquatic Habitat

Four aquatic features were assessed by NRSI, including three non-regulated drainage features; Drainage Features B, C, and D, and one watercourse; Watercourse NLT-1. One additional drainage feature; Drainage Feature A, was not assessed by NRSI, but has been described based on existing studies (Savanta 2020). These have been described below as they exist from south to north within the study area. A photograph log of the aquatic features is provided in Appendix VII.

Drainage Feature A

Drainage Feature A was assessed through an EIS of the property on which it occurs (Savanta 2020). The feature exists as a minor swale through a residential property that conveys spring flows, but is dry for much of the year. The feature does not connect to a fish-bearing watercourse and does not provide fish habitat. The management recommendation made for this feature was “mitigation”, allowing it to be removed as part of the development of the land parcel as long as the development maintains the spring flow conveyance function.

Drainage Feature B

Drainage Feature B is a non-regulated feature that collects water from the residential development area east of Ninth Line and conveys it in a westerly direction, crossing Ninth Line, and into a series of two SWM ponds. These ponds appear to outlet to the open water ponds associated with the East Lisgar Branch of Sixteen Mile Creek via an underground outlet pipe.

Based on this series of structures, fish passage upstream from Sixteen Mile Creek into Drainage Feature B is expected to be quite limited.

Drainage Feature B, east of Ninth Line, exhibits a straightened, trapezoidal channel form from where it transitions from a piped feature west of Churchill Meadows Boulevard to Ninth Line. Houses back on to the north side of the feature and a recreational trail runs parallel along the south side. The base of the channel measures approximately 3-4m in width and a small, low flow channel was observed within this during the May assessment. The width of the wetted channel ranged from 0.1-1.5m, with water depths ranging from 0.02-0.15m, which includes areas of braided channel and pools. Overall water depths were very shallow and although some flow was observed during the assessment it is expected that the channel is dry for much of the year, only flowing in response to spring melt and precipitation events. Small pools were observed throughout the channel, but the majority of the water was observed to occur within a combination of single and braided channels through dense cattail and rip rap/cobble. The pools were primarily associated with fine sediments. On the upstream side of the Ninth Line culvert, substrates were dominated by rip rap, cobble, and gravel with limited vegetation, which transitioned to finer substrates and moderate to dense vegetation growth (primarily cattail) further upstream. Shrubs and small trees were also observed along the banks of Drainage Feature B in moderate to high abundance.

Drainage Feature B conveys flow through a double concrete box culvert under Ninth Line. Trash racks are present on the upstream side of each culvert and debris was present on the racks up to approximately 0.4m indicating that flows do become elevated in the channel under high flow conditions. As mentioned, substrates on the upstream side of the culverts are dominated by rip rap, cobble, and gravel, which appear to have been built up above the bottom elevation of the culvert.

Water temperature at the time of the assessment was 18°C near the upstream end of the culvert. No fish were observed within the channel, which provides marginal fish habitat. If fish are present within the stormwater ponds west of Ninth Line there is the potential for them to move in to Drainage Feature B, but the rocky substrates built up on the upstream side of the double box culvert are likely to inhibit upstream movement. Although water was observed within the channel upstream and within the box culverts it was not visible within the rocks indicating that it was flowing through the open spaces of the rocks along the bottom of the channel.

Further to this, fish are not expected to be able to access Drainage Feature B from the East Lisgar Branch.

Drainage Feature C

Drainage Feature C was noted to be very similar to Drainage Feature B in both form and function. Similar to Feature B, Feature C is a non-regulated feature that coveys spring flows and stormwater under Ninth Line through a double concrete box culvert and into stormwater ponds west of Ninth Line. Based on aerial imagery it appears to flow from the stormwater ponds to the East Lisgar Branch of Sixteen Mile Creek through an underground pipe.

Some water was observed to be flowing slowly in Drainage Feature C during the May assessment, but the volume of water was less than what was observed flowing in Drainage Feature B, suggesting that Drainage Feature B collects and conveys more stormwater than Feature C. The channel is largely overgrown with cattails, with the exception of the area immediately upstream from the culverts, which was generally devoid of vegetation due to the substrates consisting primarily of rip rap, cobble, and gravel.

Water temperature at the time of the assessment was 18°C near the upstream end of the culvert. Similar to Feature B, no fish were observed within the channel, which provides marginal fish habitat. Further to this, fish are not expected to be able to access Drainage Feature C from the East Lisgar Branch of Sixteen Mile Creek.

Drainage Feature D

Drainage Feature D is a non-regulated feature that exists as an intermittent/ephemeral drainage channel. This feature appears to originate at the outlet of a cross-culvert, located on the west side of Ninth Line near McDowell Drive. This feature collects and conveys stormwater that is diverted to the culvert from Ninth Line. Feature D conveys water through a straight channel to the East Lisgar Branch of Sixteen Mile Creek approximately 230m southwest of Ninth Line. Channel substrates are primarily comprised of fine sediments and vegetation was observed growing within it, including cattail, terrestrial grasses and forbs. No flow was observed within the channel at the time of the assessment on May 28.

Watercourse NLT-1

Watercourse NLT-1 is a regulated watercourse that represents outflow from the adjacent Osprey Marsh SWM complex to the east. Controlled flow from the complex is discharged into a

straightened channel to the west of Ninth Line prior to its discharge into the East Lisgar Branch of Sixteen Mile Creek. During the May assessment water was observed flowing from the SWM pond over rip rap as a shallow riffle for approximately 10m before transitioning to a lower-gradient channel. At the base of the riffle water is ponded and is then diverted through a concrete flow control structure. From the control structure, water is directed through a 1.5m wide concrete-lined channel for approximately 250m before transitioning to a more natural channel form at the East Lisgar Branch. Substrates within the concrete-lined channel include a combination of fine sediments with some gravel and cobble. Small areas of cattail were also observed growing within the concrete channel, which provides some in-stream cover and habitat.

Between Ninth Line and the flow control structure the banks on either side of the channel are also concrete, which extend 20 to 25m from the edge of the channel on each side. This area is expected to be dry for most of the year as water from the SWM pond would flow through the rectangular “low-flow” channel. This concrete channel provides some, but generally limited aquatic habitat, which offers the opportunity for future enhancements.

5.3.2 Fish Community

The watercourses within and in the vicinity of the study area support a warmwater fish community (Dunn 2006, AFW 2015, 2017). Fish community surveys conducted in 2014 and 2015 along the East Lisgar Branch of Sixteen Mile Creek identified 12 fish species including Black Crappie (*Pomoxis nigromaculatus*), Bluegill (*Lepomis macrochirus*), Bluntnose Minnow (*Pimephales notatus*), Brown Bullhead (*Ameiurus nebulosus*), Creek Chub (*Semotilus atromaculatus*), Fathead Minnow (*Pimephales promelas*), Golden Shiner (*Notemigonus crysoleucas*), Goldfish (*Carassius auratus*), Pumpkinseed (*Lepomis gibbosus*), White Sucker (*Catostomus commersonii*), Northern Pike (*Esox lucius*), and Common Carp (*Cyprinus carpio*) (AFW 2015, 2017). All species identified are common across Ontario and are moderately to highly tolerant of non-specific stressors (Eakins 2021).

Aquatic SAR distribution mapping was reviewed to identify any known fish and/or freshwater mussel SAR within the study area (DFO 2019). No aquatic SAR are identified for the aquatic features within the study area, but Silver Shiner (*Notropis photogenus*) is noted for Sixteen Mile Creek, including Critical Habitat for the species. The aquatic features within the study area do, however, act as contributing habitat to Sixteen Mile Creek by way of the East Lisgar Branch. A single historic record of Redside Dace (*Clinostomus elongatus*) (1960), a species listed as

Endangered in Ontario (MECP 2019), was also noted for the East Lisgar Branch (AFW 2015). However, this watercourse and the aquatic features within the study area are not identified as SAR habitat (DFO 2019) and suitable habitat for the species was not observed during field surveys.

6.0 Natural Environment Significance and Sensitivity

Analysis of the significance of existing natural features 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 the road ROW preliminary design. The following summarizes significant and sensitive natural features and habitats present within the study area which represent constraints and were considered as part of the selection of a preferred alternative design for the proposed undertaking. Policy-based constraints were identified in accordance with the Peel Region and Mississauga OPs, and the conservation authority regulations and policies as summarized in Section 3.0. This assessment incorporates relevant findings from previous natural environment studies completed within the study area (e.g., AFW 2015) as well as supplementary field investigations completed by NRSI.

6.1 Significant Woodlands

The Region of Peel OP (2018) and the City of Mississauga OP (2020) does not specifically identify Significant Woodlands. Significant Woodland is considered a Core Area of the Region's Greenlands system, and is a form of the City's Significant Natural Areas. A review of woodland significance evaluation guidelines and criteria that are applicable to Peel Region and the City of Mississauga was completed for the Ninth Line Lands Subwatershed Study (AFW 2015). In particular, the City of Mississauga's Natural Heritage and Urban Forest Strategy Report (NSE and Beacon Environmental 2014) identified the following criteria for woodland significance:

- Any woodland containing cultural woodlands and plantations ≥4ha;
- Any woodland excluding cultural woodlands and plantations ≥2ha; or,
- Any woodland excluding cultural woodlands and plantations ≥0.5ha to 2ha,
    - with old growth characteristcs;
    - within 100m of another significant features (as defined in the Peel Region OP);
    - within 30m of a watercourse or evaluated wetland; or,
    - supporting significant species or communities*

* “significant species and communities” includes any G1, G2, G3, S1, S2 or S3 plant or animal species or community as designated by the Natural Heritage Information Centre (NSE and Beacon Environmental 2014; AFW 2015).

Based on these criteria, all woodlands within the Ninth Line Lands were considered significant (AFW 2015). Within the EA study area, this includes the following woodland communities as mapped in the subwatershed study:

- Fresh-Moist Sugar Maple-Hardwood Deciduous Forest (FOD6-5), located opposite Erin Centre Boulevard, immediately west of Ninth Line;
- Mineral Cultural Woodland/Fresh-Moist Green Ash-Hardwood Lowland Deciduous Forest complex (CUW1/FOD7-2), located opposite Osprey Boulevard, immediately west of Ninth Line;
- Fresh-Moist Sugar Maple-White Elm Deciduous Forest (FOD6-4), comprising three adjacent mapped units, south of Derry Road West and immediately west of Ninth Line.

Although the CUW1/FOD7-2 woodland was considered a Significant Woodland in the Subwatershed Study Phase 1 report (AFW 2015), it was not recommended for inclusion within the proposed Ninth Line Lands NHS as presented in the Phase 2 report. The area of Ninth Line Lands containing the CUW1/FOD7-2 woodland is identified as “medium density residential” in future land use plan mapping (AFW 2017). Although this coarse land use planning does not presuppose that the CUW1/FOD7-2 woodland will be removed through future land development applications (i.e., woodland protection measures will be considered as part of future site plan applications and EIS studies), the subwatershed study planning suggests that the CUW1/FOD7-2 woodland may not represent the same level of constraint as the other two Significant Woodland communities (FOD6-5 and FOD6-4) that were recommended for incorporation into the NHS.

No woodlands exist on lands to the immediate east of Ninth Line that could be impacted by the proposed undertaking. One additional woodland exists within the study area to the east of Ninth Line. However, this feature is located approximately 100m east of the ROW and therefore will not be negatively impacted by the undertaking. See Map 2 for Significant Woodlands located in the study area.

These woodland features represent a constraint to Ninth Line ROW upgrade planning and design, and should be preserved in their entirety. This includes the CUW1/FOD7-2 woodland which, although considered a lesser constraint than the FOD6-5 and FOD6-4 features, should also be protected to the extent feasible. If complete avoidance is not possible, footprint impacts should be minimized to the extent possible. The boundaries of these features will be delineated and confirmed during future woodland dripline surveys, in conjunction with the applicable review agencies (e.g., CVC), that will inform the Detailed Design of the undertaking.

6.2 Wetlands

Several wetland features were mapped within the Ninth Line Lands, some of which fall within the EA study area. No MNRF-mapped wetlands occur within the study area to the east of Ninth Line. No Provincially Significant Wetlands occur within the study area. However, the Ninth Line Corridor Study (NSE 2012) identified all wetlands within the Ninth Line Lands to be locally significant due to the scarcity of wetland cover within Mississauga (AFW 2015).

See Map 2 for the location of wetlands within the study area as mapped for the subwatershed study. The subwatershed study identified certain wetlands that should be retained as part of future development plans, which are associated with the East Lisgar Branch watercourse or are internal to a woodland (AFW 2015). None of these wetlands are located immediately adjacent to Ninth Line and will not be impacted. Other wetlands were to be considered on a case-by-case basis with respect to their significance and sensitivity, and whether measures such as compensation should be considered for any removals caused by development activities.

According to the City of Mississauga OP (2020) criteria for wetland significance, certain wetlands within the study area would be deemed significant due to their size being >0.5ha, as shown on Map 2. Within or immediately adjacent to the ROW, this only includes a Graminoid Mineral Meadow Marsh (MAM2) located opposite Doug Leavens Boulevard, whereas the other City-significant wetlands are further removed from the ROW and are less likely to be impacted. The Ninth Line Lands Scoped Subwatershed Study Phase 3 report recognizes that wetlands located east of the proposed Highway 407 transitway corridor (i.e., wetlands located immediately west of Ninth Line) will be isolated from other natural features and corridors, and will be affected by changes to local hydrology. It was recommended that more detailed assessments be completed to determine their existing and future form and function once the detailed design of the transitway is underway and more information is available on planned

developments east of the transitway. The ultimate extent of wetland removals will be determined based on these studies (Wood 2020).

Wetlands immediately west of Ninth Line that may be impacted by the undertaking comprise meadow marsh features that have originated from past land use activities, such as where they have formed along narrow agricultural drainage swales, or where surface water collects over relatively low-pervious soils in idle/former agricultural fields. These features have low levels of biological diversity and provide relatively poor quality wetland habitat. Nonetheless, it is recommended that wetland impacts be avoided in the design and construction of the planned road improvements to the extent feasible, with more emphasis on the retention of City-defined Significant Wetlands (Map 2). Impacts to these wetlands, and their surrounding regulated lands, are also prohibited unless permitted by Conservation Halton or the CVC. If localized impacts are unavoidable, as determined through the EA, these should be minimized to the extent possible. Appropriate mitigation measures would be required as part of future impact assessments completed during Detailed Design. An updated assessment of wetland presence, form and function will also be required based on future land development activities that may occur along the west side of Ninth Line by the time of Ninth Line Detailed Design planning. The boundaries of these features, within or adjacent to the ROW, are to be accurately delineated using the Ontario Wetland Evaluation System in conjunction with the applicable conservation authority during the Detailed Design stage.

6.3 Aquatic Features and Fish Habitat

The aquatic features within the study area (Map 2) consist of four non-regulated drainage features, which provide indirect fish habitat and one regulated watercourse (NLT-1), which provides direct fish habitat. Direct fish habitat is defined as spawning grounds and any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly in order to carry out their life processes. All aquatic features are highly impacted and primarily act to collect and convey stormwater from the developed lands east of Ninth Line west towards the East Lisgar Branch of Sixteen Mile Creek.

Drainage Feature A exists as a minor drainage feature that does not connect to a waterbody within or outside of the study area. Drainage Features B and C exhibit similar form and function and both act to convey flows from the developed lands east of Ninth Line to SWM facilities west of Ninth Line. These ponds outlet to the East Lisgar Branch but do not appear to be connected directly to features B and C east of Ninth Line. However, if fish are present within the SWM

ponds they could potentially access these features under high flow conditions through the existing double box culverts under Ninth Line. Drainage Feature D conveys flow directly to the East Lisgar Branch, but only provides marginal habitat as an intermittent/ephemeral feature. This feature begins at Ninth Line at a cross culvert and does not connect to any aquatic features east of the road.

Watercourse NLT-1 is the only regulated aquatic feature within the study area, which connects directly to the East Lisgar Branch. It provides direct fish habitat and acts as a corridor for fish movement between the East Lisgar Branch and the Osprey Marsh SWM complex. Under low flow conditions fish may have trouble navigating either the vegetated areas at the downstream extent of the concrete channel and/or the rip rap riffle section of the channel at the pond outlet, but under higher flow conditions fish are likely able to move between upstream and downstream habitats. However, under elevated flow conditions, high flow velocities within the concrete channel and at the control structure outlet may act to inhibit upstream fish movement. Watercourse NLT-1 is managed as warmwater fish habitat (Dunn 2006, AFW 2015, 2017) that exhibits low to moderate habitat sensitivity and provides some, but generally limited habitat function in its current state. The highly altered nature of the channel provides opportunities for restoration and enhancement (LGL 2020a), which could include re-alignment to a more natural, meandering channel form that incorporates pool and riffle sequences. This has been identified as an option through the Ninth Line Lands Scoped Subwatershed Study (AFW 2015, 2017) and Conceptual Fish Habitat Offsetting Plan (NRSI 2018) and is further discussed in section 9.0.

Sixteen Mile Creek is identified as SAR Occupied Habitat for Silver Shiner (DFO 2019, LGL 2020a), including Critical Habitat for the species. The East Lisgar Branch and the aquatic features within the study area are not included as SAR habitat, but do occur upstream of SAR Occupied habitat and contribute to it. Improvements and enhancements made to features within the study area would act to benefit the local fish community in addition to downstream resources, namely Sixteen Mile Creek.

Within the Mississauga OP, watercourses represent both a component of the natural heritage system as well as a form of natural hazard. Watercourses and their associated hazard lands and safety allowances are also regulated by the conservation authorities. Development and site alteration is prohibited within the regulated Watercourse NLT-1 unless permitted by Conservation Halton. In accordance with the policies described in Section 3.0, the planned Ninth Line infrastructure improvement works must be planned, designed and constructed such

that negative impacts are avoided or appropriately mitigated, and that upstream and downstream hazard conditions are not exacerbated by the undertaking.

As fish habitat, Watercourse NLT-1 falls under the protections of the federal *Fisheries Act*. Under the Act, actions that would cause the harmful alteration, disruption or destruction of fish habitat (HADD) are prohibited. Any activities that may cause HADD must first be assessed through the proponent-led self-assessment. If there is potential that the preferred alternative will cause HADD then the project will need to be submitted to DFO for a site-specific review to determine if a Fisheries Act Authorization is required.

6.4 Species at Risk

6.4.1 Confirmed Habitats

Based on previous field studies (AFW 2015, Savanta 2020, LGL 2020b) and supplementary surveys completed for the EA, three SAR have been confirmed within the study area: Barn Swallow, Bobolink, and Eastern Meadowlark.

Barn Swallow

Barn Swallow nesting habitat was confirmed through previous surveys as occurring within agricultural structures within the Ninth Line Lands that are well removed from the Ninth Line ROW (AFW 2015, Savanta 2020). These nesting structures will not be impacted by the road improvement works. The study area also contains foraging habitat for Barn Swallows that nest in the immediate vicinity. Barn Swallow foraging habitat that is located within 200m of a nest is defined as part of the general habitat for the species (MNRF undated a) and is protected by the ESA. However, the planned road improvement undertaking will have a negligible to no impact on available Barn Swallow foraging habitat in the vicinity. Impacts to Barn Swallow habitat are therefore not anticipated. Because impacts to Barn Swallow habitat are not anticipated, the habitat for this species is not considered a constraint and is not shown on Map 2. Nonetheless, due to the atypical but periodic occurrences of Barn Swallow nesting within culverts, inspections of these culverts for nesting evidence must be completed prior to culvert works or replacements.

Bobolink and Eastern Meadowlark

Bobolink and Eastern Meadowlark have been documented as breeding in large open field habitats within the Ninth Line Lands. The planned undertaking is not expected to have any impact on these breeding habitats due to the negligible amount of field edge that may be impacted along the ROW boundaries. Construction disturbances would be temporary and

should be designed to mitigate impact to the species. Mineral Cultural Meadow (CUM1) features that have been documented as habitat for breeding Bobolink and/or Eastern Meadowlark individuals (possible or probable breeding habitat), based on previous surveys and EA-stage surveys, are shown on Map 2.

6.4.2 Potential Habitat

Bat Species at Risk

Detailed surveys of potential bat roosting or maternity colony habitat have not been completed throughout the entirety of the study area to date. However, the woodlands that fall within the study area were previously noted as containing suitable habitat for bats due to the presence of several large tree snags (AFW 2015). These woodlands may therefore provide habitat for SAR bats. In particular, based on completion of a plot-based cavity tree assessment within the south study area FOD6-5 woodland, a density of >10 snags/ha were found, confirming the existence of suitable maternity roost habitat within this feature (AFW 2015) (see below regarding SWH).

Four potential bat habitat trees were identified within the study area which may provide suitable roosting habitat (Map 2). 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 municipal and conservation authority policies except where permitted or authorized by the MECP pursuant to the ESA.

Other Species at Risk Records

Appendix IX lists SAR that have occurrence records in the study area vicinity (up to 10km) based on review of background information sources. An assessment of habitat suitability was completed for these species based on a review of each species' habitat requirements (e.g., OMNR 2000) versus habitat availability within the study area as confirmed through site investigations. In addition to the SAR described above, one other SAR, Chimney Swift (*Chaetura pelagica*), was determined to have suitable habitat within the study area based on the presence of houses with chimneys immediately adjacent to the Ninth Line ROW. These generally comprised certain older houses on the west side of Ninth Line. However, the ESA-protected habitat for Chimney Swift comprises the human-made nesting structure itself (MNRF undated b). Houses within chimney structures are not anticipated to be impacted as part of the planned undertaking. Furthermore, no Chimney Swifts were observed during site

investigations. Therefore, no impacts to Chimneys Swifts or their habitat are expected. Suitable habitat for other SAR with occurrence records in the surrounding vicinity are considered absent (Appendix IX).

6.5 Significant Wildlife Habitat

An assessment of SWH was completed for the study area based on the results of previous natural environment studies undertaken within the study area as well as NRSI's supplementary field surveys for the Ninth Line EA. The SWH screening completed for the subwatershed study (AFW 2015) identified a number of Candidate SWH types for the Ninth Line Lands; of these, only SWH types that were considered applicable to the lands immediately adjacent to Ninth Line that may be impacted by the road improvement works were considered. Based on this assessment, one category of SWH was confirmed (Habitat for Special Concern and Rare Wildlife Species), while one category was considered Candidate SWH (Bat Maternity Colonies). See Appendix X for the complete SWH assessment tables.

6.5.1 Confirmed Significant Wildlife Habitat

Special Concern and Rare Wildlife Species – Eastern Wood-Pewee Habitat

Breeding habitat for the SCC Eastern Wood-Pewee was confirmed within the Fresh-Moist Sugar Maple-Hardwood Deciduous Forest (FOD6-5) during both the subwatershed studies field investigations (AFW 2015) as well as during the Ninth Line EA fieldwork. Breeding bird surveys completed for the property immediately south of the FOD6-5 woodland also recorded the presence of Eastern Wood-Pewee within this feature (Savanta 2020). These results provide strong evidence of a long-term recurring Eastern Wood-Pewee breeding territory within the woodland. Based on survey data, only one singing male has been recorded within the feature at a time. This is in line with the expectation that the FOD6-5 woodland would likely support a single breeding territory based on its size.

Breeding bird survey work completed for the Highway 407 Transitway in 2018/2019 (LGL 2020b) also identified the presence of Eastern Wood-Pewee within the northernmost unit of the Fresh-Moist Sugar Maple-White Elm Deciduous Forests (FOD6-4) at the north end of the study area, just south of Derry Road West (Map 2). Although Eastern Wood-Pewee was not recorded within this woodland during the Ninth Line EA fieldwork, nor was it recorded in this feature during subwatershed study surveys (AFW 2015), the 407 transitway fieldwork recorded this observation from the vantage point of a breeding bird point count station located near the

northwest end of the woodland. By contrast, the EA survey data was collected from a point count station situated on the east side of the feature. Due to road noise, it is possible that a singing Eastern Wood-Pewee located toward the west side of the feature may not have been detected from the east side point count station. Based on a precautionary approach, the northernmost FOD6-4 feature is considered confirmed habitat for the SCC Eastern Wood-Pewee.

6.5.2 Candidate Significant Wildlife Habitat

Bat Maternity Colonies

Candidate SWH for Bat Maternity Colonies was identified within the FOD6-5 woodland at the south end of the study area as part of the subwatershed study (AFW 2015). This conclusion was based on field surveys which confirmed a density of >10 snags/ha within the woodland, which meets a criterion to render the feature Candidate SWH (MNRF 2015). This woodland also represents Significant Woodland and confirmed SWH for Eastern Wood-Pewee. As stated above, direct impacts to this feature should be avoided. If tree removals along the woodland edge are unavoidable, MECP consultation will be required to determine appropriate actions in accordance with the ESA.

6.6 Regionally Significant Vegetation

A total of 17 regionally rare (Varga 2000) vegetation species were inventoried within the Ninth Line Lands during the subwatershed study, while 10 regionally rare species were identified during the Ninth Line Corridor Study (NSE 2012; AFW 2015). The specific locations of these plants were not mapped, so it cannot be confirmed whether any fall within or adjacent to the EA study area. The specific regionally rare vegetation species are listed in their respective reports.

As listed in Section 5.2.2, 10 regionally uncommon or rare vegetation species (Varga 2000) were inventoried during EA field surveys. These individuals were identified closer to the road and will therefore require consideration within the impact assessment and associated avoidance or mitigation measures.

While regionally rare vegetation species in and of themselves do not represent policy-based constraints to road design or construction, their presence renders additional significance to the features in which they are located. Measures should be taken to avoid impacts to regionally significant vegetation and to protect individual plants during construction where necessary. If

impacts cannot be avoided, the individual plants should be relocated to an appropriate site when feasible.

6.7 Ecological Linkages

The Ninth Line Corridor Study (NSE 2012) identified the potential for ecological connectivity between the Ninth Line Lands and two City of Mississauga Natural Area System features located east of Ninth Line: a woodland feature located south of Erin Centre Boulevard (identified in the study as CM9) and the Osprey Marsh SWM complex (identified as LS1). As stated in the Corridor Study, the CM9 woodland feature is effectively isolated from the Ninth Line Lands by existing residential development that occurs immediately east of Ninth Line. However, a direct connection between the Osprey Marsh SWM complex and the Ninth Line Lands exists via a culvert that directs flow from NLT-1 westwards under Ninth Line. General recommendations were made in the Corridor Study to improve the ecological connectivity between the existing natural features east of Ninth Line with the candidate natural areas identified for the Ninth Line Lands, where opportunities exist (NSE 2012). However, no specific recommendations were made with respect to connectivity enhancements that may be implemented within the Ninth Line ROW. No specific recommendations to enhance ecological connectivity to areas outside of the Ninth Line Lands were made in the Subwatershed Study Phase 1 report (AFW 2015).

The alignment of watercourse NLT-1 is recommended to be altered within the Ninth Line Lands to accommodate the planned Highway 407 transitway and to alleviate periodic flooding occurrences within the existing residential development to the east. However, the location of the watercourse crossing at Ninth Line, and thus the ROW linkage location, is not proposed to be relocated (AFW 2017). The realignment of NLT-1 within the Ninth Line Lands was identified as an opportunity to enhance both the aquatic habitat of the watercourse and the connectivity of the proposed Ninth Line Lands NHS with natural features to the east. Recommended enhancements to the watercourse corridor included incorporation of a natural meandering channel design with riffles and pools, with other microhabitats for aquatic species. The enhanced ecological corridor was anticipated to provide a more connected and resilient system of natural heritage features relative to the existing conditions (NRSI 2018). The Ninth Line ROW will represent a critical conduit for this ecological linkage, insofar as it allows for the safe passage of wildlife and minimization of wildlife road mortality. To ensure a continuous ecological linkage is maintained that is compatible with anticipated corridor enhancements to the west, it may be necessary to investigate opportunities for small to medium-sized wildlife crossings at the existing culvert crossing of NLT-1. This may include recommendations for

design features that allow for wildlife movements (e.g., dry shelves, dedicated terrestrial passage) as part of potential replacement or retrofitting of the existing culvert. Associated plans for directional fencing to direct wildlife into the passage will also be required during the Detailed Design stage, subject to agency consultation and site investigation.

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 transportation and transit, city building, natural heritage, socio-economic environment, cultural heritage, and engineering considerations. Within the Natural Heritage category, the following individual sub-criteria were included for evaluation:

- Minimizes Impact to and Enhances Provincially Significant Wetlands (PSW), Environmentally Sensitive Areas (ESA), and Areas of Natural and Scientific Interest (ANSI);
- Minimizes Impact to Wildlife, Vegetation, Aquatic Species and Habitat, and Species at Risk;
- Provides Drainage and Stormwater Management Improvements and Mitigates Erosion; and,
- Minimizes Effects on Climate Change.

The overall evaluation of alternative designs comprised two separate sub-evaluations. One sub-evaluation concerned the footprint of the proposed road widening:

- Alternative 1: Widen to the west
- Alternative 2: Widen about the centreline
- Alternative 3: Widen to the east

For the majority of the Natural Heritage criteria, none of these three alternatives resulted in any greater or lesser degree of impact, or were inapplicable (e.g., due to absence of PSWs, ESAs and ANSIs). However, from the perspective of Natural Heritage, the alternative to widen to the east was most preferred as it would allow for complete avoidance of direct impact to natural features located along the west side of Ninth Line. Widening to the west would require “minor” impacts to significant natural features, such as Significant Woodlands, SWH and wetlands, while widening about the centreline would require “moderate” impacts to these features. Both of Alternatives 1 and 2 were equally considered “less preferred” when all Natural Heritage criteria were considered.

Based on an evaluation of all criteria, the selected design alternative was Alternative 1: Widen to the west.

The other sub-evaluation concerned the types of active transportation facilities to be incorporated into the design, including the following:

- Alternative 1: On-street bike lanes with buffers, and sidewalks on both sides
- Alternative 2: Boulevard cycle tracks (separated from vehicular lanes) and sidewalks on both sides
- Alternative 3: Multi-use path (no additional bike lanes/cycle tracks or sidewalks)

In most cases, there was no difference among these alternatives with respect to the Natural Heritage criteria. However, Alternative 3 presented greater potential to reduce natural feature impacts due to a narrower-width multi-use trail footprint compared to the required widths of sidewalks and bike lanes associated with the other two alternatives. Nonetheless, all three alternatives were considered "preferred" when all Natural Heritage criteria were considered.

Based on an evaluation of all criteria, the selected design alternative was Alternative 2: Boulevard cycle tracks (separated from vehicular lanes) and sidewalks on both sides.

See Appendix XI for HDR's alternative design plan evaluation matrix tables.

These selected alternative designs were the basis of the Preliminary Design prepared and discussed in terms of impact potential further herein.

8.0 Impact Assessment

8.1 Description of Proposed Works

The planned road improvements will include a widening of Ninth Line along its west side within the study area limits to accommodate an expansion of the travelled road surface from two to four lanes. Both sides of the road will include a 2m wide sidewalk and a 2m wide cycle track. In various places, the sidewalk and cycle track on each side will be separated by a narrow landscape buffer containing street tree plantings. Intersection improvements and the addition of central medians are also incorporated into the design. The width of the ROW is proposed to be widened to accommodate the new transportation facilities.

The road profile will be reconstructed to an urban design with curb and gutter, from its current semi-rural design containing a combination of drainage ditches, ditch inlets, catchbasins and storm sewers. The overall drainage patterns and drainage locations will not be altered from existing conditions, with the exception of minor localized changes (HDR 2021). As described further below, the drainage and SWM plan associated with the Preliminary Design also includes the use of bioretention cells within the ROW as a means of Low Impact Development (LID) SWM measures to control runoff water quantity, quality, water balance and erosion protection.

8.2 Approach to Impact Assessment

The assessment of potential impacts was determined by comparing the details of the preferred Preliminary Design 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; and,
- 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.

8.3 Direct Impacts and Mitigations

8.3.1 Vegetation Removal and Site Grading

Terrestrial natural feature impacts are limited to the west side of Ninth Line, as lands to the east side are entirely built-up and urbanized. The majority of the natural features that will be directly impacted by the undertaking comprise passively regenerating and early successional Mineral Cultural Meadow (CUM1). These meadow features have largely resulted from former agricultural fields that have been left idle pending future land development approvals and construction of the Highway 407 transitway infrastructure. The CUM1 features to be impacted are relatively disturbed and generally comprise common pioneer vegetation species with a high proportion of non-native species growth.

The proposed undertaking will also require a direct impact to the three Significant Woodlands identified within the study area; these include the two Significant Woodlands (FOD6-5 and FOD6-4) that were proposed for inclusion within the Ninth Line Lands NHS (AFW 2017). The Preliminary Design has been developed with an aim to minimize the degree of impact on the FOD6-5 and FOD6-4 woodlands by minimizing the design width of the ROW infrastructure adjacent to these features. Specifically, the 2.45m spacing between the sidewalk and cycle track that is incorporated into the majority of the plan will be reduced to 2.0m adjacent to these woodlands. The 2.0m width is a minimum to maintain the utility zone; due to this narrower width, street trees are not proposed within these sections of the utility zone (P. Yip, HDR, pers. comm., February 2021).

In total, 0.535ha of Significant Woodland will require removal along their eastern edges to accommodate the proposed undertaking. Specifically, this comprises 0.01ha of removal from the FOD6-5 woodland (representing 2.2% of its total area), 0.12ha from the CUW1/FOD7-2 woodland (representing 8.9%), and 0.31 ha from the FOD6-4 woodlands (all three units collectively; representing 4.8%).

The proposed road works will also require encroachment into two wetland units, a Graminoid Mineral Meadow Marsh (MAM2) located opposite the Ninth Line intersection with Doug Leavens Boulevard (Maps 3l-m), and a small Cattail Mineral Shallow Marsh (MAS2-1) located along watercourse NLT-1 on the west side of Ninth Line (Map 3i). An area of MAM2 eastern fringe totaling 0.07ha (6.5% of its total area) will require removal for infrastructure widening. However, as stated for the CUM1 communities, this MAM2 feature is of relatively low ecological quality. This is especially true for the portion of the wetland immediately abutting the Ninth Line ROW

that will be directly impacted, as this area is occupied by disturbance-tolerant and ecologically generalist species. The planned extension of the NLT-1 culvert will require an encroachment footprint of approximately 15m^2 into the MAS2-1 wetland. This footprint area is associated with the culvert itself; the total limits of construction disturbance within the wetland will be determined during Detailed Design (P. Yip, HDR, pers. comm., June 2021). Other wetlands identified within the study area are not expected to be directly impacted based on the Preliminary Design. Wetlands located along the west side of Ninth Line, outside of woodland features, were anticipated by the subwatershed study to be removed as part of future land developments (AFW 2017) and will be more than compensated for within the proposed Ninth Line Lands NHS. In addition, the planned realignment for NLT-1 within the Ninth Line Lands will incorporate created wetland features as part of an enhanced riparian corridor connecting with lands to the east of Ninth Line via the Osprey Marsh SWM complex (AFW 2017).

Once the Ninth Line Lands NHS is implemented, wetland coverage within the lands will increase to 39ha from the existing 24ha, while woodland land cover will increase to 30ha from the existing 19ha (Wood 2020). The ecological quality and functionality of the wetlands in particular will be superior to the existing features once fully established. However, depending on the road construction timing in relation to creation of the Ninth Line Lands NHS, compensation for direct removal of Significant Woodland and wetland features may be implemented on City-owned lands. Detailed area-based compensation requirements, and specific and suitable compensation locations, will be determined in consultation with City staff and Conservation Halton.

Tree removals associated with woodland edge impacts, as well as to address study area tree removals located outside of woodlands, are to be compensated for according to the CVC's Ecological Offsetting Guidelines (CVC 2020b), where removals occur with the CVC's jurisdiction. Tree removals must be compensated for at a 3:1 ratio within Conservation Halton's regulation limit (Conservation Halton 2021). Compensation plantings should be established within the ROW, as part of the streetscaping design, to the extent feasible. It is anticipated that any additional compensation requirements can be accommodated within the planned Ninth Line Lands NHS and/or within other City-owned lands as stated above.

Management of the newly created/disturbed woodland edges following road works is recommended to include native vegetation restoration plantings, invasive species management, and other measures as directed by an Edge Management Plan as described further in Section

9.0. The Edge Management Plan should also address wetland features requiring restoration of areas impacted by road works. However, because wetlands located west of Ninth Line, outside of woodland features, were anticipated to be removed due to future land use changes and the NLT-1 watercourse realignment in the subwatershed study, it is recommended that restoration measures within these features focus on immediate mitigative actions such as soil stabilization of disturbed/graded areas through native seed mix application. Ecological enhancements of these wetland edges, such as through establishment of woody vegetation plantings and invasive species management, should only be implemented where considered worthwhile based on agency consultation during the Detailed Design stage. It is recommended that encroachments into these woodland and wetland features be reduced through the Detailed Design stage.

No federally or provincially significant vegetation species will be impacted by the proposed road widening. However, grading requirements may require removal of some of the regionally-significant vegetation species listed in Section 5.2.2. Measures should be taken to avoid impacts to regionally significant vegetation and to protect individual plants during construction where necessary. If impacts cannot be avoided, the individual plants should be relocated to an appropriate site when feasible. Alternately, seed can be collected from the plants to be impacted and re-distributed within areas of suitable habitat outside of anticipated future construction or land development zones.

Tree Removal

Of the 983 trees inventoried, 658 are anticipated to be removed. Of the 658 anticipated to be removed, 7 are recommended for removal as a result of their condition and position which may pose a public hazard.

The remaining 651 trees are anticipated to be removed based on the extent of the proposed construction and site grading. Many of these are in direct conflict with the proposed road reconstruction and construction of pedestrian/cyclist infrastructure and utility corridors. Trees situated along the grading limit or in close proximity that may incur severe root damage as a result of grading have also been recommended for removal. Most of the trees anticipated to be removed based on the extent of the proposal are in good to fair health with an improbable potential for structural failure, and range in size from 10.0cm DBH to 122.8cm DBH.

As described in the TPP, the tree removal analysis completed for this assignment accounts for trees within the Ninth Line ROW as well as adjacent trees with crowns overlapping the ROW limits. Trees within and adjacent to the ROWs of intersecting roads were also inventoried where they might be impacted by the undertaking. Based on the Preliminary Design, which requires an expanded ROW and grading limits that extend outside of the existing ROW, it is anticipated that additional trees that were not inventoried will also require removal. It is recommended that these additional trees be inventoried and assessed as part of a supplementary tree inventory to be completed during the Detailed Design stage. See above for general comments about anticipated impacts to the woodland edge zones.

Recommendations have been provided in the TPP to protect trees to be retained through the use of tree protection fencing. Recommended measures have also been provided in the TPP 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, at least 1,029 trees are to be planted in compensation for tree removal requirements. This total includes compensation for tree removals along the woodland edges that were inventoried. This is a minimum requirement, recognizing that additional un-inventoried trees may also require compensation as described above. The total number of tree compensation plantings will be determined during the Detailed Design stage. Confirmation of tree compensation requirements must also account for conservation authority tree compensation guidelines (e.g., compensation requirements according to CVC 2020b; a 3:1 tree compensation requirement within the Conservation Halton jurisdiction). For each of the CVC and Conservation Halton regulated areas, the greater of the conservation authority vs City guideline-based tree compensation requirements will apply.

These compensation plantings are to be accommodated within the Ninth Line ROW and/or in replacement of trees or other vegetation requiring removal within the City landscape planting easements, to the extent feasible. Compensation planting details will be provided within a future Landscape Plan to be provided during the Detailed Design stage. As stated above, compensation plantings that cannot be accommodated within the ROW can also be considered for incorporation into the planned Ninth Line Lands NHS and/or other City-owned lands. See the TPP (NRSI 2021) for additional details of the tree removal, protection, and mitigation requirements.

8.3.2 Impacts to Terrestrial Wildlife and their Habitats

Bobolink and Eastern Meadowlark Habitat

The proposed undertaking will require a minor encroachment into CUM1 features that have been identified as Bobolink and/or Eastern Meadowlark habitat (Map 3). Altogether, a total of 0.90ha of mapped habitat will require removal along the length of Ninth Line. Functionally, however, these areas to be impacted adjacent to the ROW do not represent important habitat. Bobolinks tend to nest more centrally within habitat patches (McCracken et al. 2013). While Eastern Meadowlarks do nest closer to field edges and use perches within these areas, it is less likely that Eastern Meadowlark would establish nests immediately adjacent to the Ninth Line ROW (due to heavy vehicular use and associated noise and visual disturbances) relative to the expansive areas of suitable habitat within the CUM1 features located further away from the ROW. Furthermore, the area of habitat removal is negligible relative to the amount of suitable habitat located within the Ninth Line Lands (representing 2.4% of the habitat area shown on Map 2). Negative habitat impacts to Bobolink and Eastern Meadowlark are therefore not anticipated. However, as stated below, site alteration and grading must be completed outside of the bird nesting period to avoid impacts to individuals of these species and their nests.

Species at Risk Bats and Bat Maternity Colonies Candidate Significant Wildlife Habitat

Of the four potential bat habitat trees inventoried within the study area, three are anticipated to require removal based on the preliminary design (Trees A, C and D as shown on Map 2, which correspond to tree inventory IDs #755, 845 and 893, respectively (NRSI 2021)). 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 Trees A and D 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 (67cm DBH and 85cm DBH for Trees A and D, respectively) trees in fair condition. However, both of these trees were assessed as having a “possible” potential for structural failure (NRSI 2021), so will require an updated assessment by a Certified Arborist during the Detailed Design stage. Tree C is a dead tree and will require removal for public safety reasons. If it is determined through detailed design that Trees A and D 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. Consultation with the MECP's Species at Risk Branch must be completed by contacting SAROntario@ontario.ca.

As stated above, the proposed road construction work will require encroachment into the eastern edge of the FOD6-5 woodland, which has been confirmed as Candidate SWH for Bat Maternity Colonies due the density of suitable snags/cavity trees (AFW 2015). It is recommended that additional measures be considered during the Detailed Design stage to avoid impacts to the FOD6-5 woodland if feasible. If tree removals along the woodland edge are unavoidable, MECP consultation will be required to determine appropriate actions in accordance with the ESA. At a minimum, to avoid injury or mortality to bats, and in combination with requirements to avoid contravention of the *Migratory Birds Convention Act* (MBCA; see below) trees within the FOD6-5 woodland should be removed outside of the period April 1-October 31. It is recommended that tree removals within the CUW1/FOD7-2 and FOD6-4 woodland edges, as well as Potential Bat Habitat Trees A, C and D, also be removed outside of this period as a precautionary measure to avoid potential injury or mortality of bat SAR.

Eastern Wood-Pewee Significant Wildlife Habitat

Road reconstruction works will require a narrow encroachment into the FOD6-5 and FOD6-4 Significant Woodland features that have been identified as SWH for Eastern Wood-Pewee. As stated above, the road design has been developed such that direct impacts have been minimized within these features while accommodating the preferred ROW design elements (e.g., sidewalk, cycling track). Eastern Wood-Pewees predominantly make use of intermediate-age to mature deciduous and mixed forests having a relatively open understorey. This species makes use of woodland edge habitats in proximity to its nest area for foraging purposes, and tends to select breeding territories with fewer pines (COSEWIC 2012). During the site visits in which Eastern Wood-Pewee was detected within the FOD6-5 woodland, the singing male was located interior within the woodland and at no time was observed near the eastern woodland edge that will be removed. Within the FOD6-4 woodland unit south of Derry Road West, Eastern Wood-Pewee was only recorded from a breeding bird station on the northwest side of the feature and was not recorded within the east end that will be impacted. The relatively small areas of woodland edge to be removed within these features, relative to their overall size, are not expected to negatively impact the quality of the woodland as breeding habitat for the species. Eastern Wood-Pewee is expected to maintain breeding territories within each of these features post-construction. The greatest potential for impact to the species is likely to arise from

construction-stage disturbances. These can be mitigated by avoiding any vegetation removal or grading activity within the bird nesting period as discussed below. As a species relatively tolerant of adjacent human occupied landscapes, it is expected that Eastern Wood-Pewee will persist within these woodlands during the construction period of the road improvements since they generally occupy portions of the woodland more removed from the road.

Other Wildlife Species

Most 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 these local wildlife species or populations.

The road improvement works will require a widening of the existing ROW and grading limits that extend into some of the adjacent natural features along the west side of Ninth Line. Affected habitats include woodland edge and a small area of meadow marsh wetland that support wildlife species adapted to those features types, whose populations are more localized on the heavily urbanized (to the east) and agriculture-dominant (to the west) landscape. However, construction footprint impacts within woodland and wetland features will be negligible in terms of their overall sizes, and the road infrastructure widening itself is not anticipated to render these habitat areas unsuitable to the woodland- and wetland-dependent species. Short-term disturbances to these species may occur during construction. See Section 8.4.1 for further discussion and appropriate mitigations associated with this.

It should be noted that, with the exception of the FOD6-5 and FOD6-4 woodlands that will be retained, the cultural meadows, meadow marsh/shallow marsh and wooded natural features located immediately west of Ninth Line (east of the proposed transitway) may be removed subject to future site-level land development applications, EIS studies and planning approvals. However, the proposed NHS to be created within the Ninth Line Lands is intended to more than offset the loss of these natural features, which provide relatively low levels of biodiversity and wildlife habitat value (AFW 2017).

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. Where SAR bat considerations are required, this window should be extended to April 1-October 31 (see above). The destruction of migratory birds and their nests is prohibited under the federal MBCA.

Ecological Linkages

As described in Section 6.7, the study area contains one functional ecological linkage between the Ninth Line Lands and lands to the east, via the NLT-1 watercourse culvert crossing under Ninth Line. The NLT-1 linkage at Ninth Line was recognized in the subwatershed study as an important ecological connection to the Osprey Marsh SWM complex and natural features further upstream, and was incorporated into NHS planning for the lands (AFW 2017). The location of the NLT-1 crossing at Ninth Line will not change as a result of the proposed road improvements. Consequently, this linkage location will be maintained. Habitat connectivity and movement functions will be maintained, as the culvert sizing will not be reduced, and physical barriers will not be introduced (e.g., perched culverts, trash racks at culvert openings). The planned culvert extensions for NLT-1 will incorporate an openness ratio of 0.38 for each of the three cells, exceeding the minimum value of 0.1 to convey wildlife passage up to medium-sized mammals. The extended culvert cells will each feature dimensions of 7.0m and 2.4m in width and height, respectively, which exceed the minimum values of 1m for each to allow passage for up to medium-sized mammals (Conservation Halton 2018). However, the proposed works provide the opportunity to improve the design of the watercourse channel and culvert infrastructure within the ROW such that fish and terrestrial wildlife movement opportunities are improved.

As part of the culvert extension works, the culvert infrastructure conveying NLT-1 will be retrofitted to incorporate a dry shelf to allow terrestrial wildlife movement opportunities for at least the majority of the year. The dry shelf/dry bench has been incorporated into the Preliminary Design drawings for the culvert extension works. Other opportunities for enhancement of the watercourse channel and culvert infrastructure should be explored during the Detailed Design stage to improve their functionality for wildlife movements and to improve fish habitat. For example, plans for fencing to direct wildlife into the culverts will also be required during the Detailed Design stage, subject to agency consultation and site investigation. Specific recommendations with respect to the placement of appropriate substrates and cover features (e.g., logs, rocks, woody debris; low-growing vegetation at the culvert openings) will also be provided during the Detailed Design stage. See Section 9.0 for restoration and

enhancement recommendations for the NLT-1 watercourse at the ROW to improve the aquatic habitat value at this location.

8.3.3 Impacts to Fish and Aquatic Habitats

As described in section 6.3, Watercourse NLT-1 is the only aquatic feature within the study area that provides suitable, albeit limited, direct fish habitat and provides connection between fish habitat upstream and downstream from Ninth Line. Under its current state the existing culvert structure over Watercourse NLT-1 also facilitates the flow of water and nutrients from upstream to downstream. Proposed works associated with Ninth Line at this crossing include the widening of the road by 5m on either side to accommodate for active transportation. The existing triple-cell cast-in-place concrete box culvert will also require extension to accommodate the road widening, to 32.1 (HDR 2021). Based on the extent of the proposed work and the current condition of the watercourse, it is expected that a HADD of fish habitat can be avoided. However, due to the potential need for in-water work and channel adjustments, it is recommended that a DFO self-assessment be conducted with the potential requirement of a Request for Review to be submitted to DFO for approval.

Based on the proposed roadway alignment, the existing outlet from the Osprey March (Watercourse NLT-1) is proposed to be re-aligned within the Ninth Line Lands. However, the location of the watercourse crossing within the Ninth Line ROW will not change as a result of this future watercourse realignment work.

In-water works must consider the potential direct impacts to fish within Watercourse NLT-1 during construction. If in-water works are required, a fish salvage should be conducted by a qualified biologist to prevent death of fish. A *Licence to Collect Fish* must be obtained from the MNRF prior to the fish salvage being completed. Construction should also aim to maintain flow from upstream to downstream within Watercourse NLT-1 over the course of in-water works.

Opportunities for enhancement of the watercourse channel and culvert infrastructure should be explored during the Detailed Design stage to improve their functionality to improve fish habitat. See Section 9.0 for restoration and enhancement recommendations for the NLT-1 watercourse at the ROW to improve the aquatic habitat value at this location.

As recommended within the Scoped Subwatershed Study (AFW 2015, 2017), the function of ephemeral drainage features that act as contributing habitat and support downstream fish habitat should be maintained and replicated through enhanced lot level conveyance measures.

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 areas west of Ninth Line. The majority of natural or naturalizing land cover west of the road comprises cultural meadow that is relatively resilient to temporary construction disturbances. However, additional efforts will be necessary to minimize construction impacts on adjacent woodland and wetland features.

Actions should be taken 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 TPP. Tree protection fencing will take the form of 1200mm high heavy-duty orange snow fence secured to steel t-bar stakes following the specifications outlined in the TPP. Where silt fencing for ESC measures is required but not tree protection fencing, silt fencing may be used as a form of construction limit demarcation.

Measures have been recommended in the TPP to protect retained trees through the installation of appropriate tree protection fencing as detailed on Map 2 of the TPP. Prior to any construction activities (rough grading, vegetation and tree removal), the tree protection fencing should be installed where directed in the TPP to accommodate tree protection zones in accordance with City guidelines. Otherwise, fencing should be installed at least at the dripline of tree canopies to the extent possible to mitigate root zone impacts. 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. See the TPP (NRSI 2021) 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.

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.

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 Ninth Line and to the East Lisgar Branch via the drainage features and Watercourse NLT-1, 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. Sedimentation to Watercourse NLT-1 and the East Lisgar Branch must also be considered, and mitigated appropriately to prevent impacts fish and fish habitat.

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-slope of construction zones and may receive sediment-laden runoff;
- Timing of construction activities to occur during dry periods, where possible;
- 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.

Disturbances to watercourse riparian vegetation must be avoided or minimized during construction. If riparian vegetation is disturbed or removed or disturbed, ESC measures such as silt fences, rock check flow dams and sedimentation ponds should be utilized to protect downstream receivers. These measures must be maintained during construction until the site is stabilized with seed and mulch (HDR 2021).

8.4.3 Water Quantity Control

No significant changes to the stormwater drainage patterns within the EA study area will occur as a result of the proposed road improvements. Stormwater will continue to drain toward Drainage Features B and C, Watercourse NLT-1, and the existing storm sewer network as currently occurs. See the Drainage and Stormwater Management Report (HDR 2021) for details of the existing and proposed study area drainage system.

The proposed widening of the road infrastructure (e.g., increase from two to four lanes, addition of sidewalks and cycle tracks) will increase the amount of impervious surface in the study area by 7.19ha. Unless appropriately mitigated, this increase in impervious surface will result in less overall infiltration of stormwater and increases in stormwater runoff into aquatic receivers. This can in turn result in erosion and sedimentation impacts and associated water quality

degradation. As the sole regulated watercourse feature within the study area, post-development peak flows that discharge to NLT-1 must be controlled to the pre-development rate for the full range of storm events, in accordance with Conservation Halton requirements (HDR 2021).

Various measures are proposed to control runoff flow rates and volume discharges into the receiving watercourse and drainage features. This will include the use of pervious surfaces (e.g., grass, permeable pavement) within the boulevard and median areas outside of the active transportation facilities to minimize impervious surfaces within the ROW. This will also include the use of bioretention cells as a form of LID stormwater management within the ROW. The bioretention cells will comprise subsurface modular units constructed as a trench and filled with lightly compacted soil and planted with street trees as part of the ROW landscape design. The trench will contain a medium of sand, fines and organic material to support the vegetation. A perforated underdrain distribution pipe will be incorporated into a granular layer for soils with low infiltration rates and will direct excess runoff to the existing storm sewer system. The bioretention cells will effectively function to capture and store runoff, promote evapotranspiration via the rooted street trees, filter out suspended particulates through the soil medium and root zone flow, and provide extended detention and reduced flow velocities (HDR 2021).

The bioretention cells have been designed, such as in terms of their numbers, sizes and locations, to meet regulatory requirements for water balance and runoff storage, flow control and erosion control. The cells will be located where runoff discharges directly into a watercourse or drainage feature. See the Drainage and Stormwater Management Report (HDR 2021) for additional details about the proposed bioretention cell LID features.

Other LID measures to control water flow velocities, erosion potential and water quality will be considered during the Detailed Design stage based on the assessed feasibility. These may include the use of infiltration trenches, or vegetated filter strips and plunge pools (HDR 2021).

8.4.4 Water Quality Control

The LID bioretention measures described above will also function to treat stormwater runoff to an “Enhanced” level of water quality (80% Total Suspended Solids removal). It is recommended that stormwater directed toward the bioretention cells be pre-treated through the use of catchbasin inserts (e.g., CB Shield) (HDR 2021). The bioretention cells were designed to treat pavement areas that are equivalent to the total increase in pavement area along the Ninth

Line corridor within the subcatchments where the existing pavement area is already being treated by the existing SWM ponds west of the road. In the other subcatchments, the cells are sized to treat runoff from the total paved area to meet the total increase in pavement area within the project limits (HDR 2021). Altogether, a total of 7.81ha of pavement will receive water quality treatment, exceeding the 7.19ha of treatment that is required according to regulatory requirements (HDR 2021).

Where runoff catchment areas are less than 2ha, oil-grit separator (OGS) units are also proposed as a means of water quality control. In order to achieve an "Enhanced" level of treatment, the OGS units will be located in series with additional water quality mitigation measures, such as the use of catchbasin inserts. The design of the water quality treatment system will be further refined during the Detailed Design stage.

Indirect impacts may also occur through faulty construction equipment. Machinery should arrive on site in clean condition and is to be checked and maintained free of fluid leaks. A Spill Response Plan (SRP) should be developed prior to commencement of construction if there is the potential for deleterious substance leaks during construction. This SRP should provide a detailed response system to deal with events such as the release of petroleum, oils and lubricants or other hazardous liquids and chemicals. A spill kit must also be kept on site at all times and on-site workers must be trained in the use of this kit and be fully aware of the SRP.

Indirect water quality impacts should be considered during the Detailed Design stage regarding the potential to negatively impact the existing water quality within the study area. Use of salt during winter should be minimized, or alternatives to road salt should be used to avoid water contamination. A Salt Management Plan should be prepared during Detailed Design.

8.5 Induced Impacts

Induced impacts may occur where public use of the reconstructed Ninth Line ROW causes human-induced disturbances or stresses on adjacent natural features or existing ecological functions. For road reconstruction projects, including for the Ninth Line 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 cycling lanes. 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 Human Encroachment and Wildlife Movement Disturbances

Future land use mapping for the Ninth Line Lands between the planned transitway and Ninth Line has identified that the FOD6-5 and FOD6-4 woodlands and the existing NLT-1 watercourse crossing will be maintained while the lands surrounding the SWM ponds located between Drainage Features B and C will be restored with meadow, woodland and wetland vegetation (Wood 2020). Of these features, it is anticipated that the FOD6-4 woodlands will continue to be lined with permanent fencing along their boundary with the ROW, as currently occurs, and that permanent fencing will also be established along the SWM block where it abuts the ROW to prevent unauthorized public access. Human encroachment impacts into these features are therefore not anticipated.

Of the other features, the FOD6-5 woodland is most susceptible and sensitive to human encroachment impacts. Evidence of human use of this woodland was observed during site investigations where ad hoc pathways into the feature from the Ninth Line roadside were seen. However, evidence of widespread human disturbance within the feature was not seen. Nonetheless, it is recommended that a permanent fence (e.g., chain-link) be installed along the ROW boundary facing this woodland as a means of inhibiting future human encroachment impacts, since this City-owned woodland is not intended to be a public-access feature (e.g, by providing formal trails or signage). Installation of a permanent fence is expected to effectively inhibit public access into the feature and the associated ecological disturbances that can arise (e.g., vegetation trampling through path formation, garbage and debris dumping, facilitation of non-native/invasive species growth and proliferation).

The FOD6-5 woodland does not provide a land-based ecological linkage to natural features to the east of Ninth Line since those lands are entirely developed for residential land uses. Nonetheless, a permanent fence as recommended above can also function to inhibit wildlife access from the woodland onto the road. The installation of a permanent fence will therefore

not sever an existing ecological linkage, but will mitigate road mortality impacts and motorist hazards (due to potential deer crossings).

The fencing should be designed to inhibit crossing by both deer and small-sized mammals as well as reptiles and amphibians. The fencing should comprise 2.8m tall galvanized steel chain-link with the bottom buried 20-40cm to prevent tunnelling underneath. It should extend the length of the woodland facing the ROW. In order to inhibit small mammal, reptile and amphibian movement, a smooth, flat barrier material (e.g., vinyl) or hardware cloth with ¼-inch mesh or less should be fastened to the bottom of the chain-link. This material should be at least 1m high and be buried 10-20cm deep. The ends of this material should extend beyond either end of the chain-link fence to curve back on itself, within the feature edge, to inhibit small animal movement around the fence-ends. These portions of curved fence-ends will need to be self-supported with permanent stakes or posts. Details of this fencing are to be confirmed during the Detailed Design stage in consultation with City and CVC staff, and in accordance with the CVC's Fish and Wildlife Crossing Guidelines (CVC 2017).

See Section 8.3.2 for discussion about the maintenance and enhancement of wildlife movement along the NLT-1 watercourse corridor crossing.

9.0 Ecological Restoration and Enhancement

The preferred Preliminary Design of the road improvements will require encroachment into natural feature edges along the west side of Ninth Line. Restoration of these disturbed feature edges will therefore be necessary to mitigate the associated negative effects, such as the colonization and spread of non-native/invasive species, erosion of disturbed soils, and increases in negative edge effects within woodlands. The road reconstruction also affords the opportunity to enhance the natural feature edges that will be retained. Based on the proposed land use plan for the lands east of the transitway and west of Ninth Line, only the FOD6-5 and FOD6-4 woodlands and the NLT-1 watercourse crossing are identified for retention within the Ninth Line Lands NHS. Additional meadow, wetland and woodland features are proposed for creation around the SWM ponds located between Drainage Features B and C (Wood 2020), but it is assumed that these will not be created until after road reconstruction activities. It is therefore recommended that ecological enhancements focus on features to be incorporated into the NHS, while restoration measures elsewhere within the study area emphasize mitigative actions such as soil stabilization of disturbed/graded areas through native seed mix application.

A Restoration Planting Plan (RPP) should be prepared during the Detailed Design stage to direct the species types, locations, quantities, and other parameters associated with all restoration and enhancement zones within the study area. The RPP should address all areas of construction disturbance into natural and naturalizing areas west of Ninth Line as well as the NLT-1 watercourse within the ROW. At a minimum, disturbed areas should be stabilized with an appropriate nurse cover crop (e.g., Annual Oats) supplemented with or followed by an application of native seed mix appropriate to the location. Seed mix selection and application rates must meet City and/or conservation authority guidelines where applicable.

Treatment of the new woodland edges should be prescribed within the RPP and include management techniques to prevent and protect the retained woodland from further impacts. This can include activities such as selective tree removal, pruning, pre-stressing and interplanting and should be designed by a qualified professional. Native woody vegetation plantings should also be established along the new created edges of the FOD6-5 and FOD6-4 woodlands, in accordance with the RPP. These plantings should be reflective of the existing species assemblage within the woodlands, be suitable to the site conditions (e.g., accounting for sunlight exposure and soil conditions) and should comprise species native to Peel and Halton Regions. Coordination with the owner(s) of the adjacent property(ies) containing the FOD6-4

woodlands may be required, whereas the City owns the FOD6-5 woodland. Special consideration should be made for restoration species that are tolerant of harsh roadside conditions, such as species that are hardy to the effects of road salt spray and pollution. The RPP should be compatible with and reflective of any applicable restoration and enhancement recommendations made in the Phase 3 Subwatershed Study (Implementation and Monitoring) (Wood 2020).

An updated assessment of non-native/invasive species growth within the natural features to be restored (e.g., within the woodland edge areas) should be undertaken during the Detailed Design stage. Based on these results, an Invasive Species Management Plan targeted to the non-native/invasive species at issue should be developed and incorporated into the RPP.

The feasibility of transplanting or salvaging regionally rare plants or seeds from the impacted areas should be considered and included in the RPP.

The recommendations described above will be compiled and described within an Edge Management Plan, which will guide the implementation of all required natural feature edge restoration activities including planting installations, maintenance and monitoring. The Edge Management Plan will also incorporate the Invasive Species Management Plan, any requirements for significant species relocations, disturbance inspections, and any other required edge management measures.

The planned undertaking also provides the opportunity to establish a diverse assemblage of tree plantings within the study area ROW, including species that are less susceptible to road salt and pollution toxicity effects. Opportunities to establish a variety of native woody species, suitable to the urban planting conditions, will also be afforded for the adjacent landscape easements through re-establishment of individuals that required removal to accommodate construction activities. These ROW and landscape easement plantings are expected to contribute toward the compensation requirements for anticipated tree removals as recommended in the TPP (NRSI 2021). ROW plantings, including the requirements for tree compensation, will be detailed in a future Landscape Planting Plan and/or RPP to be prepared during the Detailed Designs stage.

Watercourse NLT-1, in its current state, offers limited fish habitat and provides opportunities for restoration and enhancement by naturalizing the highly altered concrete channel and its associated floodplain. Restoration activities may focus on replacing the straightened, concrete

channel with a more natural, meandering form and incorporating riffle-pool sequences across its length to provide a more heterogenous habitat. Restoration of the watercourse within the ROW will be planned based on Natural Channel Design principles based on fluvial geomorphology recommendations. Bank and riparian plantings should include a variety of species that will overhang the channel to provide additional forage to the watercourse in the form of terrestrial insects, and also to provide additional shading. These recommendations will enhance the overall form and function of Watercourse NTL-1 and are in line with recommendations provided within the Scoped Subwatershed Study for the adjacent Ninth Line lands (AFW 2015, 2017) and the associated Conceptual Fish Habitat Offsetting Plan (NRSI 2018). Proposed re-alignments to the watercourse also provide an opportunity to improve connectivity with the Osprey Marsh since the pond outlet currently provides a limited connection. Based on the Scoped Subwatershed Study, Watercourse NLT-1 and its corridor will be protected and incorporated in to the proposed NHS. Overall, the proposed enhancements will provide higher quality fish habitat within Watercourse NLT-1 and should improve the water quality and the flow of nutrients to the East Lisgar Branch.

10.0 Monitoring

Monitoring tasks associated with the road improvement undertaking have been recommended with regard for the monitoring strategy that has been developed for the adjacent Ninth Line Lands to ensure consistency, integration, and data compatibility. A Monitoring Plan has been developed for the Ninth Line Lands as described in the Phase 3 Scoped Subwatershed Study (Wood 2020), and further detailed in the CEIIS Terms of Reference (NRSI 2020). The Monitoring Plan incorporates a multi-disciplinary suite of monitoring objectives and methodologies, including Aquatic and Terrestrial Ecology, as well as related categories such as Water Quality. An important aspect of the Monitoring Plan is that it follows an adaptive management framework, such that monitoring data is continuously reported and reviewed by regulatory agency staff and that mitigative or remedial actions are taken when warranted in a timely manner. The components, methodologies and timing considerations of the Monitoring Plan would itself be continually under review based on these results. A Monitoring Plan prepared specifically for the purposes of the Ninth Line road improvement works should be prepared in consultation with the City, Conservation Halton and CVC during the Detailed Design stage, and should apply the applicable components of the Ninth Line Lands Monitoring Plan (Wood 2020, NRSI 2020) where appropriate.

Recommended monitoring measures include those summarized below, subject to agency consultation and additional natural heritage information collected during the Detailed Design stage. Recommended monitoring tasks associated with this undertaking are primarily grouped into three categories: (a) compliance monitoring associated with the effective functioning of construction mitigation measures, (b) water quality monitoring of the NLT-1 to ensure relevant quality criteria are not being exceeded, and (c) monitoring of terrestrial and aquatic restoration areas to ensure these features are successfully establishing as intended.

10.1 Construction-Stage Compliance Monitoring

10.1.1 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 feature 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.

10.1.2 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, and is to be undertaken by the environmental monitor.

- 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 adjacent natural features, 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 areas.
- Storage of machinery and material, fill, etc. in designated areas away from the adjacent natural features.

10.1.3 Water Quality Monitoring

A water quality monitoring program should be planned and implemented in accordance with the recommendations of the subwatershed study and the CEIIS (Wood 2020, NRSI 2020). This is required to ensure that water quality control measures are functioning as intended. Water quality monitoring should be completed in Watercourse NLT-1 to ensure that road runoff-borne pollutants are not entering the watercourse and thereby degrading the quality of the created aquatic habitat within the reconstructed channel immediately downstream. Monitoring should be completed during and post-construction, and should be compared with pre-construction data (either through new surveys or based on existing information) that uses the same methodology and sampling locations as during- and post-construction periods. Water quality monitoring parameters, duration and timing described in the subwatershed study should be reviewed as part of monitoring plan confirmation with agency staff during the Detailed Design stage.

10.1.4 Vegetative and Habitat Restoration Inspections

Inspections of restoration plantings and seeded areas should be completed to ensure survival and healthy establishment. The objective of this monitoring should be to validate that the intended ecological condition (e.g., restored woodland edge, restored meadow) is being achieved. This is expecting that some die-back of vegetation will occur due to a variety of

causes (e.g., wildlife browsing). Remedial actions should be identified for implementation if/when necessary, such as efforts to reduce competition from adjacent vegetation (e.g., cutting back overcrowding vegetation, removing non-native growth), or installing new replacement plantings. A component of this monitoring will include inspection of the restored aquatic habitat within Watercourse NLT-1 within and immediately adjacent to the ROW. In accordance with the proposed CEIIS Comprehensive Monitoring Plan (NRSI 2020), this would include detailed habitat mapping to ensure created aquatic habitat features are consistent with what was planned and installed, and targeted fish community surveys to determine whether the target fish community is using the features.

Vegetation and habitat restoration monitoring should be coordinated with other monitoring being undertaken within the Ninth Line Lands, following the CEIIS Comprehensive Monitoring Plan, to the extent possible. As with other monitoring components, the details of this plan are to be confirmed in conjunction with agency consultation.

11.0 Summary and Recommendations

NRSI was retained by HDR, on behalf of the City of Mississauga, to complete an NEA to inform a Class EA and Preliminary Design for improvements to Ninth Line between Eglinton Avenue West and Derry Road West. The EA study area represents a divide between the highly developed residential lands to the east and the largely undeveloped Ninth Line Lands to the west. The Ninth Line Lands are subject to the ongoing Ninth Line Lands Scoped Subwatershed Study to inform future land use planning, as well as the ongoing Class EA associated with the MTO's future Highway 407 Transitway. Natural features are entirely located to the west of Ninth Line, and largely comprise culturally-influenced and relatively disturbed features. However, the natural features also include Significant Woodlands as well as wetlands that should be preserved to the extent possible in road improvement designs. SAR habitats confirmed to the west of Ninth Line include foraging habitat for Barn Swallow, and Bobolink and Eastern Meadowlark breeding habitat; however, these habitats are not expected to be impacted by the undertaking. Suitable habitat for SAR bats was identified, associated with woodland and individual tree features. SWH for Eastern Wood-Pewee was also confirmed, while Candidate SWH for Bat Maternity Colonies was identified. The study area contains one regulated watercourse crossing, known as NLT-1, while two other non-regulated drainage features also cross the ROW. Of these, only NLT-1 provides direct fish habitat. The NLT-1 watercourse corridor represents the only functional ecological linkage within the study area, between the Ninth Line Lands to the west and the Osprey Marsh SWM complex to the east.

Various alternative design options were considered for both the footprint widening of the Ninth Line corridor as well as the types of active transportation facilities to be incorporated. The majority of the Natural Heritage criteria included in the evaluation made no difference to the selection of preferred alternative designs for each, although somewhat less natural environment impact would occur through a widening to the east, and through use of a multi-use path rather than sidewalks and cycle tracks. However, when all criteria were considered, the preferred options were to widen the road to the west, and to incorporate sidewalks and cycle tracks on both sides of the road.

The Preliminary Design will require a widening of the existing ROW boundaries, and grading encroachment into the edges of natural features west of the road. This will include minor encroachments into Significant Woodland and wetland features. Despite these encroachments, negative impacts to Barn Swallow, Bobolink and Eastern Meadowlark SAR habitats, and SWH

for Eastern Wood-Pewee, are not expected provided recommended construction mitigation measures such as vegetation removal timing windows are employed. MECP consultation will be required to address any required tree removals along the boundary of the Fresh-Moist Sugar Maple-Hardwood Deciduous Forest (FOD6-5) and removal of the identified Potential Bat Habitat Trees to determine the need for any additional survey requirements or mitigation measures in accordance with the ESA. The planned widening of Ninth Line, and details associated with the widening of the NLT-1 corridor, should be reviewed as part of a DFO self-assessment to determine the need for a DFO Request for Review during the Detailed Design stage.

The Preliminary Design has been developed to minimize direct impacts to the woodland and wetland natural features west of the road. However, further measures should be considered during the Detailed Design stage to avoid or further reduce anticipated direct impacts to these features. Various other recommendations were provided to effectively mitigate indirect and induced impacts associated with the planned road improvements. Recommendations have also been provided for the restoration and enhancement of the adjacent natural features, and to monitor construction-stage and post-construction ecological enhancements. These have been made in accordance with restoration/enhancement and monitoring strategies established for the Ninth Line Lands and are intended to complement and integrate with those initiatives. This will include measures to enhance the quality of the east-west ecological linkage provided by the NLT-1 watercourse crossing.

Provided the above measures are implemented, and subject to future Detailed Design-stage requirements, it is expected that Regional, City and conservation authority policies regarding the need to minimize infrastructure reconstruction disturbances to the natural heritage features and ecological functions have been appropriately satisfied.

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

- Detailed delineation and agency confirmation of Significant Woodland and wetland boundaries within or adjacent to the ROW, and subsequent boundary surveying to inform Detailed Design planning;
- Georeferencing and confirmation of relocation or other mitigation strategies associated with regionally significant vegetation within the ROW;

- Completion of updated checks for Barn Swallow nesting within suitable habitats (e.g., culvert structures);
- Refinement of the Detailed Design and associated grading limits to avoid, or otherwise further minimize natural feature impacts adjacent to Ninth Line;
- Completion of supplementary tree inventory work to fully inform tree removal and protection requirements associated with the proposed widened ROW and associated grading requirements;
- Based on the above, updates and confirmation of tree compensation requirements and incorporation into strategies for streetscaping design, or toward off-site habitat creation and enhancement initiatives (e.g., the Ninth Line Lands NHS);
- Consultation with MECP with respect to potential bat habitat impacts;
- Retention of Potential Bat Habitat Trees A and D within the Detailed Design, if feasible;
- Design of ecological enhancements to the NLT-1 watercourse crossing for the improvement of fish and aquatic habitat, and for the purposes of wildlife movement;
- Completion of a DFO self-assessment associated with proposed NLT-1 culvert extension and other in-water works, and submission of a DFO Request for Review if necessary;
- Identification of additional LID measures for runoff quantity and quality control, water balance and erosion control, to supplement currently-recommended measures where suitable to the study area conditions and ROW design;
- Preparation of a Salt Management Plan to mitigate road salt impacts to aquatic features, where applicable;
- Design confirmation for recommended wildlife exclusion fencing along the east boundary of the Fresh-Moist Sugar Maple-Hardwood Deciduous Forest (FOD6-5);
- Development of an Edge Management Plan to incorporate restoration planting details, an Invasive Species Management Plan tailored to the existing conditions and restoration requirements, and other relevant edge management measures; and,
- Confirmation of a Monitoring Plan in conjunction with the regulatory agencies.

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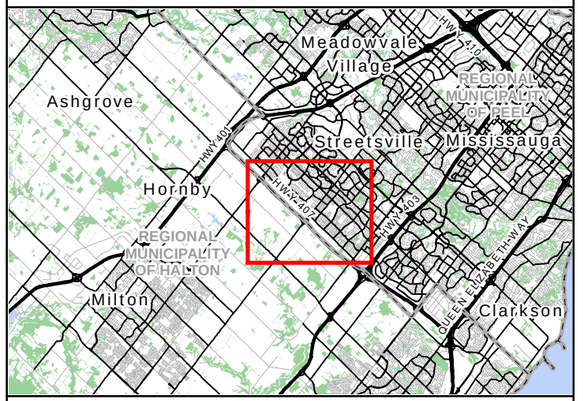
Maps

Map 1

Ninth Line, Mississauga EA

Study Area



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4825000 4824000 4823000 4822000 4821000

DERRY ROAD WEST
DERRY ROAD
LISGAR DRIVE
TRELAWNY CIRCLE
BATTLEFORD ROAD
EDENWOOD DRIVE
MONTEVIDEO ROAD
WINDWOOD DRIVE
TOURS ROAD
MILLERS GROVE
FARMSTEAD LANE
OSPREY BOULEVARD
BRITANNIA ROAD WEST
ERIN MILLS PARKWAY
ROY DRIVE
TURNEY DRIVE
BELL HARBOUR DRIVE
PEACOCK DRIVE
GLEN ERIN DRIVE
CASTLEBRIDGE DRIVE
WINSTON CHURCHILL BOULEVARD
GREENSBORO DRIVE
LONG VALLEY ROAD
REGIONAL MUNICIPALITY OF PEEL
MCDOWELL DRIVE
THOMAS STREET
DUNCAIRN DRIVE
10TH LINE WEST
OSCAR PETERSON BOULEVARD
East Lisgar Branch
Watercourse NT-1-1
Drainage Feature C
NINTH LINE
Drainage Feature D
HIGHWAY 407
Drainage Feature B
CHURCHILL MEADOWS BOULEVARD
TACC DRIVE
ERIN CENTRE BOULEVARD
Drainage Feature A
ECLINTON AVENUE WEST
RIDGEWAY DRIVE
REGIONAL MUNICIPALITY OF HALTON
BRITANNIA ROAD
TRAFALGAR ROAD
East Sixteen Mile Creek
Middle Sixteen Mile Creek
HWY 407

Legend

- Study Area
- Municipal Boundary
- Preliminary Floodplain Limit as per Draft Ninth Line Lands Scoped Subwatershed Study
- Utility Line
- Railway
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Other Wetland (Non-PSW)
- Unevaluated Wetland
- Wooded

Note: Existing and proposed floodplain limits are the same

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Project: 2376 Date: June 17, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:20,000**

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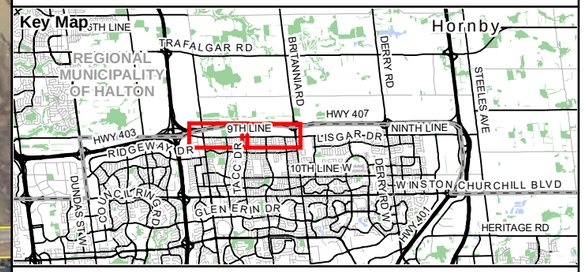
Map 2

Ninth Line, Mississauga EA

Natural Environment Constraints



Legend

- Potential Bat Habitat Tree
- Aquatic Feature Crossing
- Breeding Bird Survey Station (BMB)
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Ecological Land Classification (ELC)
  - (CUM1) Mineral Cultural Meadow Ecosite
  - (CUM1-1) Dry-Moist Old Field Meadow Type
  - (CUT) Cultural Thicket
  - (CUP1) Deciduous Plantations
  - (CUP3-9) Norway Spruce Coniferous Plantations
  - (CUT) Cultural Thicket
  - (CUW1) Mineral Cultural Woodland Ecosite
  - (FOD6-4) Fresh-Moist Sugar Maple-White Elm Deciduous Forest Type
  - (FOD6-5) Fresh - Moist Sugar Maple - Hardwood Deciduous Forest Type
  - (FOD7-2) Fresh-Moist Green Ash-Hardwood Lowland Deciduous Forest Type
  - (FOD7-3) Fresh-Moist Willow Lowland Deciduous Forest Type
  - (H1-H6) Hedgerow
  - (MAM2) Graminoid Mineral Meadow Marsh Ecosite
  - (MAM2-2) Reed-canary Grass Graminoid Mineral Meadow Marsh Type
  - (MAS2-1) Cattail Mineral Shallow Marsh Type
  - (OAGM1) Annual Row Crops
  - (OAO) Open Aquatic
  - (SWD2-2) Green Ash Mineral Deciduous Swamp Type
  - (SWD3) Maple Mineral Deciduous Swamp Ecosite
  - (SWD3-3) Swamp Maple Mineral Deciduous Swamp Type
  - (SWD4) Mineral Deciduous Swamp Ecosite
  - (SWT2) Mineral Thicket Swamp Ecosite

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Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:6,000**

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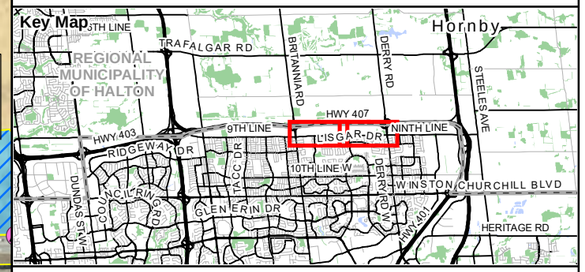
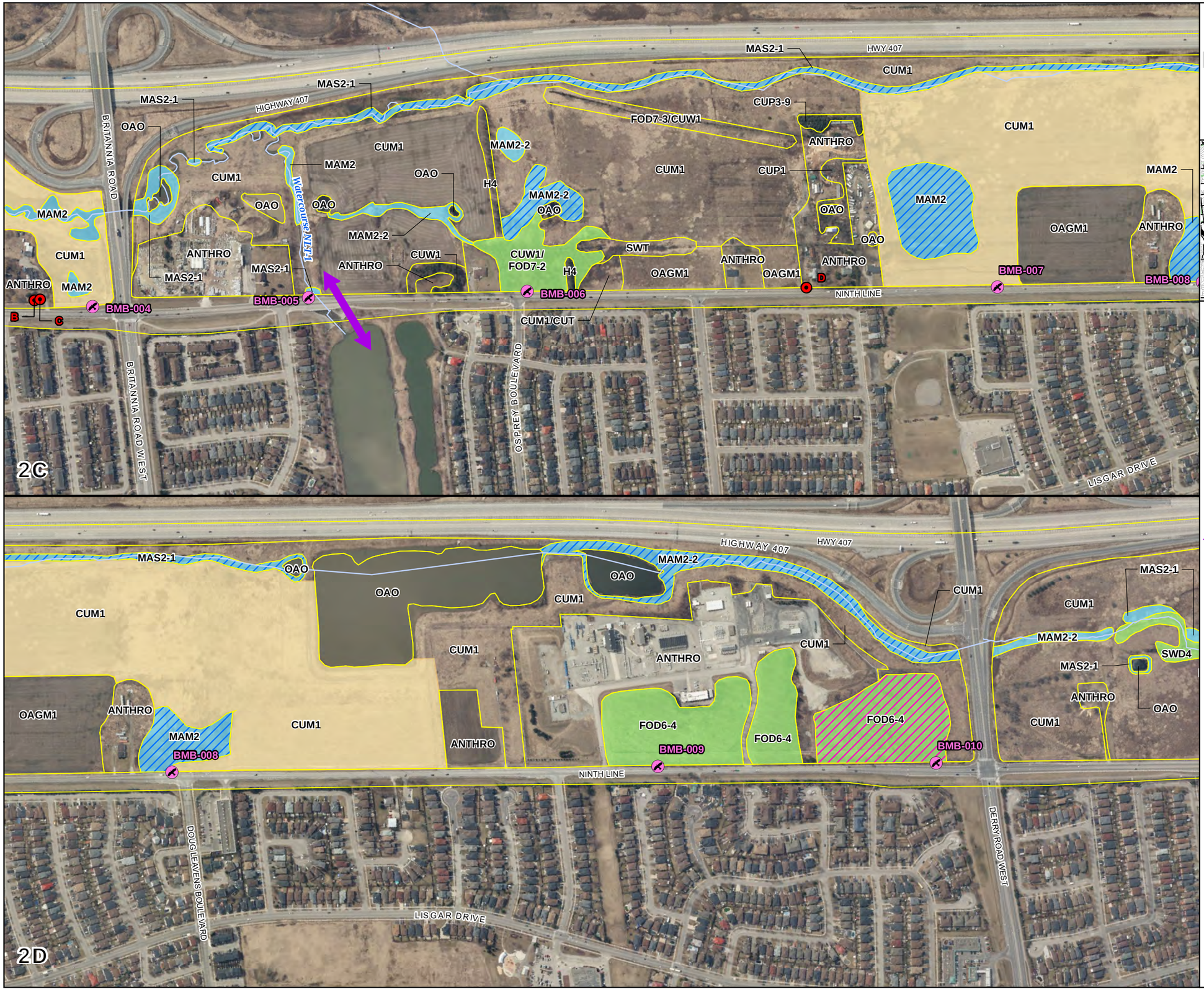
Map 2

Ninth Line, Mississauga EA

Natural Environment Constraints





Legend

- Potential Bat Habitat Tree
- Aquatic Feature Crossing
- Breeding Bird Survey Station (BMB)
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Ecological Land Classification (ELC)
- (CUM1) Mineral Cultural Meadow Ecosite
- (CUM1-1) Dry-Moist Old Field Meadow Type
- (CUT) Cultural Thicket
- (CUP1) Deciduous Plantations
- (CUP3-9) Norway Spruce Coniferous Plantations
- (CUT) Cultural Thicket
- (CUW1) Mineral Cultural Woodland Ecosite
- (FOD6-4) Fresh-Moist Sugar Maple-White Elm Deciduous Forest Type
- (FOD6-5) Fresh - Moist Sugar Maple - Hardwood Deciduous Forest Type
- (FOD7-2) Fresh-Moist Green Ash-Hardwood Lowland Deciduous Forest Type
- (FOD7-3) Fresh-Moist Willow Lowland Deciduous Forest Type
- (H1-H6) Hedgerow
- (MAM2) Graminoid Mineral Meadow Marsh Ecosite
- (MAM2-2) Reed-canary Grass Graminoid Mineral Meadow Marsh Type
- (MAS2-1) Cattail Mineral Shallow Marsh Type
- (OAGM1) Annual Row Crops
- (OAO) Open Aquatic
- (SWD2-2) Green Ash Mineral Deciduous Swamp Type
- (SWD3) Maple Mineral Deciduous Swamp Ecosite
- (SWD3-3) Swamp Maple Mineral Deciduous Swamp Type
- (SWD4) Mineral Deciduous Swamp Ecosite
- (SWT2) Mineral Thicket Swamp Ecosite

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Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:6,000**

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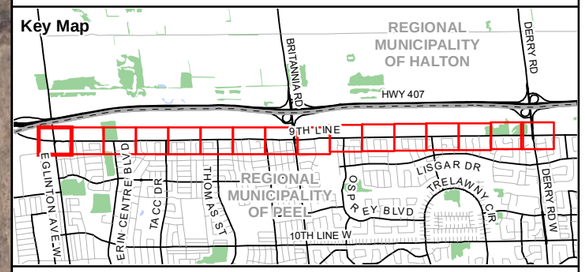
Map 3A

Ninth Line, Mississauga EA

Preliminary Design



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUW1) Mineral Cultural Woodland Ecosite

(OAO) Open Aquatic

(SWD3-3) Swamp Maple Mineral Deciduous Swamp Type

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Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

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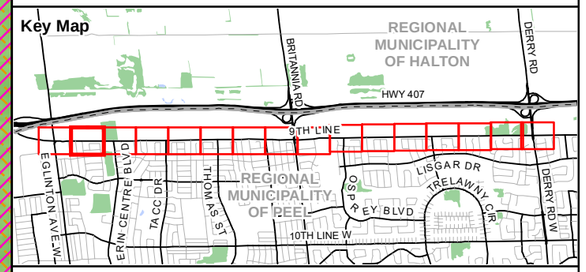
Map 3B

Ninth Line, Mississauga EA

Preliminary Design



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(FOD6-5) Fresh - Moist Sugar Maple - Hardwood Deciduous Forest Type

(OAO) Open Aquatic

(SWD3) Maple Mineral Deciduous Swamp Ecosite

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Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

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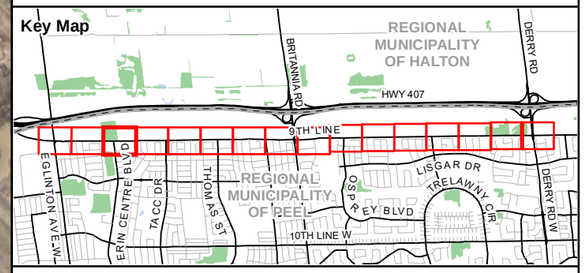
Map 3C

Ninth Line, Mississauga EA

Preliminary Design

Key Map



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(FOD6-5) Fresh - Moist Sugar Maple - Hardwood Deciduous Forest Type

(OAGM1) Annual Row Crops

(SWD3) Maple Mineral Deciduous Swamp Ecosite

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Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

0 20 40 60 80 Metres

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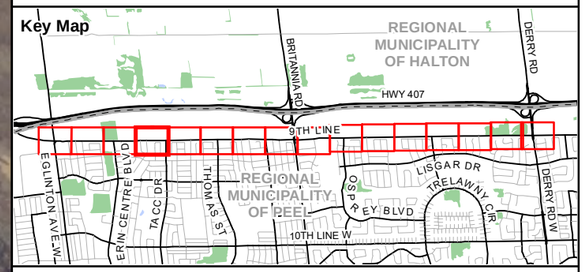
Map 3D

Ninth Line, Mississauga EA

Preliminary Design



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

0 20 40 60 80 Metres

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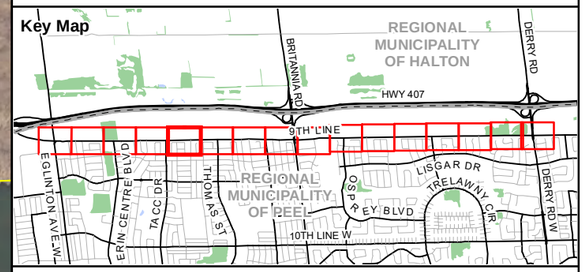
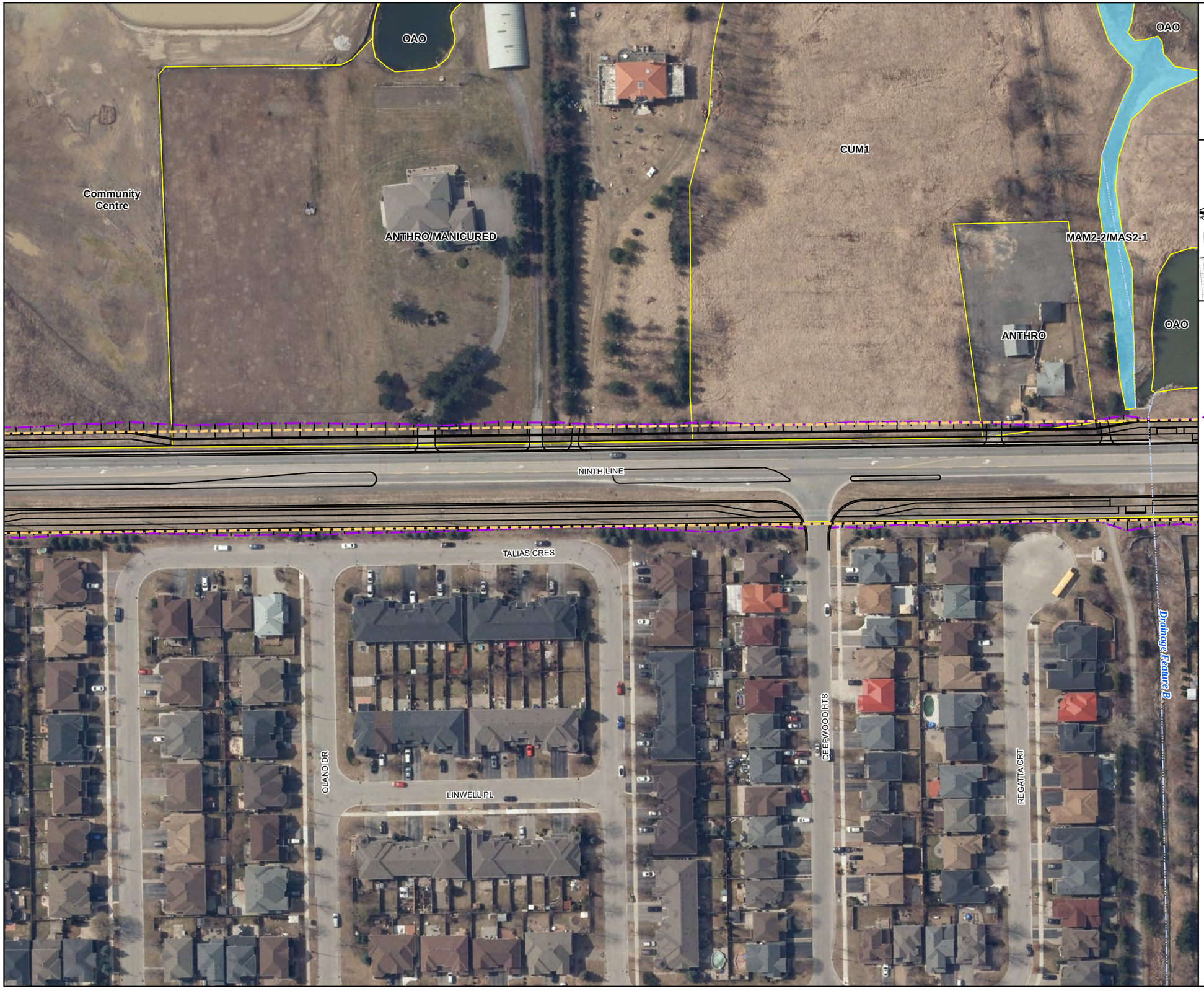
Map 3E

Ninth Line, Mississauga EA

Preliminary Design





Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(OAO) Open Aquatic

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

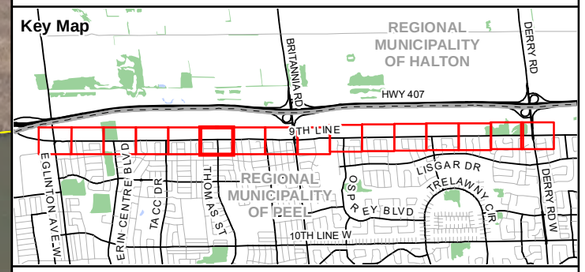
0 20 40 60 80 Metres

N

Map 3F

Ninth Line, Mississauga EA

Preliminary Design



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(OAO) Open Aquatic

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

0 20 40 60 80 Metres

N

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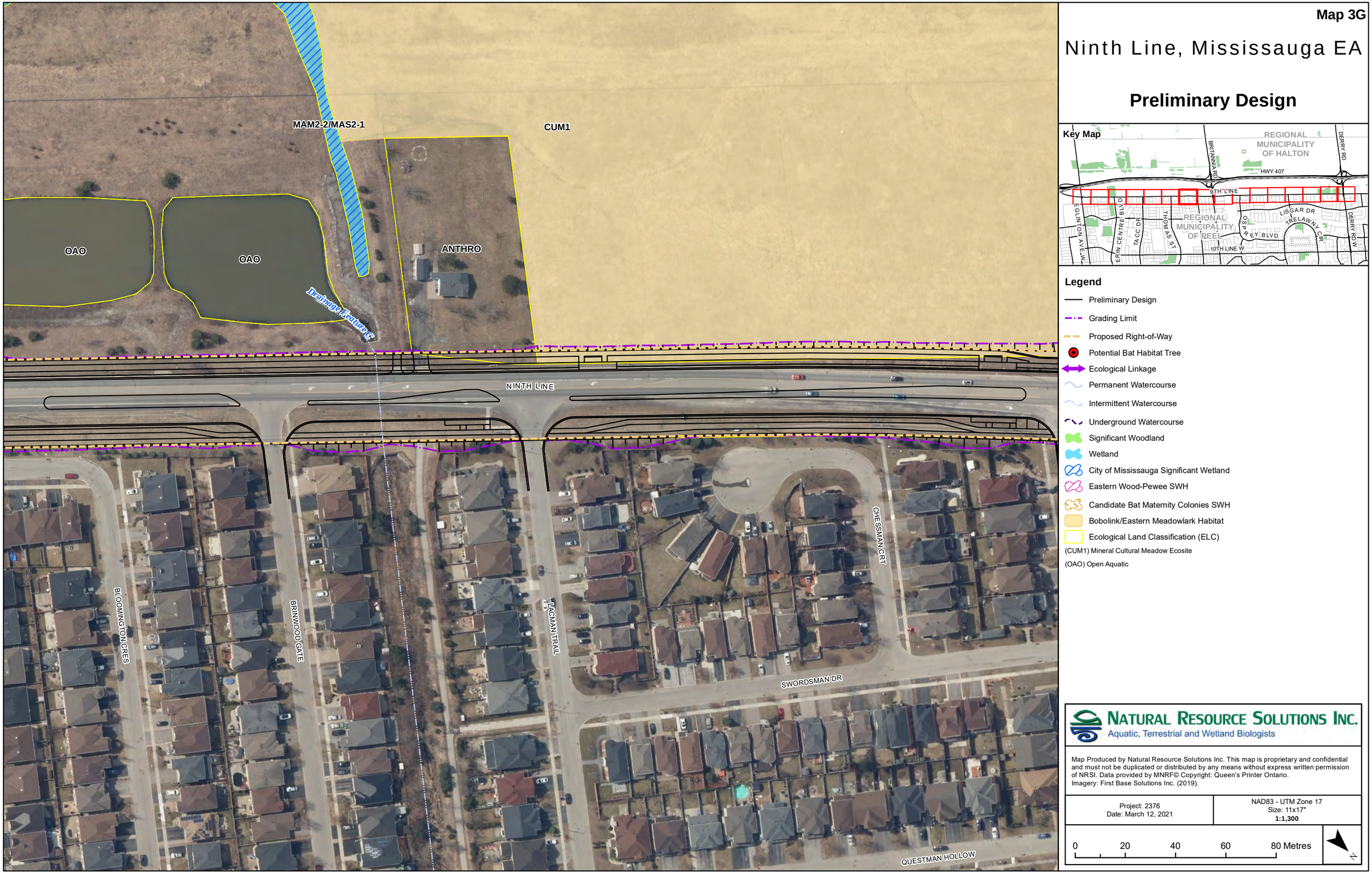
Map 3G

Ninth Line, Mississauga EA

Preliminary Design



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(OAO) Open Aquatic

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

0 20 40 60 80 Metres

N

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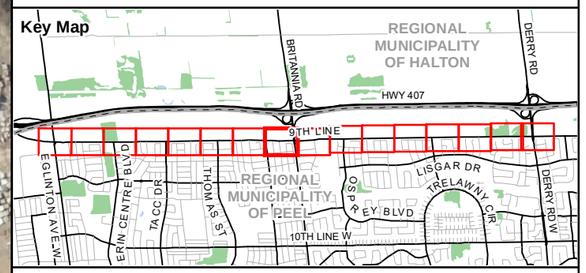
Map 3H

Ninth Line, Mississauga EA

Preliminary Design



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(MAM2) Graminoid Mineral Meadow Marsh Ecosite

(MAS2-1) Cattail Mineral Shallow Marsh Type

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

0 20 40 60 80 Metres

N

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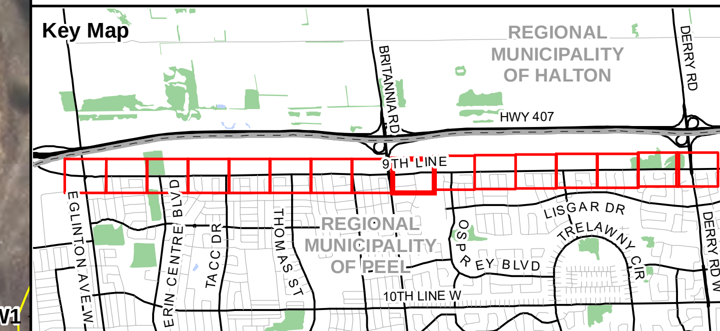
Map 3I

Ninth Line, Mississauga EA

Preliminary Design

Key Map



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUW1) Mineral Cultural Woodland Ecosite
(MAM2) Graminoid Mineral Meadow Marsh Ecosite
(MAM2-2) Reed-canary Grass Graminoid Mineral Meadow Marsh Type
(MAS2-1) Cattail Mineral Shallow Marsh Type
(OAO) Open Aquatic

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

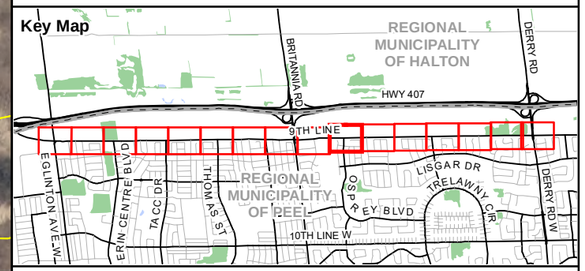
0 20 40 60 80 Metres

N

Map 3J

Ninth Line, Mississauga EA

Preliminary Design



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUT) Cultural Thicket
(CUW1) Mineral Cultural Woodland Ecosite
(FOD7-2) Fresh-Moist Green Ash-Hardwood Lowland Deciduous Forest Type
(MAM2-2) Reed-canary Grass Graminoid Mineral Meadow Marsh Type
(OAGM1) Annual Row Crops
(OAO) Open Aquatic
(SWT2) Mineral Thicket Swamp Ecosite

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

0 20 40 60 80 Metres

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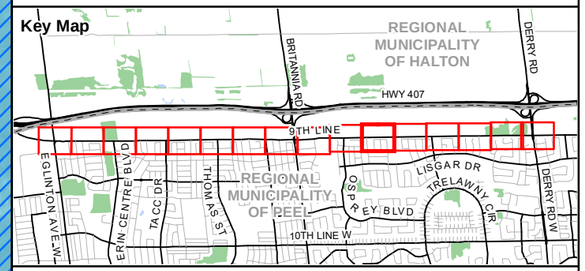
Map 3K

Ninth Line, Mississauga EA

Preliminary Design



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP1) Deciduous Plantations
(MAM2) Graminoid Mineral Meadow Marsh Ecosite
(OAGM1) Annual Row Crops
(OAO) Open Aquatic
(SWT2) Mineral Thicket Swamp Ecosite

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

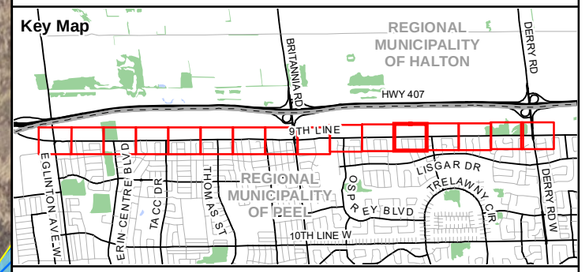
0 20 40 60 80 Metres

N

Map 3L

Ninth Line, Mississauga EA

Preliminary Design



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(MAM2) Graminoid Mineral Meadow Marsh Ecosite

(OAGM1) Annual Row Crops

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

0 20 40 60 80 Metres

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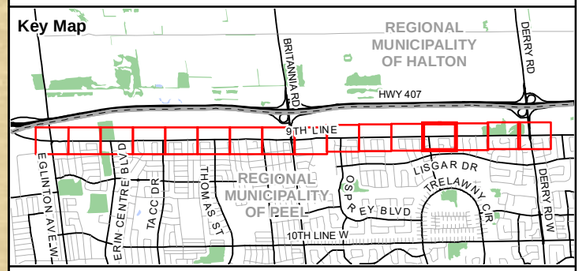
Map 3M

Ninth Line, Mississauga EA

Preliminary Design



ANTHRO

MAM2

CUM1

NINTH LINE

SAPLING TRAIL

DOUG LEAVENS BOULEVARD

MOON LILY CRES

INDIGO CRES

ASTRO CRT

METEOR CRT

TINTERN ABBEY CRT

Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(MAM2) Graminoid Mineral Meadow Marsh Ecosite

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

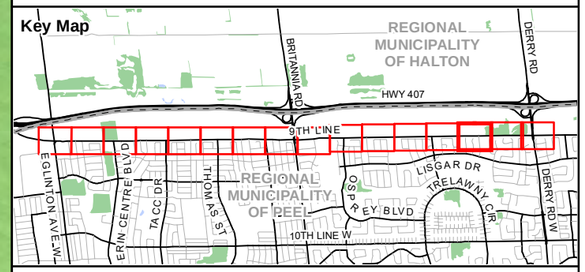
0 20 40 60 80 Metres

N

Map 3N

Ninth Line, Mississauga EA

Preliminary Design



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(FOD6-4) Fresh-Moist Sugar Maple-White Elm Deciduous Forest Type

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

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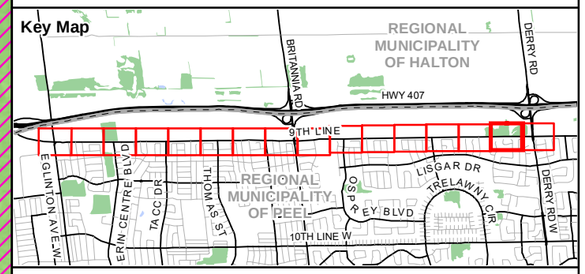
Map 3O

Ninth Line, Mississauga EA

Preliminary Design



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(FOD6-4) Fresh-Moist Sugar Maple-White Elm Deciduous Forest Type

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

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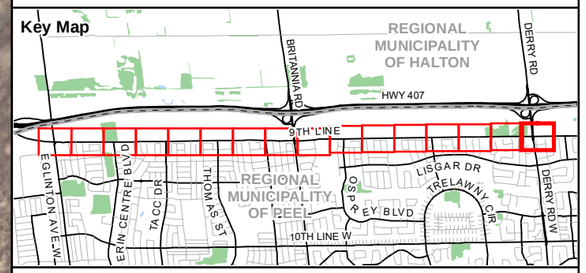
Map 3P

Ninth Line, Mississauga EA

Preliminary Design



Legend

- Preliminary Design
- Grading Limit
- Proposed Right-of-Way
- Potential Bat Habitat Tree
- Ecological Linkage
- Permanent Watercourse
- Intermittent Watercourse
- Underground Watercourse
- Significant Woodland
- Wetland
- City of Mississauga Significant Wetland
- Eastern Wood-Pewee SWH
- Candidate Bat Maternity Colonies SWH
- Bobolink/Eastern Meadowlark Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(FOD6-4) Fresh-Moist Sugar Maple-White Elm Deciduous Forest Type

(MAS2-1) Cattail Mineral Shallow Marsh Type

(OAO) Open Aquatic

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Project: 2376 Date: March 12, 2021	NAD83 - UTM Zone 17 Size: 11x17" **1:1,300**

0 20 40 60 80 Metres

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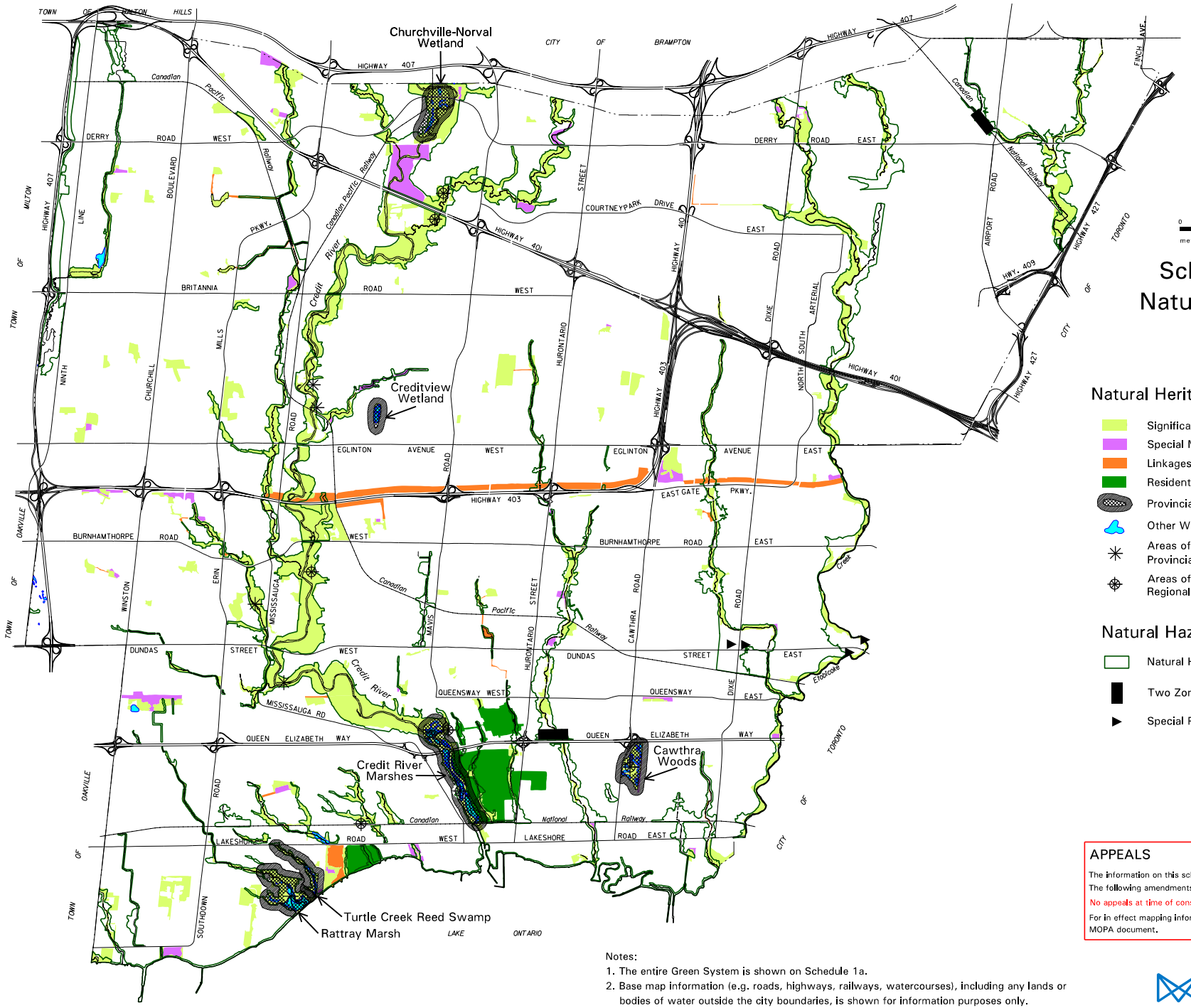
Appendix I
City of Mississauga OP Schedule 3



Schedule 3
Natural System

Natural Heritage System:

- Significant Natural Areas and Natural Green Spaces
- Special Management Areas
- Linkages
- Residential Woodlands
- Provincially Significant Wetlands
- Other Wetlands
- Areas of Natural and Scientific Interest - Provincial Significance
- Areas of Natural and Scientific Interest - Regional Significance

Natural Hazards:

- Natural Hazards
- Two Zone Floodplain Regulations
- Special Policy Area Floodplain

APPEALS

The information on this schedule reflects Council adopted amendments. The following amendments are under appeal and affect this schedule:

No appeals at time of consolidation.

For in effect mapping information refer to the Consolidation Tables and MOPA document.

Notes:

1. The entire Green System is shown on Schedule 1a.
2. Base map information (e.g. roads, highways, railways, watercourses), including any lands or bodies of water outside the city boundaries, is shown for information purposes only.
3. The limits of the Natural Hazards shown on this Schedule are for illustrative purposes only. The appropriate Conservation Authority should be consulted to determine their actual location.

MISSISSAUGA

V - 15.003

Appendix II
Plant Species Inventoried Within the Study Area

Plant Species Reported from the Study Area

Scientific Name	Common Name	CC	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Peel Region	NRSI Observed	FOD, SWD, Hedgerows	CUM1	CUW1	CUT/SWT	MAM, MAS, OAO
		Oldham et al. 1998	MNRF 2020a	MNRF 2020a	ernment of Canada 2	rnment of Canada 2	rnment of Canada 2	Varga 2000		Additional Notes	Additional Notes	Additional Notes	Additional Notes	Additional Notes
Pteridophytes	**Ferns & Allies**													
Dryopteridaceae	**Wood Fern Family**													
Dryopteris carthusiana	Spinulose Wood Fern	5	S5					X	X	X				
Gymnosperms	**Conifers**													
Cupressaceae	**Cypress Family**													
Thuja occidentalis	Eastern White Cedar	4	S5					X	X	X		X		
Pinaceae	**Pine Family**													
Picea abies	Norway Spruce	0	SE3					X	X			X		
Picea glauca	White Spruce	6	S5					R3	X			X		
Pinus strobus	Eastern White Pine	4	S5					X	X	X				
Pinus sylvestris	Scots Pine	0	SE5					X	X			X		
Dicotyledons	**Dicots**													
Aceraceae	**Maple Family**													
Acer negundo	Manitoba Maple	0	S5					X	X		X	X		X
Acer platanoides	Norway Maple	0	SE5					X	X	X				
Acer rubrum	Red Maple	4	S5					X	X	X				
Acer saccharinum	Silver Maple	5	S5					X	X	X		X		
Acer saccharum	Sugar Maple	4	S5					X	X	X				
Acer x freemanii	*(Acer rubrum X Acer saccharinum)*	6	SNA					XSR	X	X				
Anacardiaceae	**Sumac or Cashew Family**													
Rhus typhina	Staghorn Sumac	1	S5					X	X		X		X	
Toxicodendron radicans var. rydbergii	Western Poison Ivy	2	S5					X	X	X				
Apiaceae	**Carrot or Parsley Family**													
Aegopodium podagraria	Goutweed	0	SE5					X	X			X		
Sanicula marilandica	Maryland Sanicle	5	S5					X	X	X				
Sium suave	Hemlock Water-parsnip	4	S5					X	X	X				
Apocynaceae	**Dogbane Family**													
Apocynum cannabinum var. hypericifolium	Clasping-leaved Hemp Dogbane	3	S5					X	X	X				
Vinca minor	Periwinkle	0	SE5					X	X	X				
Asclepiadaceae	**Milkweed Family**													
Asclepias syriaca	Common Milkweed	0	S5					X	X		X		X	
Vincetoxicum rossicum	European Swallow-wort	0	SE5					X	X			X		
Asteraceae	**Composite or Aster Family**													
Arctium minus	Common Burdock	0	SE5					X	X		X			
Artemisia vulgaris	Common Wormwood	0	SE5					X	X			X		
Cichorium intybus	Chicory	0	SE5					X	X		X			
Cirsium arvense	Creeping Thistle	0	SE5					X	X		X			
Cirsium vulgare	Bull Thistle	0	SE5					X	X		X			
Erigeron philadelphicus	Philadelphia Fleabane	1	S5					X	X	X				
Eurybia macrophylla	Large-leaved Aster	5	S5					X	X	X				
Euthamia graminifolia	Grass-leaved Goldenrod	2	S5					X	X		X			
Inula helenium	Elecampane	0	SE5					X	X		X		X	
Leucanthemum vulgare	Oxeye Daisy	0	SE5					X	X		X			
Pilosella caespitosa	Meadow Hawkweed	0	SE5					X	X	X				
Solidago altissima var. altissima	Eastern Tall Goldenrod	1	S5					X	X		X	X		
Solidago canadensis	Canada Goldenrod	1	S5					X	X		X			
Solidago flexicaulis	Zigzag Goldenrod	6	S5					X	X	X				
Solidago gigantea	Giant Goldenrod	4	S5					X	X	X				
Symphyotrichum cordifolium	Heart-leaved Aster	5	S5					X	X	X				
Symphyotrichum lanceolatum ssp. lanceo	White Panicled Aster	3	S5						X		X	X		
Symphyotrichum lateriflorum	Calico Aster	3	S5						X	X				
Symphyotrichum novae-angliae	New England Aster	2	S5					X	X		X			X
Tragopogon pratensis	Meadow Goat's-beard	0	SE5					X	X		X			
Balsaminaceae	**Touch-me-not Family**													
Impatiens capensis	Spotted Jewelweed	4	S5					X	X	X				
Berberidaceae	**Barberry Family**													
Podophyllum peltatum	May-apple	5	S5					X	X	X				
Betulaceae	**Birch Family**													
Alnus glutinosa	European Black Alder	0	SE4						X				X	
Ostrya virginiana	Eastern Hop-hornbeam	4	S5					X	X	X				
Boraginaceae	**Borage Family**													

Cynoglossum officinale	Common Hound's-tongue	0	SE5					X	X	X				
Myosotis laxa	Small Forget-me-not	6	S5					X	X	X				
Brassicaceae	**Mustard Family**													
Alliaria petiolata	Garlic Mustard	0	SE5					X	X	X	X	X		
Barbarea vulgaris	Bitter Wintercress	0	SE5					X	X		X			
Capsella bursa-pastoris	Common Shepherd's Purse	0	SE5					X	X		X			
Hesperis matronalis	Dame's Rocket	0	SE5					X	X		X	X		
Campanulaceae	**Bellflower Family**													
Campanula rapunculoides	Creeping Bellflower	0	SE5					X	X			X		
Caprifoliaceae	**Honeysuckle Family**													
Lonicera dioica	Limber Honeysuckle	5	S5					X	X	X				
Lonicera x bella	*(Lonicera morrowii X Lonicera tatarica)*	0	SNA					X	X	X	X	X		
Viburnum lentago	Nannyberry	4	S5					X	X	X				
Viburnum opulus	Cranberry Viburnum	5	S5					X	X				X	
Caryophyllaceae	**Pink Family**													
Cerastium fontanum	Common Mouse-ear Chickweed	0	SE5					X	X		X			
Celastraceae	**Staff-tree Family**													
Euonymus obovatus	Running Strawberry Bush	6	S4					X	X	X				
Clusiaceae	**St. John's-wort Family**													
Hypericum perforatum	Common St. John's-wort	0	SE5					X	X	X	X			
Convolvulaceae	**Morning-glory Family**													
Convolvulus arvensis	Field Bindweed	0	SE5					X	X		X			
Cornaceae	**Dogwood Family**													
Cornus racemosa	Gray Dogwood	2	S5					X	X	X	X	X	X	
Cornus sericea	Red-osier Dogwood	2	S5					X	X				X	X
Dipsacaceae	**Teasel Family**													
Dipsacus fullonum	Common Teasel	0	SE5					X	X		X	X	X	
Elaeagnaceae	**Oleaster Family**													
Elaeagnus angustifolia	Russian Olive	0	SE3					X	X			X		
Euphorbiaceae	**Spurge Family**													
Euphorbia cyparissias	Cypress Spurge	0	SE5					X	X		X			
Euphorbia virgata	Russian Leafy Spurge	0	SE5?					X	X		X			
Fabaceae	**Pea Family**													
Lotus corniculatus	Garden Bird's-foot Trefoil	0	SE5					X	X		X			
Medicago lupulina	Black Medic	0	SE5					X	X		X			
Robinia pseudoacacia	Black Locust	0	SE5					X	X		X	X		
Securigera varia	Common Crown-vetch	0	SE5					X	X			X	X	
Trifolium pratense	Red Clover	0	SE5					X	X		X			
Trifolium repens	White Clover	0	SE5					X	X		X			
Vicia cracca	Tufted Vetch	0	SE5					X	X		X			
Fagaceae	**Beech Family**													
Fagus grandifolia	American Beech	6	S4					X	X	X				
Quercus macrocarpa	Bur Oak	5	S5					X	X	X		X		
Quercus rubra	Northern Red Oak	6	S5					X	X	X		X		
Geraniaceae	**Geranium Family**													
Geranium maculatum	Spotted Geranium	6	S5					U	X	X				
Geranium robertianum	Herb-Robert	2	S5					X	X	X				
Grossulariaceae	**Currant Family**													
Ribes aureum var. villosum	Buffalo Currant	0	SE3					X	X			X		
Ribes cynosbati	Prickly Gooseberry	4	S5					X	X	X				
Ribes rubrum	Northern Red Currant	0	SE5					X	X			X		
Hippocastanaceae	**Buckeye Family**													
Aesculus hippocastanum	Horse Chestnut	0	SE2					X	X			X		
Hydrophyllaceae	**Water-leaf Family**													
Hydrophyllum virginianum	Virginia Waterleaf	6	S5					X	X	X				
Juglandaceae	**Walnut Family**													
Carya cordiformis	Bitternut Hickory	6	S5					X	X	X				
Carya ovata	Shagbark Hickory	6	S5						X	X				
Juglans nigra	Black Walnut	5	S4?					X	X			X		
Lamiaceae	**Mint Family**													
Glechoma hederacea	Ground Ivy	0	SE5					X	X	X	X			
Leonurus cardiaca	Common Motherwort	0	SE5						X				X	
Lycopus americanus	American Water-horehound	4	S5					X	X					X
Mentha canadensis	Canada Mint	3	S5					X	X					X
Nepeta cataria	Catnip	0	SE5					X	X				X	
Lythraceae	**Loosestrife Family**													

Lythrum salicaria	Purple Loosestrife	0	SE5					X	X	X				X
Moraceae	**Mulberry Family**													
Morus alba	White Mulberry	0	SE5					X	X			X		
Oleaceae	**Olive Family**													
Fraxinus americana	White Ash	4	S4					X	X	X	X	X	X	
Fraxinus pennsylvanica	Green Ash	3	S4					X	X	X		X		X
Syringa vulgaris	Common Lilac	0	SE5					X	X			X		
Onagraceae	**Evening-primrose Family**													
Circaea canadensis ssp. canadensis	Canada Enchanter's Nightshade	2	S5					X	X	X				
Oenothera biennis	Common Evening-primrose	0	S5					U	X		X			
Papaveraceae	**Poppy Family**													
Sanguinaria canadensis	Bloodroot	5	S5					X	X	X				
Plantaginaceae	**Plantain Family**													
Plantago major	Common Plantain	0	SE5					X	X		X			
Polygonaceae	**Smartweed Family**													
Rumex crispus	Curly Dock	0	SE5					X	X		X			
Primulaceae	**Primrose Family**													
Lysimachia ciliata	Fringed Loosestrife	4	S5					X	X	X				
Ranunculaceae	**Buttercup Family**													
Anemone quinquefolia	Wood Anemone	7	S5						X	X				
Ranunculus abortivus	Kidney-leaved Buttercup	2	S5					X	X	X				
Ranunculus acris	Tall Buttercup	0	SE5					X	X			X		X
Ranunculus sceleratus	Cursed Buttercup	2	S5						X					X
Rhamnaceae	**Buckthorn Family**													
Rhamnus cathartica	Common Buckthorn	0	SE5					X	X	X	X	X		
Rosaceae	**Rose Family**													
Crataegus punctata	Dotted Hawthorn	4	S5					X	X			X		
Exochorda racemosa	Common Pearlbush	0	SE1						X		X			
Fragaria vesca	Woodland Strawberry	4	S5						X	X				
Geum aleppicum	Yellow Avens	2	S5					X	X	X		X		
Malus pumila	Common Apple	0	SE4					X	X				X	
Potentilla simplex	Old-field Cinquefoil	3	S5					U	X	X	X			
Prunus serotina var. serotina	Black Cherry	3	S5						X	X				
Prunus virginiana	Choke Cherry	2	S5					X	X	X		X	X	
Rosa blanda	Smooth Rose	3	S5					X	X	X				
Rosa multiflora	Multiflora Rose	0	SE5					X	X	X			X	
Rosa rubiginosa	Briar Rose	0	SE4					X	X				X	
Rubus idaeus	Common Red Raspberry	2	S5						X		X	X	X	
Rubus occidentalis	Black Raspberry	2	S5					X	X			X		
Rubiaceae	**Madder Family**													
Galium aparine	Cleavers	4	S5					R4	X	X		X		
Galium obtusum	Blunt-leaved Bedstraw	6	S4S5					U	X	X				
Salicaceae	**Willow Family**													
Populus grandidentata	Large-toothed Aspen	5	S5					X	X	X				
Populus tremuloides	Trembling Aspen	2	S5					X	X	X				
Populus x canadensis	*(Populus deltoides X Populus nigra)*	0	SNA						X		X			
Salix alba	White Willow	0	SE4					X	X			X		X
Salix amygdaloides	Peach-leaved Willow	6	S5					R6	X			X	X	
Salix discolor	Pussy Willow	3	S5					X	X				X	
Salix eriocephala	Heart-leaved Willow	4	S5					X	X					X
Salix euxina	Crack Willow	0	SE						X				X	
Salix interior	Sandbar Willow	1	S5					R5	X				X	X
Scrophulariaceae	**Figwort Family**													
Veronica officinalis	Common Speedwell	0	SE5					X	X	X				
Solanaceae	**Nightshade Family**													
Solanum dulcamara	Bittersweet Nightshade	0	SE5					X	X	X	X			X
Tiliaceae	**Linden Family**													
Tilia americana	American Basswood	4	S5					X	X	X				
Ulmaceae	**Elm Family**													
Ulmus americana	American Elm	3	S5					X	X	X		X		
Ulmus pumila	Siberian Elm	0	SE3					X	X		X			
Vitaceae	**Grape Family**													
Parthenocissus quinquefolia	Virginia Creeper	6	S4?						X			X		
Parthenocissus vitacea	Thicket Creeper	4	S5					X	X	X	X	X		
Vitis riparia	Riverbank Grape	0	S5					X	X	X	X		X	
Alismataceae	**Water-plantain Family**													

Alisma triviale	Northern Water-plantain	1	S5					X	X			X		
Araceae	**Arum Family**													
Arisaema triphyllum ssp. triphyllum	Jack-in-the-pulpit	5	S5						X	X				
Cyperaceae	**Sedge Family**													
Carex gracillima	Graceful Sedge	4	S5					X	X	X				
Carex pensylvanica	Pennsylvania Sedge	5	S5					X	X	X				
Carex radiata	Eastern Star Sedge	4	S5					X	X	X				
Carex rosea	Rosy Sedge	2	S5					X	X	X				
Carex stipata	Awl-fruited Sedge	3	S5					X	X	X				
Carex tuckermanii	Tuckerman's Sedge	7	S5					R6	X	X				
Eleocharis erythropoda	Red-stemmed Spikerush	4	S5					X	X					X
Schoenoplectus tabernaemontani	Soft-stemmed Bulrush	5	S5					X	X					X
Iridaceae	**Iris Family**													
Iris pseudacorus	Yellow Iris	0	SE4					X	X					X
Juncaceae	**Rush Family**													
Juncus effusus	Soft Rush	4	S5						X					X
Lemnaceae	**Duckweed Family**													
Spirodela polyrhiza	Great Duckweed	4	S5					U	X					X
Liliaceae	**Lily Family**													
Allium tricoccum	Wild Leek	7	S4					X	X	X				
Asparagus officinalis	Garden Asparagus	0	SE5					X	X			X		
Hemerocallis fulva	Orange Daylily	0	SE5					X	X		X			
Lilium michiganense	Michigan Lily	7	S4					U	X	X				
Maianthemum racemosum	Large False Solomon's Seal	4	S5					X	X	X				
Trillium grandiflorum	White Trillium	5	S5					X	X	X				
Orchidaceae	**Orchid Family**													
Epipactis helleborine	Eastern Helleborine	0	SE5					X	X	X				
Poaceae	**Grass Family**													
Bromus commutatus	Hairy Brome	0	SE4					X	X		X			
Bromus inermis	Smooth Brome	0	SE5					X	X		X	X	X	
Dactylis glomerata	Orchard Grass	0	SE5					X	X		X			
Elymus repens	Creeping Wildrye	0	SE5					X	X		X			
Glyceria striata	Fowl Mannagrass	3	S5					X	X	X				
Lolium arundinaceum	Tall Fescue	0	SE5					X	X		X			
Phalaris arundinacea	Reed Canary Grass	0	S5					X	X		X			X
Phleum pratense	Common Timothy	0	SE5					X	X		X		X	
Phragmites australis ssp. australis	European Reed	0	SE5						X		X			X
Poa annua	Annual Bluegrass	0	SE5					X	X		X			
Poa compressa	Canada Bluegrass	0	SE5					X	X		X			
Poa pratensis	Kentucky Bluegrass	0	S5						X		X		X	
Puccinellia distans	Spreading Alkaligrass	0	SE5					X	X		X			
Typhaceae	**Cattail Family**													
Typha angustifolia	Narrow-leaved Cattail	0	SE5					X	X					X
Typha latifolia	Broad-leaved Cattail	1	S5					X	X					X
Total									**174**	**81**	**60**	**46**	**25**	**22**

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Appendix III
Bird Species Reported from the Study Area and Vicinity

Bird Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[3]	OBBA[4]		NRSI Observed
						17PJ02	17NJ92	
Anatidae	**Ducks, Geese & Swans**							
Branta canadensis	Canada Goose	S5				CO	CO	
Aix sponsa	Wood Duck	S5				CO	PR	
Anas platyrhynchos	Mallard	S5				CO	CO	
Phasianidae	**Partridges, Grouse & Turkeys**							
Bonasa umbellus	Ruffed Grouse	S4						PR
Columbidae	**Pigeons & Doves**							
Columba livia	Rock Pigeon	SNA				CO	CO	X
Zenaida macroura	Mourning Dove	S5				CO	CO	CO
Cuculiformes	**Cuckoos & Anis**							
Coccyzus americanus	Yellow-billed Cuckoo	S4B				PR		
Coccyzus erythropthalmus	Black-billed Cuckoo	S5B				PR	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	PR	PO	
Charadriidae	**Plovers**							
Charadrius vociferus	Killdeer	S5B, S5N				CO	CO	PO
Scolopacidae	**Waders**							
Bartramia longicauda	Upland Sandpiper	S4B					PO	
Gallinago delicata	Wilson's Snipe	S5B				PR		
Scolopax minor	American Woodcock	S4B				PO	PO	
Actitis macularia	Spotted Sandpiper	S5				CO	CO	
Laridae	**Gulls, Terns & Skimmers**							
Larus delawarensis	Ring-billed Gull	S5B, S4N						PO
Larus argentatus	Herring Gull	S5B, S5N						X
Ardeidae	**Herons & Bitterns**							
Ardea herodias	Great Blue Heron	S4B						X
Butorides virescens	Green Heron	S4B				PR	PR	
Nycticorax nycticorax	Black-crowned Night-Heron	S3B,S3N						
Cathartidae	**Vultures**							
Cathartes aura	Turkey Vulture	S5B				PO		
Accipitridae	**Hawks, Kites, Eagles & Allies**							
Circus cyaneus	Northern Harrier	S4B	NAR	NAR			CO	
Accipiter striatus	Sharp-shinned Hawk	S5	NAR			CO		

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[3]	17PJ02	17NJ92	NRSI Observed
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR			CO	
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR		CO	CO	
Strigidae	**Typical Owls**							
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR		PR	PO	
Alcedinidae	**Kingfishers**							
Megaceryle alcyon	Belted Kingfisher	S4B				CO	PO	
Picidae	**Woodpeckers**							
Melanerpes erythrocephalus	Red-headed Woodpecker	S4B	SC	END	Schedule 1		CO	
Dryobates pubescens	Downy Woodpecker	S5				CO	PO	PR
Dryobates villosus	Hairy Woodpecker	S5				CO	CO	
Colaptes auratus	Northern Flicker	S4B				CO	PO	
Dryocopus pileatus	Pileated Woodpecker	S5				CO	PO	
Falconidae	**Caracaras & Falcons**							
Falco sparverius	American Kestrel	S4				CO	PO	
Falco peregrinus anatum/tundrius	Peregrine Falcon	S3B	SC	SC	Schedule 1	CO		
Tyrannidae	**Tyrant Flycatchers**							
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC		CO	PO	PR
Empidonax alnorum	Alder Flycatcher	S5B				PO	PO	
Empidonax traillii	Willow Flycatcher	S5B				PR	PR	PO
Empidonax minimus	Least Flycatcher	S4B				PO	PO	
Sayornis phoebe	Eastern Phoebe	S5B				CO		
Myiarchus crinitus	Great Crested Flycatcher	S4B				CO	PR	PO
Tyrannus tyrannus	Eastern Kingbird	S4B				CO	CO	PR
Vireonidae	**Vireos**							
Vireo gilvis	Warbling Vireo	S5B				CO	PR	PO
Vireo olivaceus	Red-eyed Vireo	S5B				CO	PO	PR
Corvidae	**Crows & Jays**							
Cyanocitta cristata	Blue Jay	S5				CO	CO	PO
Corvus brachyrhynchos	American Crow	S5B				CO	CO	PO
Alaudidae	**Larks**							
Eremophila alpestris	Horned Lark	S5B				CO	PO	
Hirundinidae	**Swallows**							
Progne subis	Purple Martin	S4B				PR	PR	
Tachycineta bicolor	Tree Swallow	S4B				CO	CO	PO
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B				CO	CO	X
Riparia riparia	Bank Swallow	S4B	THR	T		CO		
Petrochelidon pyrrhonota	Cliff Swallow	S4B				CO	CO	
Hirundo rustica	Barn Swallow	S4B	THR	T		CO	PR	PR
Paridae	**Chickadees & Titmice**							
Poecile atricapillus	Black-capped Chickadee	S5				CO	CO	PR

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[3]	17PJ02	17NJ92	NRSI Observed
Sittidae	**Nuthatches**							
Sitta carolinensis	White-breasted Nuthatch	S5				PR	PO	PO
Certhiidae	**Creepers**							
Certhia americana	Brown Creeper	S5B				PO		
Troglodytidae	**Wrens**							
Troglodytes aedon	House Wren	S5B				CO	CO	
Cistothorus palustris	Marsh Wren	S4B					PO	
Thryothorus ludovicianus	Carolina Wren	S4				PO		
Turdidae	**Thrushes**							
Sialia sialis	Eastern Bluebird	S5B	NAR	NAR			PR	
Catharus fuscescens	Veery	S4B				PO		
Hylocichla mustelina	Wood Thrush	S4B	SC	T		PO	PR	
Turdus migratorius	American Robin	S5B				CO	CO	CO
Mimidae	**Mockingbirds, Thrashers & Allies**							
Dumetella carolinensis	Gray Catbird	S4B				CO	PR	PO
Toxostoma rufum	Brown Thrasher	S4B				PR	PR	
Mimus polyglottos	Northern Mockingbird	S4				CO	CO	
Sturnidae	**Starlings**							
Sturnus vulgaris	European Starling	SNA				CO	CO	CO
Bombycillidae	**Waxwings**							
Bombycilla cedrorum	Cedar Waxwing	S5B				CO	CO	PR
Passeridae	**Old World Sparrows**							
Passer domesticus	House Sparrow	SNA				CO	CO	PR
Fringillidae	**Finches & Allies**							
Carpodacus mexicanus	House Finch	SNA				CO	CO	PO
Spinus tristis	American Goldfinch	S5B				CO	PR	PR
Parulidae	**Wood Warblers**							
Seiurus aurocapillus	Ovenbird	S4B				PO		
Parkesia noveboracensis	Northern Waterthrush	S5B				PO	PO	
Geothylpis philadelphia	Mourning Warbler	S4B				PR	CO	
Geothylpis trichas	Common Yellowthroat	S5B				PO	PR	PR
Setophaga ruticilla	American Redstart	S5B				CO		PO
Setophaga petechia	Yellow Warbler	S5B				CO	CO	PR
Setophaga pinus	Pine Warbler	S5B				CO		
Emberizidae	**New World Sparrows & Allies**							
Pipilo erythrophthalmus	Eastern Towhee	S4B				PO	PO	
Spizella passerina	Chipping Sparrow	S5B				CO	PR	PO
Spizella pusilla	Field Sparrow	S4B				CO	PO	
Passerculus sandwichensis	Savannah Sparrow	S4B				CO	CO	PR

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[3]	17PJ02	17NJ92	NRSI Observed
Melospiza melodia	Song Sparrow	S5B				CO	CO	PR
Melospiza georgiana	Swamp Sparrow	S5B				PO	PR	CO
Cardinalidae	**Cardinals, Grosbeaks & Allies**							
Piranga olivacea	Scarlet Tanager	S4B				PR	CO	
Cardinalis cardinalis	Northern Cardinal	S5				CO	PR	PR
Pheucticus ludovicianus	Rose-breasted Grosbeak	S4B				CO	PR	
Passerina cyanea	Indigo Bunting	S4B				CO	CO	
Icteridae	**Blackbirds**							
Dolichonyx oryzivorus	Bobolink	S4B	THR	T	No Schedule	CO	CO	PR
Agelaius phoeniceus	Red-winged Blackbird	S4				CO	CO	CO
Sturnella magna	Eastern Meadowlark	S4B	THR	T	No Schedule	CO	PR	PO
Quiscalus quiscula	Common Grackle	S5B				CO	CO	CO
Molothrus ater	Brown-headed Cowbird	S4B				CO	CO	PO
Icterus spurius	Orchard Oriole	S4B				PO	PR	
Icterus galbula	Baltimore Oriole	S4B				CO	CO	

[1]MNRF 2021; [2]MECP 2020; [3]Government of Canada 2021; [4]BSC et al. 2008

Appendix IV
Herpetofauna Species Reported from the Study Area and Vicinity

Reptile and Amphibian Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[3]	Ontario Reptile and Amphibian Atlas[4] Squares: 17PJ02, 17NJ92	NRSI Observed
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*	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	Milksnake	S4	NAR	SC	Schedule 1	X	
Opheodrys vernalis	Smooth Greensnake	S4				X	
Nerodia sipedon sipedon	Northern Watersnake	S5	NAR	NAR		X	
Storeria dekayi dekayi	Dekay's Brownsnake	S5	NAR	NAR		X	
Storeria occipitomaculata occipitom	Red-bellied Snake	S5				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 laterale	Blue-spotted Salamander	S4				X	
Ambystoma maculatum	Spotted Salamander	S4				X	
Necturus maculosus	Mudpuppy	S4	NAR	NAR		X	
Notophthalmus viridescens viridesc	Red-spotted Newt	S5				X	
Plethodon cinereus	Eastern Red-backed Salamander	S5				X	
Toads and Frogs							
Anaxyrus americanus	American Toad	S5				X	
Hyla versicolor	Gray Treefrog	S5				X	
Pseudacris triseriata pop. 2	Western Chorus Frog *(Great Lakes/S*	S3	NAR	T	Schedule 1	X	
Pseudacris crucifer	Spring Peeper	S5				X	
Lithobates catesbeiana	American Bullfrog	S4				X	
Lithobates clamitans melanota	Green Frog	S5				X	
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR		X	
Lithobates sylvaticus	Wood Frog	S5				X	

[1]MNRF 2021a; [2]MECP 2020; [3]Government of Canada 2021; [4]Ontario Nature 2019

Appendix V
Mammal Species Reported from the Study Area and Vicinity

Mammal Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[3]	Ontario Mammal Atlas[4]	NRSI Observed
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 fumeus	Smoky Shrew	S5				X	
Chiroptera	**Bats**						
Eptesicus fuscus	Big Brown Bat	S4				X	
Lasionycteris noctivagans	Silver-haired Bat	S4				X	
Lasiurus borealis	Eastern Red Bat	S4				X	
Lasiurus cinereus	Hoary Bat	S4				X	
Myotis lucifugus	Little Brown Myotis	S4	END	E	Schedule 1	X	
Myotis septentrionalis	Northern Myotis	S3	END	E	Schedule 1	X	
Lagomorpha	**Rabbits and Hares**						
Lepus europaeus	European Hare	SNA				X	
Sylvilagus floridanus	Eastern Cottontail	S5				X	X
Rodentia	**Rodents**						
Castor canadensis	Beaver	S5				X	
Marmota monax	Woodchuck	S5				X	
Microtus pennsylvanicus	Meadow Vole	S5				X	X
Mus musculus	House Mouse	SNA				X	
Ondatra zibethicus	Muskrat	S5				X	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	X
Tamiasciurus hudsonicus	Red Squirrel	S5				X	
Tamias striatus	Eastern Chipmunk	S5				X	X
Zapus hudsonius	Meadow Jumping Mouse	S5				X	
Carnivora	**Carnivores**						

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[3]	Ontario Mammal Atlas[4]	NRSI Observed
Canis latrans	Coyote	S5				X	
Mephitis mephitis	Striped Skunk	S5				X	
Mustela frenata	Long-tailed Weasel	S4				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 2020; [2]MECP 2019; [3]Government of Canada 2021; [4]Dobbyn 1994

Appendix VI
Butterfly Species Reported from the Study Area and Vicinity

Butterfly Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule3	TEA Atlas[4] (Square 17PJ02)	NRSI Observed
Hesperiidae	**Skippers**						
Anatrytone logan	Delaware Skipper	S4				X	
Ancyloxypha numitor	Least Skipper	S5				X	
Epargyreus clarus	Silver-spotted Skipper	S4				X	
Erynnis baptisiae	Wild Indigo Duskywing	S4				X	
Erynnis icelus	Dreamy Duskywing	S5				X	
Erynnis juvenalis	Juvenal's Duskywing	S5				X	
Euphyes vestris	Dun Skipper	S5				X	
Hylephila phyleus	Fiery Skipper	SNA				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	
Thorybes pylades	Northern Cloudywing	S5				X	
Thymelicus lineola	European Skipper	SNA				X	
Wallengrenia egeremet	Northern Broken Dash	S5				X	
Papilionidae	**Swallowtails**						
Eurytides marcellus	Zebra Swallowtail	SNA				X	
Papilio cresphontes	Giant Swallowtail	S4				X	
Papilio glaucus	Eastern Tiger Swallowtail	S5				X	
Papilio canadensis X glaucus	Midsummer Tiger Swallowtail					X	
Papilio polyxenes	Black Swallowtail	S5				X	
Pieridae	**Whites and Sulphurs**						
Colias eurytheme	Orange Sulphur	S5				X	
Colias philodice	Clouded Sulphur	S5				X	
Pieris rapae	Cabbage White	SNA				X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**						
Callophrys niphon	Eastern Pine Elfin	S5				X	
Celastrina sp.	Azure species					X	
Celastrina lucia	Northern Spring Azure	S5				X	

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule3	TEA Atlas[4] (Square 17PJ02)	NRSI Observed
Cupido comyntas	Eastern Tailed Blue	S5				X	
Glaucopsyche lygdamus	Silvery Blue	S5				X	
Lycaena hyllus	Bronze Copper	S5				X	
Lycaena phlaeas	American Copper	S5				X	
Satyrium acadica	Acadian Hairstreak	S4				X	
Satyrium calanus	Banded Hairstreak	S4				X	
Satyrium caryaevorus	Hickory Hairstreak	S4				X	
Satyrium edwardsii	Edwards' Hairstreak	S4				X	
Satyrium liparops	Striped Hairstreak	S5				X	
Nymphalidae	**Brush-footed Butterflies**						
Aglais milberti	Milbert's Tortoiseshell	S5				X	
Boloria bellona	Meadow Fritillary	S5				X	
Cercyonis pegala	Common Wood-Nymph	S5				X	
Chlosyne nycteis	Silvery Checkerspot	S5				X	
Coenonympha tullia	Common Ringlet	S5				X	
Danaus plexippus	Monarch	S2N, S4B	SC	E	Schedule 1	X	
Euphydryas phaeton	Baltimore Checkerspot	S4				X	
Junonia coenia	Common Buckeye	SNA				X	
Lethe anthedon	Northern Pearly-Eye	S5				X	
Lethe appalachia	Appalachian Brown	S4				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 Merchant	S5				X	
Polygonia interrogationis	Question Mark	S5				X	
Polygonia progne	Grey Comma	S5				X	
Speyeria cybele	Great Spangled Fritillary	S5				X	
Vanessa atalanta	Red Admiral	S5				X	
Vanessa cardui	Painted Lady	S5				X	

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule3	TEA Atlas[4] (Square 17PJ02)	NRSI Observed
Vanessa virginiensis	American Lady	S5				X	

[1]MNRF 2020; [2]MECP 2019; [3]Government of Canada 2021; [4]MacNaughton et al. 2020

Appendix VII
Odonate Species Reported from the Study Area and Vicinity

Dragonfly and Damselfly Species Reported From the Study Area

Scientific Name	Common Name	SRANK[1]	SARO[2]	COSEWIC[3]	SARA Schedule[4]	Odonate Atlas[10] (17PJ02)	Odonate Atlas[10] (17NJ92)	NRSI Observed
Calopterygidae	**Broadwinged Damselflies**							
Calopteryx aequabilis	River Jewelwing	S5				X		
Calopteryx maculata	Ebony Jewelwing	S5				X	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 forcipatus	Sweetflag Spreadwing	S4				X		
Lestes rectangularis	Slender Spreadwing	S5				X		
Lestes unguiculatus	Lyre-tipped Spreadwing	S5				X		
Coenagrionidae	**Narrow-winged Damselflies**							
Amphiagrion saucium	Eastern Red Damsel	S4				X		
Argia fumipennis violacea	Violet Dancer	S5				X		
Argia moesta	Powdered Dancer	S5				X		
Chromagrion conditum	Aurora Damsel	S5				X		
Coenagrion resolutum	Taiga Bluet	S5				X		
Enallagma anna	River Bluet	S2				X		
Enallagma antennatum	Rainbow Bluet	S4				X		
Enallagma ebrium	Marsh Bluet	S5				X		
Enallagma exsulans	Stream Bluet	S5				X		
Enallagma hageni	Hagen's Bluet	S5				X		
Ischnura posita	Fragile Forktail	S4				X		
Ischnura verticalis	Eastern Forktail	S5				X		
Aeshnidae	**Darners**							
Aeshna canadensis	Canada Darner	S5					X	
Aeshna constricta	Lance-tipped Darner	S5				X		
Anax junius	Common Green Darner	S5				X		
Boyeria vinosa	Fawn Darner	S5				X		
Gomphidae	**Clubtails**							
Arigomphus furcifer	Lilypad Clubtail	S3				X		
Arigomphus villosipes	Unicorn Clubtail	S2S3				X		

Phanogomphus quadricold	Rapids Clubtail	S1	END	E	Schedule 1	X		
Gomphurus fraternus	Midland Clubtail	S4				X		
Ophiogomphus rupinsulens	Rusty Snaketail	S4				X		
Corduliidae	**Emeralds**							
Epitheca pinceps	Prince Baskettail	S5				X		
Libellulidae	**Skimmers**							
Erythemis simplicicollis	Eastern Pondhawk	S5				X		
Leucorrhinia intacta	Dot-tailed Whiteface	S5				X		
Libellula luctuosa	Widow Skimmer	S5				X	X	
Libellula pulchella	Twelve-spotted Skimmer	S5				X		
Libellula quadrimaculata	Four-spotted Skimmer	S5				X		
Plathemis lydia	Common Whitetail	S5				X	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 2020; [2]MECP 2019; [3]Government of Canada 2021; [4]Ontario Odonata Atlas Database 2020

Appendix VIII
Aquatic Habitat Assessment Photolog

Photo 1. Upstream side of Ninth Line culvert along Drainage Feature B, facing southwest (May 28, 2020).

Photo 2. Upstream view of Drainage Feature B from culvert, facing northeast (May 28, 2020).

Photo 3. Downstream view of Drainage Feature B facing Ninth Line culvert, facing southwest (May 28, 2020).

Photo 4. Upstream view of Drainage Feature B, facing northeast (May 28, 2020).

Photo 5. Drainage Feature B outlet to SWM pond at Ninth Line culvert, facing southwest (May 28, 2020).

Photo 6. Upstream side of Ninth Line culvert along Drainage Feature C, facing south (May 28, 2020).

Photo 7. Upstream view of Drainage Feature C, facing northeast (May 28, 2020).

Photo 8. Wetted channel along Feature C (May 28, 2020).

Photo 9. Drainage Feature C outlet to SWM pond at Ninth Line culvert, facing southwest (May 28, 2020).

Photo 10. Downstream view of Drainage Feature D from Ninth Line, facing southwest (May 28, 2020).

Photo 11. View of Ninth Line culvert outlet along Drainage Feature D, facing east (May 28, 2020).

Photo 12. View of Drainage Feature D channel downstream from Ninth Line culvert, facing east (May 28, 2020).

Photo 13. Downstream view of Watercourse NLT-1 towards Ninth Line from Osprey Marsh SWM pond, facing southwest (May 28, 2020).

Photo 14. Upstream view of Watercourse NLT-1 from Ninth Line, facing northeast (May 28, 2020).

Photo 14. Downstream view of Watercourse NLT-1 towards Ninth Line from the flow control structure, facing southwest (May 28, 2020).

Photo 14. Downstream view of Watercourse NLT-1 from Ninth Line, facing southwest (May 28, 2020).

Appendix IX
Species at Risk/Species of Conservation Concern Habitat Assessment

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	Species Observed?
Birds									
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	BSC et al. 2008; eBird 2020	No suitable nesting habitat observed	No
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; eBird 2020; AFW 2015	Yes	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; eBird 2020; iNaturalist 2020; AFW 2015	Yes	Yes
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; eBird 2020	Yes	No
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; eBird 2020	Yes	No
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; eBird 2020; AFW 2015	Yes	Yes
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; AFW 2015	Yes	Yes
Falco peregrinus anatum/tundrius	Peregrine Falcon	S3B	SC	SC	Schedule 1	rock cliffs, crags, especially situated near water; tall buildings in urban centres	BSC et al. 2008; eBird 2020	Yes (foraging habitat only)	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	Yes	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	Species Observed?
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; AFW 2015	Yes	No
Herpetofauna									
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 2019	No	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 2019	Yes	No
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 2019	No	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 2019	No	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 2019	Yes	No
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 2019; iNaturalist 2020	Yes	No
Mammals									
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	No	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	Species Observed?
Myotis lucifugus	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	Dobbyn 1994	Yes	No; however, presumed present
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	Dobbyn 1994	Yes	No; however, presumed present
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	Yes	No; however, presumed present
Insects									
Danaus plexippus	Monarch	S2N, S4B	SC	SC	Schedule 1	Host plants are milkweeds (*Asclepias* spp.)	iNaturalist 2020	Yes	No

[1]MNRF 2020; [2]MECP 2019; [3]Government of Canada 2021; [4]OMNR 2000

LEGEND
SRANK
S1 Critically Imperiled
S2 Imperiled
S3 Vulnerable
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 X
Significant Wildlife Habitat Assessment

Significant Wildlife Habitat Assessment Tables

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 7E.

	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 Northern Pintail Gadwall Blue-winged Teal Green-winged Teal American Wigeon Northern Shoveler Tundra Swan	CUM1 CUT1 - Plus evidence of annual spring flooding from melt water or run-off within these Ecosites. - Fields with seasonal flooding and waste grain in the Long Point, Rondeau, Lake. St. Clair, Grand Bend and Pt. Pelee areas may be important to Tundra Swans.	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[l] or more individuals required. • The area of the flooded field ecosite habitat plus a 100-300m radius buffer dependant 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.	Cultural Meadow is present within the study area. However, the indicator wildlife species have not been recorded in abundances anywhere near the significance criterion according to eBird records collected within the study area. Significant waterfowl stopover and staging habitat is considered absent in the study area. According to the Ninth Line Scoped Subwatershed Study (SWS; AFW 2015), study area cultural meadows do not accumulate sheet water during the spring or concentrations of waterfowl. **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 Green-winged Teal American Black Duck Northern Pintail Northern Shoveler American Wigeon Gadwall Blue-winged Teal Hooded Merganser Common Merganser Red-breasted Merganser Lesser Scaup Greater Scaup Common Goldeneye Bufflehead Long-tailed Duck Surf Scoter White-winged Scoter Black Scoter Canvasback Redhead Ruddy Duck Brant White-winged Scoter Black Scoter	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[l] or more of listed species for 7 days[l], 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.	Shallow marsh and deciduous swamp habitat is present within the study area. However, according to the SWS, these habitats were not found to contain a large concentration of migrating waterfowl during field surveys. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 7E.

	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	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[l] 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[l] Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100m radius area[cxlviii] • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMIST[cxlix] Index #8 provides development effects and mitigation measures.	The study area contains meadow marsh habitats. However, the indicator wildlife species have not been recorded in abundances anywhere near the significance criterion according to eBird records collected within the study area. Large abundances of these species were not documented during the SWS. Significant shorebird migratory stopover habitat is considered absent in 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 Bald Eagle: Forest Community Series: FOD, FOM, FOC, SWD, SWM, or SWC, on shoreline areas adjacent to large rivers or adjacent to lakes with open water (hunting area).	The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. Raptor wintering (hawk/owl) sites need to be > 20ha[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 and large trees and snags aviable for roosting[cxlix] Information Sources • OMNRF Districts • Natural clubs • Natural Heritage Information Centre (NHIC) Raptor Winter Concentration Area • Data from Bird Studies Canada • Reports and other information available from CAs • Results of Christmas Bird Counts	Studies confirm the use of these habitats by: • One or more Short-eared Owls, or, One of 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[l]. • 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"[ccxi] • SWHMIST[cxlix] Index #10 and #11 provides development effects and mitigation measures.	Candidate SWH for this habitat function was identified in the SWS, with specific reference to the FOD6-5 woodland at the south end of the study area, and adjacent CUM1 cultural meadow habitat. Rough-legged Hawk, Red-tailed Hawk, American Kestrel, Snowy Owl, and Bald Eagle have been reported in the immediate study area vicinity on eBird. Since the SWS, CUM1 habitat immediately adjacent to the FOD6-5 woodland has been returned to row crop agriculture, and a large portion of nearby CUM1 has been removed for construction of a new community centre. Suitable habitat is therefore now absent. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 7E.

	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 all Ontario landscapes.	Big Brown Bat Eastern Pipistrelle/Tri-colored 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 The locations of bat hibernacula are relatively poorly known. Information Sources • OMNRF for possible locations and contact for local experts • Natural Heritage Information Centre (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[l]. • The area includes 200m radius around the entrance of the hibernaculum[cxlviii, ccvii, l]. for the development types and 1000m for wind farms [ccv]. • Studies are to be conducted during the peak swarming period (Aug. – Sept.). Surveys should be conducted following methods outlined in the[ccv]."Bats and Bat Habitats: Guidelines for Wind Power Projects" [ccv] • SWHMIST[cxlix] Index #1 provides development effects and mitigation measures.	Suitable habitat is not present within the study area. **Not SWH**
Wildlife Habitat: Bat Maternity Colonies					
Rationale: Known locations of forested bat maternity colonies are extremely rare in all Ontario landscapes.	Big Brown Bat Silver-haired Bat	Maternity colonies considered SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD FOM SWD SWM	Maternity colonies can be found in tree cavities, vegetation and often in building [sxxii, 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[l] • >5 Adult Female Silver-haired Bats[l] • The area of the habitat includes the entire woodland or the forest stand ELC Ecosite containing the maternity colonies[l]. • Evaluation methods for maternity colonies should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects"[ccv]. • SWHMIST[cxlix] Index #12 provides development effects and mitigation measures.	The FOD6-5 woodland the south end of the study area was confirmed in the SWS to contain >10 snags/ha. **Candidate SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 7E.

	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 • Field naturalists clubs • OMNRF Ecologist or Biologist • Natural Heritage Information Centre (NHIC)	• Presence of 5 over-wintering Midland Painted Turtles is significant[l]. • One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant[l]. • 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. – Apr)[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.	Natural ponds are not located immediately adjacent to the Ninth Line ROW. During the SWS, spring basking turtle observations were limited to SWM ponds at the north end of the study area, with only 2 individuals observed. **Not SWH**
Wildlife Habitat: Reptile Hibernaculum					
Rationale: Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant	Snakes: Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake Special Concern: Milksnake Eastern Ribbonsnake	For all snakes, habitat may be found in any ecosite in southern Ontario 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. The existence of rock piles or slopes, stone fences, and crumbling foundations assist in identifying candidate SWH.	For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural locations. Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line[xliv, l, li, liii, 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. 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 available from CAs • Local naturalists and experts, as well as university herpetologists may also know where to find some of these sites. • Natural Heritage Information Centre (NHIC)	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)[l]. • 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[l]. • SWHMIST[cxlix] Index #13 provides development effects and mitigation measures for snake hibernacula.	Significant abundances or diversity of snake species were not observed during the SWS field investigations, and no snakes were documented during the previous Ninth Line Corridor Study (NSE 2012). Potential hibernaculum features (e.g, structures and old foundations) are generally located away from the Ninth Line ROW. No snake species were observed during EA field surveys along roadside areas. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 7E.

	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 population are declining in Ontario.	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles Cliff faces, bridge abutments, silos, barns Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	• Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. • Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation. Information Sources • Reports and other information available from CAs • Ontario Breeding Bird Atlas[ccv]. • Bird Studies Canada: Nature Counts 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 is 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 15 m 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 (OMNRF). • Natural Heritage Information Centre (NHIC) Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries. • Reports and other information available from CAs • MNRF District Offices • Field naturalist clubs	Studies confirming: • Presence of 2 or more active nests of Great Blue Heron or other list species. • The habitat extends from the 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 colonies must 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.	Swamps of suitable size are present within the study area. However, no stick nests or other breeding evidence for herons was observed during field investigations completed for the SWS and EA. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 7E.

	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 population, typically sites are only known colony in area and are used annually.	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1:50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1 – 6 MAS1 – 3 CUM CUT CUS	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in 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 Centre (NHIC) Colonial Waterbird Nesting Area • MNRF District Offices • Field naturalist clubs	Studies confirming: • Presence of >25 active nests for Herring Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern[l]. • Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant[l]. • Presence of 5 or more pairs for Brewer's Blackbird[l]. • The edge of the colony and a minimum 150m radius area of the 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 is not present within the study area. **Not SWH**
Wildlife Habitat: Migratory Butterfly Stopover Areas					
Rationale: Butterfly stopover 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 CUT CUS Forest: FOC FOD FOM 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 10ha in size with a combination of field and forest habitat present, and will be located within 5km of Lake Ontario and Erie[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 • MNRF District Offices • Natural Heritage Information Centre (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 White Admiral's is to be considered significant[l]. • SWHMIST[cxlix] Index #16 provides development effects and mitigation measures.	The study area is not located within 5km of Lake Ontario. **Not SWH**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 7E.

	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 numbers 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 >5 ha[l] in size and within 5km [iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv] of Lake Ontario and Erie. If woodlands are rare in an area of shoreline, woodland fragments 2-5ha can be considered for this habitat • If multiple woodlands are located along the shoreline those Woodlands <2km from Lake Erie or 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 and Lake Erie are Candidate SWH[cxlviii]. Information Sources • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • Ontario Important Bird Areas (IBA) Program	Studies confirm: • Use of the habitat by >200 birds/day and with >35 spp. with at least 10 bird spp. recorded on at least 5 different survey dates[l]. This abundance and diversity of migrant bird species is considered above average and significant. • Studies should be completed during spring (March/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 located within 5km of Lake Ontario. **Not SWH**
Wildlife Habitat: Deer Winter Congregation Areas					
Rationale: Deer movement during winter in the southern areas of Ecoregion 7E 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 (CUP) smaller than 50 ha may also be used.	• Woodlots >100 ha in size or if large woodlots are rare in a planning area woodlots>50ha[l]. • Deer movement during winter in Ecoregion 7E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands[cxlviii]. • 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[l]. 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 MNRF[l]. • 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]. • SWHMIST[cxlix] Index #2 provides development effects and mitigation measures.	MNRF-mapped deer overwintering habitat is absent within the study area. **Not SWH**

Significant Wildlife Habitat Assessment Tables

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 7E.

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 Districts • Natural Heritage Information Centre (NHIC) has location information available on their website • Field naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes[lxxviii] • SWHMIST[cxlix] Index #21 provides development effects and mitigation measures.	Vegetation community types is not present within the 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%.	A sand barren area >0.5ha in size Information Sources • OMNRF Districts • Natural Heritage Information Centre (NHIC) has location information available on their website • Field naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens[lxxviii] • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotics sp)[í]. • SWHMIST[cxlix] Index #20 provides development effects and mitigation measures.	Vegetation community types is not present within the study area. **Not SWH**

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 7E.

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 7E	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2 **Five Alvar Indicator Species:** 1) Carex crawei 2) Panicum philadelphicum 3) Eleocharis compressa 4) Scutellaria parvula 5) Trichostema brachiatum These indicator species are very specific to Alvars within Ecoregion 7E[cxlix]	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animals species. Vegetation cover varies from patchy to barren with a less than 60% tree cover[lxxviii].	An Alvar site > 0.5ha in size[lxxv]. Alvar is particularly rare in Ecoregion 7E where the only known sites are found in the western islands of Lake Erie[cxcix]. Information Sources • Alvars of Ontario (2000), Federation of Ontario Naturalists[lxxvi]. • Ontario Nature – Conserving Great Lakes Alvars[ccviii]. • Natural Heritage Information Centre (NHIC) has location information available on their website • OMNRF Staff • Field Naturalist clubs • Conservation Authorities	Field studies identify four of the five **Alvar indicator species**[lxxv] at a candidate Alvar site is Significant • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • 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 types is not present within the study area. **Not SWH**
Old Growth Forest					
Rationale: Due to historic logging practices and land clearance for agriculture, old growth forest is rare in Ecoregion 7E.	Forest Community Series: FOD FOC FOM SWD SWC SWM	Old growth forests are characterized by heavy mortality or turnover of overstorey 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 area is >0.5ha Information Sources • OMNRF Forest Resource Inventory mapping • OMNRF Districts • Field naturalist clubs • Conservation Authorities • Sustainable Forestry Licence (SFL) companies will possibly know locations through field operations. • Municipal forestry departments	Field Studies will determine: • If dominant trees species of the ecosite are >140 years old, then stand is Significant Wildlife Habitat[cxlviii]. • The forested area containing the old growth characteristics will have experienced no recognizable forestry activities [cxlviii] (cut stumps will not be present) • Determine ELC Vegetation Type for forest area containing the old growth characteristics[lxxviii]. • SWHMIST[cxlix] Index #23 provides development effects and mitigation measures.	Vegetation community types is not present within the study area. **Not SWH**

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 7E.

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%. In Ecoregion 7E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario)[cc].	No minimum size to site[i] Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. Information Sources • OMNRF Districts • Natural Heritage Information Centre (NHIC) has location data available on their website • Field naturalists clubs • Conservation Authorities	Field studies confirm one or more of the Savannah indicator species listed in[lxxv] Appendix N should be present[i]. Note: Savannah plant spp. list from Ecoregion 7E should be used. • Area of the ELC Vegetation type is the SWH[lxxviii]. • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWHMIST[cxlix] Index #18 provides development effects and mitigation measures.	Vegetation community types is not present within the 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. In Ecoregion 7E, known Tallgrass Prairie and savannah remnants are scattered between Lake Huron and Lake Erie, near Lake St. Clair, north of and along the Lake Erie shoreline, in Brantford and in the Toronto area (north of Lake Ontario)[cc].	No minimum size to site[i]. 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 Centre (NHIC has location information available on their website • OMNRF Districts • Field naturalists clubs • Conservation Authorities	Field studies confirm one or more of the Prairie indicator species listed in[lxxv] Appendix N should be present[i]. Note: Prairie plant spp. list from Ecoregion 7E should be used. • Area of the ELC Vegetation Type is the SWH[lxxviii]. • 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 types is not present within the study area. **Not SWH**

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 7E.

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 OMNRF/NHIC will have up to date listing for rare vegetation communities. Information Sources • Natural Heritage Information Centre (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 rare vegetation communities were documented within the study area in the SWS. **Not SWH**

Significant Wildlife Habitat Assessment Tables

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 7E.

	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 (>0.5ha) or a wetland (>0.5ha) with 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 racoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites. 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[l], or, • Presence of 10 or more nesting pairs for listed species including Mallards[l]. • 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.	The study area contains marsh and swamp habitats. However, significant concentrations of waterfowl were not documented during the SWS field investigations. None of the indicator species were documented during EA field surveys. **Not SWH**
Wildlife Habitat: Bald Eagle and Osprey Nesting, Foraging and Perching Habitat					
Rationale: Nest sites are fairly uncommon in Ecoregion 7E and are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.	Osprey Special Concern: Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands.	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). 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 format and does not include all the habitat. • Nature Counts, Ontario Nest Records Scheme data • OMNRF Districts • Check the Ontario Breeding Bird Atlas[ccv] or Rare Breeding Birds in Ontario for species documented • Reports and other information available from 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 SWH[ccvii], 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 dependant 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.	Bald Eagle and Osprey have been documented in the immediate vicinity of the study area on eBird. However, no Bald Eagle or Osprey nests were observed within the study area during SWS field investigations, and none were observed during EA field surveys. Suitable woodland habitats adjacent to large bodies of water are not present in the study area. **Not SWH**

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 7E.

	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 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 combined >30ha or with >4ha of interior habitat[bxxxviiii, bxxxix, xc, xci, xciii, xciv, xcv,xcvi, cxxxiii]. Interior habitat determined with a 200m buffer[cxlviii]. • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest. Information Sources • OMNRF Districts • Check the Ontario Breeding Bird Atlas[ccv] or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada • Reports and other information available from 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 28 ha of habitat is the SWH[ccvii].(the 28ha habitat area would be applied where optimal habitat is irregularly shaped around the nest) • Barred Owl – A 200m radius around the nest is the SWH[ccvii]. • Broad-winged Hawk and Coopers Hawk – A 100m radius around the nest is the SWH[ccvii]. • Sharp-Shinned Hawk – A 50m radius around the nest is the SWH[ccvii]. • Conduct field investigations from early 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.	No woodlands of sufficient size or interior habitat occur 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	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles[l] • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH[l] • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100m around the nesting area dependant on slope, riparian vegetation and adjacent land use is the SWH[cxlviii]. • Travel routes from wetland to nesting area are to be considered within the SWH as part of the 30-100m area of habitat[cxlix]. • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observation studies observing the turtles nesting is a recommended method. • SWHMIST[cxlix] Index #28 provides development effects and mitigation measures for turtle nesting habitat.	No suitable nesting habitat in the form of exposed soils or gravel was identified within the study area during SWS field studies. **Not SWH**

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 7E.

	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 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[i] 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 of the habitat[cxlviii]. • SWHMIST[cxlix] Index #30 provides development effects and mitigation measures.	No seeps were identified within the study area during SWS field studies or EA field surveys. The study area is not located within a headwaters 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)[cbxxii, 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 Districts and 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/toad species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog/toad species with Call Level Codes of 3. • A combination of observational study and call count surveys [cviii] will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands. • The habitat is the wetland area plus a 230m radius of woodland area[lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx, lxxi]. If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat. • SWHMIST[cxlix] Index #14 provides development effects and mitigation measures.	Recorded breeding anuran abundances did not meet significance criteria during SWS field investigations as well as other studies completed within the area (Savanta 2019, LGL 2020b). Only low levels of anuran breeding activity were recorded within the study area. **Not SWH**

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 7E.

	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: Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within Central Ontario Landscapes	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green 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 >500m^2 (about 25m diameter)[ccvii] supporting high species diversity are significant: some small or ephemeral habitats may not be identified on MNR 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 1or more of the listed newt/salamander species or 2 or more of the listed frog or toad species and with at least 20 breeding individuals (adults and eggs masses)[lxxi, lxxiii] or 2 or more of the listed frog/toad species with Call Level of 3. or; Wetland with confirmed breeding Bullfrogs are significant[i]. • The ELC ecosite wetland area and the shoreline are the SWH. • A combination of observational study and call count surveys cviii to determine breeding/larval stages will be required during the spring (May March-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/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.	Recorded breeding anuran abundances did not meet significance criteria during SWS field investigations as well as other studies completed within the area (Savanta 2019, LGL 2020b). Only low levels of anuran breeding activity were recorded within the study area. **Not SWH**
Wildlife Habitat: 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 Pileated Woodpecker 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 >30ha[cv, cxxxi, cxxxii, cxxxiii, cxxxiv, cxxxv, cxxxvi, cxxxvii, cxxxviii, cxxxix, cxl, cxli, cxlii, cxliii, cxliv, cxlv, cxlvi, cl, cli, clii, cliii, cliv, clv, clvi, clvii, clviii, clix]. • Interior forest habitat is at least 200m from forest edge habitat[clxiv]. Information Sources • Local birder clubs • Canadian Wildlife Service (CWS) for the location of forest bird monitoring • Bird Studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to determine what forests were of greatest value to interior species. • Reports and other information available from CAs	Studies confirm: • Presence of nesting or breeding pairs of 3 or more of the listed wildlife species[i]. • Note: any site with breeding Cerulean Warblers or Canada Warbler is to be considered SWH[i]. • Conduct field investigations in 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.	Study area woodlands are too small to support area-sensitive bird breeding habitat. **Not SWH**

Significant Wildlife Habitat Assessment Tables

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 7E.

	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 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 • OMNRF Districts and wetland evaluations • Field naturalist clubs • Natural Heritage Information Centre (NHIC) • 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 breeding by any combination of 4 or more of the listed species[i]. • Note: any wetland with breeding of 1 or more Trumpeter Swans, Black Terns, 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	Marsh habitat is present within the study area. However, indicator species were not recorded during SWS field investigations or EA field surveys within the study area. **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) >30ha[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 • Local birder clubs • Ontario Breeding Bird Atlas[ccv] • EIS Reports and other information available from CAs	Field Studies confirm: • Presence of nesting or breeding of 2 or more of the listed species[i]. • A field with 1 or more breeding Short-eared Owls 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 cultural meadow occur within the study area. However, only 1 indicator species (Savannah Sparrow) was documented as breeding within the study area during both SWS field investigations and EA field surveys **Not SWH**

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 7E.

	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.	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 such as woodland area for some bird species.	Large natural field areas succeeding to shrub and thicket habitats >10ha[clxiv] in size. Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years)[i]. Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species[clxxiii]. Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. 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[i]. • A field with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat[i]. • 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.	Shrub/early successional bird breeding habitat of sufficient size is not found 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 CUM1 with inclusions of above meadow marsh ecosites can be used by terrestrial crayfish	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 large ecosite area is the SWH • Surveys should be done April to August in temporary or permanent water. Note the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult [cci] • SWHMIST[cxlix] Index #36 provides development effects and mitigation measures.	Terrestrial Crayfish habitat exists in the study area in the form of wetland and meadow habitats. However, no crayfish chimneys were identified during SWS field investigations or EA field surveys. **Not SWH**

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 7E.

	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 (NHIC).	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 and element occurrences for these species. • 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 neess to be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat for foraging habitat. • SWHMIST[cxlix] Index #37 provides development effects and mitigation measures.	Confirmed habitat for 1 SCC that is not otherwise addressed under other SWH categories, Eastern Wood-Pewee, was confirmed for the study area (FOD6-5 woodland) during the SWS field investigations as well as during EA field surveys and surveys completed for an adjacent land development (Savanta 2019). Eastern Wood-Pewee was also recorded within the FOD6-4 woodland at the far north end of the study area. Although Wood Thrush was identified to be breeding within the FOD6-5 woodland during the SWS field investigations, this species was not recorded within the feature during EA field surveys, nor during surveys completed immediately adjacent to the feature (Savanda 2019). It is concluded that Wood Thrush is likely no longer breeding within the FOD6-5 woodland. It was not recorded elsewhere within the study area.

Significant Wildlife Habitat Assessment Tables

Table 5. Characteristics of Animal Movement Corridors for Ecoregion 7E.

	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 American Toad Blue-spotted Salamander Spotted Salamander Four-toed Salamander Gray Treefrog Northern Leopard Frog Pickerel Frog Western Chorus Frog	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 considered when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 (Amphibian Breeding Habitat – Wetland) of this Schedule[l]. Information Sources • MNRF District Office • Natural Heritage Information Centre 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. Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant[cxlix]. • Corridors should have at least 15m of vegetation on both sides of waterwaycxlix or be up to 200m widecxlix 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.	Amphibian Breeding Habitat - Wetland SWH is not present within the study area. **Not SWH**

Appendix XI
Alternatives Evaluation Matrix Tables

Evaluation Criteria	Alternative 1 Widen from East to the West	Alternative 2 Widen about the Centreline	Alternative 3 Widen from West to the East
Transportation and Transit, Accessibility			
Addresses Congestion and Improves Corridor Capacity and Vehicular Level of Service to Accommodate Future Travel Demand	• All alternative designs increase capacity to meet future demands and have the same potential to reduce traffic congestion and delays		
Accommodates All Road Users, Including Pedestrians, Cyclists and Transit Users	• All alternative designs accommodate all road users by increasing road capacity, providing dedicated and continuous AT facilities, and improving transit reliance along the corridor		
Enhanced Road Safety and Comfort for All Road Users	• All alternative designs provide enhanced road safety and comfort for all road users by reducing collision potential through reduced traffic congestion and intersection improvements for auxiliary turn lanes and pedestrian / cyclist designated crossings (crossrides/crosswalks) • High potential for improving cyclist and pedestrian safety due to provision of dedicated active transportation facilities, which reduces potential conflict with vehicles		
Accommodates Commercial Goods Movement	• All alternative designs accommodates commercial goods movements		
Improved Access to / from Ninth Line	• All alternative designs reduce traffic congestion and provide greater gaps in traffic to improve access to/from Ninth Line at cross-streets and driveways		
Addresses Problem / Opportunity Statement	• All alternative designs address the problem and opportunity statement by improving Ninth Line's capacity to accommodate future traffic demands, providing AT facilities to encourage travel choices to reduce driving, improving transit efficiency and reliability, providing a continuous urban roadway with consistent drainage infrastructure, and designing Ninth Line as a complete street to serve people of all ages		
Improves Network Connectivity	• All alternative designs improve network connectivity by providing continuous 4-lane roadway, intersection improvements and dedicated AT facilities for pedestrians and cyclists.		
Improves Emergency Response Time	• All alternative designs provide additional lanes to improve emergency vehicle access and response time along the corridor		
Summary of Transportation and Transit, Accessibility	**Preferred**	**Preferred**	**Preferred**
City Building			
Consistency With The City's Strategic Priorities Pursuant to the City's Strategic Plan "Our Future Mississauga", Official Plan Policy Objectives, the Cycling Master Plan, Shaping Ninth Line, and Other Relevant Planning Documents	• All alternative designs are aligned with the City's plans and policies as these designs provide additional capacity to meet future demands and improve the cyclist and pedestrian experience		
Accommodates Existing and Planned Development	• Minor impacts to existing and planned developments on the west side of Ninth Line with marginal property impacts • Existing access is maintained and future access requirements are accommodated • Planned developments on the west can accommodate property impacts through development applications	• Moderate impacts to existing and planned developments on the west side of Ninth Line with moderate property impacts • Existing access is maintained, and future access requirements are accommodated	• Minor impacts to existing and planned developments on the west side of Ninth Line by maintaining existing right-of-way (ROW) boundary on the west side. Existing access is maintained, and future access requirements are accommodated. • Moderate impacts to potential future developments on the east side of Ninth Line
Summary of City Building	**Preferred**	**Less Preferred**	**Not Preferred**
Natural Heritage			

Evaluation Criteria	Alternative 1 Widen from East to the West	Alternative 2 Widen about the Centreline	Alternative 3 Widen from West to the East
Minimizes Impacts to and Enhances Provincially Significant Wetlands (PSWs), Environmentally Sensitive Areas (ESAs) and Areas of Natural and Scientific Interest (ANSIs)	• No Provincially Significant Wetlands (PSWs) occur within the study area • No Areas of Natural and Scientific Interest (ANSIs) within the study area		
Minimizes Impacts to Wildlife, Vegetation, Aquatic Species and Habitat, and Species at Risk	• Minor impacts to significant woodlands on the west side where there are significant woodland habitats (FOD5) for Bat Maternity Colonies. • Minor impacts to significant woodland (FOD5) and Mineral Cultural Meadow (CUM1) that are habitats for hawks, kestrel, owls, and bald eagles.	• Moderate impacts to significant woodlands on the west side where there are significant woodland habitats (FOD5) for Bat Maternity Colonies. • Moderate impacts to significant woodland (FOD5) and Mineral Cultural Meadow (CUM1) that are habitats for hawks, kestrel, owls, and bald eagles.	• No impacts to significant woodlands on the west side where there are significant woodland habitats (FOD5) for Bat Maternity Colonies. • No impacts impacts to significant woodland (FOD5) and Mineral Cultural Meadow (CUM1) that are habitats for hawks, kestrel, owls, and bald eagles.
Provides Drainage and Stormwater Management Improvements and Mitigates Erosion	• All alternative designs are urbanized roadways with curb and gutter to provide appropriate stormwater management within the road pavement.		
Minimizes Effects on Climate Change:			
a) Climate Change Mitigation: Minimizes the Generation of Greenhouse Gas Emissions and Carbon Sinks	• All alternative designs minimizes the generation of greenhouse gas and carbon sinks by improving AT facilities to reduce auto dependency • Reduction in road congestion helps decrease the amount of travel time for vehicles spent on the road • Accommodate tree planting within the boulevard where space permits		
b) Climate Change Adaptation: Resiliency or Vulnerability of the Project to Changing Climatic Conditions	• All alternative designs have the same resiliency/vulnerability of the project to changing climatic conditions • Potential for users to rely heavily on auto if users are exposed to weather events and patterns that affect the use of AT facilities		
c) Minimizes the Impact on the Environment's Adaptive Capacity (GUIDE)	• All alternative designs have the same environment's adaptive capacity for changing climatic conditions that affect the corridor		
Summary of Natural Environment	**Less Preferred**	**Less Preferred**	**Preferred**
Socio-Economic Environment			
Improves Attractiveness/Aesthetics	• Visual aesthetics will be moderately reduced due to increased pavement width from 2 to 4 lanes and the addition of active transportation facilities • Visual aesthetics can be improved through localized tree plantings and other boulevard treatments wherever possible within ROW		
Minimizes Business Impacts and Enhances Business and Place-Making Opportunities	• Improves access at commercial driveways, employment areas and cross-streets due to reduced traffic congestion • Improves pedestrian, cycling, and transit access through improved infrastructures on all designs		
Minimizes Property Acquisition	• Minor impacts to existing and future development and/or residential properties on the west side • No displacements anticipated of residential properties, but potential for property acquisition of residential properties on the west side	• Moderate impacts existing and future development and/or residential properties on the west side • No displacements anticipated of residential properties, but potential for property acquisition of residential properties	• No impacts existing and future development and/or residential properties on the west side • Potential displacements anticipated of residential properties on the east side

Evaluation Criteria	Alternative 1 Widen from East to the West	Alternative 2 Widen about the Centreline	Alternative 3 Widen from West to the East
Minimizes Noise and Vibration Impacts	• Noise levels are anticipated to increase with future traffic growth and lanes in closer proximity to properties		
Improves Air Quality	• Moderate improvement to air quality through increased transit use and reduced congestion • Active transportation and transit service improvements (through the reduced traffic congestion) can reduce dependence on automobile and provide air quality improvements		
Provides or Improves Streetscape Amenities and Urban Design Elements	• Improves streetscape amenities by provide tree plantings where space allows within the ROW • Improves urban design by accommodating dedicated AT facilities for pedestrians and cyclists		
Summary of Socio-Economic Environment	**Preferred**	**Less Preferred**	**Not Preferred**
Cultural Heritage			
Minimizes Impacts to Archaeological Resources	• Minor impacts to archaeological potentials on the west side to be minimized through design • Stage 2 archaeological assessment will be required for the study corridor • Anticipated minor impacts to existing St. Peter's Catholic Cemetery to be minimized through design, but will require Stage 3 Cemetery Investigation	• Moderate to significant impacts to archaeological potentials on the west side of the corridor • Minor impact to archaeological potential at Montessori School located on the east side of the corridor (6553 Ninth Line) • Stage 2 archaeological assessment will be required for the study corridor • moderate to significant impacts to existing St. Peter's Catholic Cemetery. Stage 3 Cemetery Investigation required.	• Moderate impact to archaeological potential at Montessori School located on the east side of the corridor (6553 Ninth Line) • Stage 2 archaeological assessment will be required for the study corridor
Minimizes Impacts to Cultural Heritage Resources	• Potential impacts to properties listed as heritage by the City of Mississauga: 5104 Ninth Line (CH1), 5768 Ninth Line (CH2), 6056 Ninth Line (CH3), and 7044 Ninth Line (CH5)	• Potential impacts to properties listed as heritage by the City of Mississauga or designated as part of the Ontario Heritage Act: 5104 Ninth Line (CH1), 5768 Ninth Line (CH2), 6056 Ninth Line (CH3), 6671 Ninth Line (CH4), and 7044 Ninth Line (CH5)	• Potential impact to property designated as part of the Ontario Heritage Act: 6671 Ninth Line (CH4)
Summary of Cultural Heritage	**Less Preferred**	**Not Preferred**	**Preferred**
Engineering Considerations, Construction Complexity and Implementation			
Minimizes Utility Relocation	• Moderate to significant utility relocation to accommodate additional lanes and AT facilities		
Addresses Drainage or Contamination Concerns	• All alternative designs will provide urbanized roadways with curb and gutter to improve drainage patterns along the corridor		
Minimizes Construction Complexity, Including Staging and Traffic Disruption During Construction	• Moderate construction complexity due to realignment of Ninth Line to the east	• Minor construction complexity as the road alignment will generally remain the same for Ninth Line	• Moderate construction complexity due to realignment of Ninth Line to the west
Optimizes Capital Costs	• All alternative designs provide improvements to all modes • Significant capital construction costs are anticipated due to the combination of utility	• All alternative designs provide improvements to all modes • Moderate capital construction costs are anticipated because centerline widening will maintain roadway crown but results in significant utility relocations	• All alternative designs provide improvements to all modes • Significant capital construction costs are anticipated due to the combination of utility

Evaluation Criteria	Alternative 1 Widen from East to the West	Alternative 2 Widen about the Centreline	Alternative 3 Widen from West to the East
	relocation, culvert and/or structural expansions and shifting the road alignment to the west		relocation, culvert and/or structural expansions and shifting the road alignment to the east
Optimizes Operation/Maintenance Costs	• Moderate increase in operating costs with additional roadway width (additional lanes) to maintain • Moderate increase in operating costs to maintain active transportation facilities		
Minimizes Property Acquisition Costs	• Potential minor property acquisition for existing and planned developments on the west side • Potential minor residential property acquisition on the west side	• Potential moderate property acquisition for existing and planned developments on the west side • Potential minor residential property acquisition on the west side	• Moderate to significant residential property acquisition on the east side
Summary of Engineering Considerations, Construction Complexity and Implementation	**Less Preferred**	**Preferred**	**Not Preferred**
OVERALL RECOMMENDATION	**Recommended**		

Alternative	Discussion	Recommendation
Alternative 1: Cycle Track and sidewalk on one side, and sidewalk on the other side	• Fatal Flaw - No cycling facilities on one side	**Not Carried Forward**
Alternative 2: On-street bike lanes with **no buffers, sidewalks on both sides**	• Fatal Flaw - No buffer between on-street bike lanes and vehicular lanes	**Not Carried Forward**
Alternative 3: On-street bike lanes with buffers, sidewalks on both sides	• Separated on-street bike lanes with buffer to improve safety for cyclists • Separated sidewalks from bike lanes	**Carry Forward**
Alternative 4: Boulevard cycle tracks (separated from vehicular lanes), sidewalks on both sides	• Physically separated boulevard cycle tracks • Separated sidewalks	**Carry Forward**
Alternative 5: Multi-use path on both sides (no additional bike lanes/cycle tracks or sidewalks)	• Physically separated active transportation facility from vehicles	**Carry Forward**

Evaluation Criteria	Alternative 1 On-street bike lanes with buffers, and sidewalks on both sides	Alternative 2 Boulevard cycle tracks (separated from vehicular lanes) and sidewalks on both sides	Alternative 3 Multi-use path (no additional bike lanes/cycle tracks or sidewalks)
Transportation and Transit, Accessibility			
Addresses Congestion and Improves Corridor Capacity and Vehicular Level of Service to Accommodate Future Travel Demand	• Medium - additional cycling capacity can support mode shift from auto to cycling by providing continuous and convenient connections, contributing to a reduction in road congestion.	• High – separated boulevard cycle tracks can support mode shift from auto to cycling by providing a safe, continuous and convenient connections that are attractive to cyclists of all ages and abilities, contributing to a reduction in road congestion	• High – a multi-use path can support mode shift from auto to cycling by providing a safe, continuous and convenient connections that are attractive to cyclists of all ages and abilities, contributing to a reduction in road congestion
Accommodates All Road Users, Including Pedestrians, Cyclists and Transit Users	• Medium – On-street bike lanes poses some risk to safety (real and perceived) for cyclists, as cyclists are in close proximity to vehicular lanes with a buffer in between	• High – boulevard cycle tracks, separated from vehicle traffic offers a high degree of separation from vehicle traffic, offering a safer environment to accommodate cyclists of all ages and abilities.	• High – a multi-use path separated from vehicle traffic offers a high degree of separation from vehicle traffic, offering a safer environment to accommodate all AT road users.
Enhanced Road Safety and Comfort for All Road Users	• Medium – On-street bike lanes poses greater risk to safety (real and perceived) for cyclists of lower ability (i.e. skill and age), as cyclists are in close proximity to vehicular lanes with a buffer in between	• High – a boulevard cycle track and sidewalk provide a high degree of separation between modes, supporting a safe environment to accommodate AT users of all ages and abilities.	• Low – a multi-use path separated from vehicle traffic offers a high degree of separation from vehicle traffic, supporting a safe environment to accommodate AT road users. However, a multi-use path may create a conflicting environment amongst pedestrians, cyclists, and other non-motorized recreational activities such as in-line skating and skateboarding.
Accommodates Commercial Goods Movement	• No impact		
Improved Access to / from Ninth Line	• High – additional cycling and pedestrian access to / from Ninth Line		

Addresses Problem / Opportunity Statement	• Yes – all alternatives:
	  ○ Improves Ninth Line's capacity to accommodate projected traffic demand and transit reliability by supporting mode shift from auto to cycling by providing continuous and convenient AT connections.
	  ○ Provide enhanced active transportation infrastructure to improve pedestrian and cycling conditions
	  ○ Support Ninth Line as a complete street to serve visitors and residents of all ages and abilities, as well as commuting and recreational uses.		

Improves Network Connectivity	• Yes – all alternatives provide a link between existing multi-use trail on Britannia Rd, Derry Rd (leading to trail system), and bike lanes on Erin Centre Blvd. • Yes – all alternatives improve pedestrian connectivity as it provides additional pedestrian facility on the west side of 9th Line		
Improves Emergency Response Time	• All alternatives provide some improvements to emergency response time as there is mode choice for users to prefer active transportation facilities to auto dependency.		
Summary of Transportation and Transit, Accessibility	**Not Preferred**	**Preferred**	**Not Preferred**
City Building			

Evaluation Criteria	Alternative 1 On-street bike lanes with buffers, and sidewalks on both sides	Alternative 2 Boulevard cycle tracks (separated from vehicular lanes) and sidewalks on both sides	Alternative 3 Multi-use path (no additional bike lanes/cycle tracks or sidewalks)
Consistency with The City's Strategic Priorities Pursuant to the City's Strategic Plan "Our Future Mississauga", Official Plan Policy Objectives, the Cycling Master Plan, Shaping Ninth Line, and Other Relevant Planning Documents	• All alternatives are consistent with the City's vision and goals as outlined in "Our Future Mississauga", the Cycling Master Plan, City of Mississauga Official Plan, and Shaping Ninth Line, including ability to provide additional capacity to meet future demands and improve the cyclist and pedestrian experience.		
Accommodates Existing and Planned Development	• No difference in alternatives as all alternatives provide active transportation facilities to both boulevards and have the potential to accommodate planned development and growth by supporting trips through additional modes of transportation.		
Summary of City Building	**Preferred**	**Preferred**	**Preferred**
Natural Heritage			
Minimizes Impacts to and Enhances Provincially Significant Wetlands (PSWs), Environmentally Sensitive Areas (ESAs) and Areas of Natural and Scientific Interest (ANSIs)	• No Provincially Significant Wetlands (PSWs) occur within the study area • No Areas of Natural and Scientific Interest (ANSIs) within the study area		
Minimizes Impacts to Wildlife, Vegetation, Aquatic Species and Habitat, and Species at Risk	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Less potential to reduce impacts with minimum 3.5m facility width (1.5m sidewalk and 1.5m bike lane) where there are limited opportunities to acquire additional property.	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Less potential to reduce impacts with minimum 3.5m facility width (1.5m sidewalk and 1.5m bike lane) where there are limited opportunities to acquire additional property.	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Greater potential to reduce impacts with minimum 3.0m MUP width (or 2.4 m in highly constrained areas) where there are limited opportunities to acquire additional property.
Provides Drainage and Stormwater Management Improvements and Mitigates Erosion	• All alternative designs are urbanized roadways with curb and gutter to provide appropriate stormwater management within the road pavement.		
Minimizes Effects on Climate Change:			
a) Climate Change Mitigation: Minimizes the Generation of Greenhouse Gas Emissions and Carbon Sinks	• All alternative designs minimize the generation of greenhouse gas and carbon sinks by improving AT facilities to reduce auto dependency • Reduction in road congestion helps decrease the amount of travel time for vehicles spent on the road • Accommodate tree planting within the boulevard where space permits		
b) Climate Change Adaptation: Resiliency or Vulnerability of the Project to Changing Climatic Conditions	• All alternative designs have the same resiliency/vulnerability of the project to changing climatic conditions • Potential for users to rely heavily on auto if users are exposed to weather events and patterns that affect the use of AT facilities		
c) Minimizes the Impact on the Environment's Adaptive Capacity (GUIDE)	• All alternative designs have the same environment's adaptive capacity for changing climatic conditions that affect the corridor		
Summary of Natural Environment	**Preferred**	**Preferred**	**Preferred**
Socio-Economic Environment			
Improves Attractiveness/Aesthetics	• No difference in alternatives as introduction of active transportation facility and streetscaping opportunities enhance visual aesthetics.		

Evaluation Criteria	Alternative 1 On-street bike lanes with buffers, and sidewalks on both sides	Alternative 2 Boulevard cycle tracks (separated from vehicular lanes) and sidewalks on both sides	Alternative 3 Multi-use path (no additional bike lanes/cycle tracks or sidewalks)
Minimizes Business Impacts and Enhances Business and Place-Making Opportunities	• Cycle tracks and sidewalks provide direct access for pedestrians and cyclists to existing and planned businesses on both boulevards. Cycle tracks are one-directional resulting in potentially longer cyclist travel distance (depending on origin and destination) to access businesses due to the inability to travel	• Cycle tracks and sidewalks provide direct access for pedestrians and cyclists to existing and planned businesses on both boulevards. Cycle tracks are one-directional resulting in potentially longer cyclist travel distance (depending on origin and destination) to access businesses due to the inability to travel	• MUPs provide direct access for pedestrians and cyclists to existing and planned businesses on both boulevards. MUPs allow for two-way travel which minimize cyclist travel distance to access businesses on either boulevard
Minimizes Property Acquisition	• No difference in alternatives as the typical right-of-way accommodates active transportation facilities in both boulevards and all alternatives are anticipated to have the same property impacts / requirements. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as the typical right-of-way accommodates active transportation facilities in both boulevards and all alternatives are anticipated to have the same property impacts / requirements. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as the typical right-of-way accommodates active transportation facilities in both boulevards and all alternatives are anticipated to have the same property impacts / requirements. • Potential to reduce impacts by reducing streetscaping zones and MUP width to 2.4m minimum, where there are limited opportunities to acquire additional property
Minimizes Noise and Vibration Impacts	• No difference in alternatives as all alternatives encourage active modes of transportation, including walking, cycling and transit thus reducing traffic noise.		
Improves Air Quality	• No difference in alternatives as all alternatives encourage safer and more comfortable pedestrian and cycling facilities, encouraging a more sustainable mode of transportation and reducing congestion.		
Provides or Improves Streetscape Amenities and Urban Design Elements	• All alternatives provide an opportunity to implement landscaping and improve streetscape amenities and urban design elements.		
Summary of Socio-Economic Environment	**Less Preferred**	**Less Preferred**	**Preferred**
Cultural Heritage			
Minimizes Impacts to Archaeological Resources	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Potential to reduce impacts by reducing streetscaping zones and MUP width to 2.4m minimum, where there are limited opportunities to acquire additional property.
Minimizes Impacts to Cultural Heritage Resources	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as all alternatives are anticipated to have the same level of impact. • Potential to reduce impacts by reducing streetscaping zones and MUP width to 2.4m minimum, where there are limited opportunities to acquire additional property.

Evaluation Criteria	Alternative 1 On-street bike lanes with buffers, and sidewalks on both sides	Alternative 2 Boulevard cycle tracks (separated from vehicular lanes) and sidewalks on both sides	Alternative 3 Multi-use path (no additional bike lanes/cycle tracks or sidewalks)
Summary of Cultural Heritage	**Preferred**	**Preferred**	**Preferred**
Engineering Considerations, Construction Complexity and Implementation			
Minimizes Utility Relocation	• No difference in alternatives as all alternatives are anticipated to have the same utility relocation requirements and require similar construction techniques and level of disruption.		
Addresses Drainage or Contamination Concerns	• All alternative designs are urbanized roadways with curb and gutter to provide appropriate stormwater management within the road pavement.		
Minimizes Construction Complexity, Including Staging and Traffic Disruption During Construction	• Low construction complexity due to preparing wider pavement width to accommodate on-street bike lanes and additional pavement markings.	• Higher construction complexity due to constructing separate facilities for pedestrians and cyclists that consist of different construction materials	• Moderate construction complexity due to preparing one type of infrastructure (paved multi-use path) for both pedestrians and cyclists.
Optimizes Capital Costs	• Comparable capital cost for structure modification to accommodate sidewalks and cycle tracks on both boulevards through structure widening/ replacement/ extension • Potential for slightly increased capital costs if varying materials are required for sidewalk and cycle track (asphalt vs concrete) and if pavement markings and signage to delineate facility types and direction is required	• Comparable capital cost for structure modification to accommodate sidewalks and cycle tracks on both boulevards through structure widening/ replacement/ extension • Potential for slightly increased capital costs if varying materials are required for sidewalk and cycle track (asphalt vs concrete) and if pavement markings and signage to delineate facility types and direction is required	• Comparable capital cost for structure modification to accommodate sidewalks and cycle tracks on both boulevards through structure widening/ replacement/ extension • Potential for slightly lower capital costs due to creating only one AT facility type
Optimizes Operation/Maintenance Costs	• Moderate operating and maintenance costs to maintain two AT facility types in both boulevards	• Moderate operating and maintenance costs to maintain two AT facility types in both boulevards	• Lower maintenance cost due to pedestrian and cyclists sharing the same facility.
Minimizes Property Acquisition Costs	• No difference in alternatives as the typical right-of-way accommodates active transportation facilities in both boulevards and all alternatives are anticipated to have the same property impacts / requirements. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as the typical right-of-way accommodates active transportation facilities in both boulevards and all alternatives are anticipated to have the same property impacts / requirements. • Potential to reduce impacts by reducing streetscaping zones where there are limited opportunities to acquire additional property.	• No difference in alternatives as the typical right-of-way accommodates active transportation facilities in both boulevards and all alternatives are anticipated to have the same property impacts / requirements. • Potential to reduce impacts by reducing streetscaping zones and MUP width to 2.4m minimum, where there are limited opportunities to acquire additional property.
Summary of Engineering Considerations, Construction Complexity and Implementation	**Less Preferred**	**Less Preferred**	**Preferred**

Evaluation Criteria	Alternative 1 On-street bike lanes with buffers, and sidewalks on both sides	Alternative 2 Boulevard cycle tracks (separated from vehicular lanes) and sidewalks on both sides	Alternative 3 Multi-use path (no additional bike lanes/cycle tracks or sidewalks)
OVERALL RECOMMENDATION	Not Recommended	Recommended	Less Recommended