

APPENDIX

B NATURAL HERITAGE INVENTORY REPORT



CITY OF HAMILTON

NATURAL HERITAGE INVENTORY FOR BRIDGE #248

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

OCTOBER 4, 2017





NATURAL HERITAGE INVENTORY FOR BRIDGE #248

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

CITY OF HAMILTON

PROJECT NO.: 161-09178-00
DATE: OCTOBER 2017

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October 4, 2017

City of Hamilton
Public Works Department,
77 James Street North, Suite 400
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Attention: Janelle Trant, Project Manager, Transportation Management

Dear Ms. Trant:

Subject: Natural Heritage Inventory for Bridge #248
Municipal Class Environmental Assessment
King Street West, Dundas, City of Hamilton

WSP Canada Inc. is pleased to provide you with our Natural Heritage Inventory for the site known as Bridge #248. The bridge is located on King Street West approximately 160 m west of Bond Street within the community of Dundas, and is identified as part of Lot 13, Concession 1 West Flamborough, City of Hamilton.

The purpose of a Natural Heritage Inventory is to undertake an inventory of biophysical and biological features present on the site and surrounding areas. A Natural Heritage Characterization Report for Bridge #248 was completed by MMM Group in May 2015. That study characterized existing natural heritage features, vegetation communities, fish habitat, an evaluation of habitat significance, and potential for presence of Species at Risk (SAR). This report updates the findings within the MMM report, provides an evaluation of natural heritage features found within 120 m of Bridge #248, and assesses the potential impacts to these features. The report will then be used as technical support for the Municipal Class Environmental Assessment for Bridge #248. Please find the document attached for your records.

Thank you for the opportunity to complete this assignment. Please contact the undersigned with questions or comments.

Yours truly,

A handwritten signature in black ink, appearing to read 'Dan Reeves'.

Dan Reeves, M.Sc.
Project Ecologist

DJR/nah

WSP ref.: 161-09178-00
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1 INTRODUCTION

WSP Canada Inc. (WSP) has been retained to complete a Natural Heritage Inventory (NHI) as part of a Municipal Class Environmental Assessment for the site known as Bridge #248, described as Part of Lot 13, Concession 1, West Flamborough, City of Hamilton. The bridge is located on King Street West, approximately 160 m west of Bond Street in the community of Dundas. Refer to Figure 1 for site location details.

This study was conducted to determine the presence and extent of Natural Heritage Features and associated constraints in the vicinity of Bridge #248. Surveys of the natural environment focused on lands within the 120 m area of influence surrounding Bridge #248, herein referred to as the “Study Area”. This report provides a description of the existing conditions within the Study Area, with a focus on the terrestrial and aquatic environment, and may be used as technical support for future Municipal Class Environmental Assessment projects. Findings from the Natural Heritage Characterization Report completed by MMM Group will be included (MMM, 2015) with updates based on the results of this study. Descriptions of natural features were determined through consultation with relevant authorities, reviews of secondary source information and direct observation during the Study Area investigation. Natural Heritage Features within the Study Area are shown on Figure 2.

2 ENVIRONMENTAL POLICY CONTEXT

2.1 PROVINCIAL POLICY STATEMENT

The Provincial Policy Statement (PPS) (Ontario Ministry of Municipal Affairs and Housing (OMMAH), 2014) is a planning document that provides a framework for, and governs development within, the Province of Ontario. To preserve various ecological resources deemed significant in the Province, development lands must be assessed for the presence of Natural Heritage Features prior to construction. Generally, Natural Heritage Features within 120 m area of influence of development lands must be assessed. These Natural Heritage Features (listed below) are both defined and afforded protections under the PPS. Linkages between Natural Heritage Features, surface water and groundwater features are also recognized and afforded similar protections under the policy. Section 2.1.2 of the PPS also requires that the diversity and connectivity of all Natural Heritage Features and the long-term ecological function of natural heritage systems be maintained, restored or improved where possible.

Under the PPS (OMMAH, 2014), development or site alteration is prohibited within significant wetlands in Ecoregions 5E, 6E and 7E and in significant coastal wetlands, but may be allowed adjacent to these features provided the adjacent lands have been evaluated and it has been demonstrated that there will be no negative impacts to these features or their ecological functions. Development may be permitted in or adjacent to significant wetlands north of Ecoregions 5E, 6E and 7E, significant woodlands and significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary’s River), significant wildlife habitat, and significant areas of natural and scientific interest (ANSI), provided there will be no negative impacts to these features or their ecological function due to the proposed undertaking. In addition, development and site alteration is not permitted in fish habitat unless in accordance with provincial and federal legislation.

Natural Heritage Features as defined by the PPS (OMMAH, 2014) include:

Natural Heritage Systems;

Fish Habitat;

Habitats of Endangered and Threatened Species;

Significant Areas of Natural and Scientific Interest (ANSI);

Significant Wetlands;

Significant Coastal Wetlands;

Significant Wildlife Habitat;

Significant Woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River); and,

Significant Valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River).

2.2 CONSERVATION AUTHORITIES ACT

The Conservation Authorities Act gives individual conservation authorities the power to regulate development and activities in or adjacent to river or stream valleys, Great Lakes and large inland lakes and shorelines, watercourses, hazardous lands and wetlands. Regulations made under the Conservation Authorities Act specify the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulations managed by individual Conservation Authorities. These regulations apply to lands within river or stream valleys, flood plains, wetlands, watercourses, lakes, hazardous lands or lands within 120 m of a Provincially Significant Wetland or wetlands greater than 2 hectares, or lands within 30 m of non-provincially significant wetlands. Development or site alteration within these regulated areas may be permitted provided development is conducted in accordance with existing policies.

The Study Area is located within the Hamilton Conservation Authority (HCA) jurisdiction. Regulation 161/06 made under the Conservation Authorities Act specifies the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulations managed by the HCA. Development or site alteration within these regulated areas may be permitted by the HCA if, in its opinion, the control of flooding, erosion, dynamic beaches, pollution, or the conservation of land will not be affected by the development.

2.3 GREENBELT PLAN

The Greenbelt Plan (Government of Ontario, 2005) was created to identify where urbanization should not occur within the Golden Horseshoe Region of southern Ontario, to provide permanent protection to the agricultural land base and the ecological features and functions occurring on this landscape. It builds upon ecological protections provided by, and includes land found within both the Niagara Escarpment Plan and Oak Ridges Moraine Conservation Plan.

This Greenbelt Plan builds upon the existing policy framework established in the Provincial Policy Statement (PPS), issued under section 3 of the Planning Act, and its implementation through municipal official plan policies and maps. Based on the above, the Greenbelt Plan must be read in conjunction with all other land use planning policy, regulations and/or standards, as amended from time to time. These documents include the PPS, provincial land use plans, upper, lower and single-tier municipal official plans, zoning by-laws, regulations under the Conservation Authorities Act and the federal Fisheries Act. Where more specific provincial plans or regulations apply to lands within the Greenbelt, the more specific plan or regulation shall prevail.

The Spencer Creek channel and surrounding floodplain are located within an area designated as Protected Countryside. As such, the policies of the Greenbelt Plan (2005) apply. Protected Countryside lands are intended to build upon lands identified under the Niagara Escarpment Plan and the Oak Ridges Moraine Conservation Plan by extending beyond the limits of these plans, and by enhancing, connecting and protecting the agricultural and environmental functions of the lands identified under these plans. It is the objective of the Greenbelt Plan that lands designated as Protected Countryside will continue to accommodate a wide range of commercial and industrial uses, as well as support recreational uses such as parks, trails, and golf courses.

2.4 NIAGARA ESCARPMENT PLAN

The Niagara Escarpment Planning and Development Act (NEPD) was created to ensure that the Niagara Escarpment, extending 725 km from the Niagara River to the islands off of Tobermory on the Bruce Peninsula, would be protected. The Niagara Escarpment Plan (Government of Ontario, 2015) was established from the NEPD to serve as a framework of objectives and policies, with a goal to strike a balance between development, preservation, and enjoyment of the Niagara Escarpment. The policies of the Niagara Escarpment Plan are the policies of the Greenbelt Plan for the Niagara Escarpment Plan Area.

The land use of the Study Area is designated as Urban Area (Government of Ontario, 2015). This designation represents the urban areas that are in close proximity to the Niagara Escarpment. The objective of lands with this designation is to further minimize impacts of urban growth on the Niagara Escarpment. Section 2.15 of the Plan indicates that “All new and reconstructed transportation and utility facilities shall be designed and located to minimize the impact on the Escarpment environment and be consistent with the objectives of this Plan.”

2.5 CITY OF HAMILTON URBAN OFFICIAL PLAN (2013) AND RURAL OFFICIAL PLAN (2012)

The Study Area is located on the boundary of the lands under the jurisdiction of the City of Hamilton Urban (2013) and Rural (2012) Official Plans; as such, policies from both Plans were reviewed. The lands south of King Street W are a part of the Urban (2013) Official Plan, while the lands north of King St W are a part of the Rural (2012) Official Plan.

Schedule B (B1 through B8) of both Official Plans identify the Natural Heritage System and Natural Heritage Features found within their respective jurisdictions. The area surrounding Spencer Creek has been identified as a Core Area within the City of Hamilton’s Natural Heritage System. Core Areas are the most important components of the Natural Heritage System in terms of biodiversity, productivity, ecological function and hydrological function. It is the intent of both Official Plans to preserve and enhance Core Areas including the ecological and hydrological function provided by these areas.

3 INFORMATION RESOURCES

Relevant information resources were consulted over the course of the report preparation. Full references are provided in the References section of this report.

Aerial photographs;

Atlas of the Breeding Birds of Ontario online (Bird Studies Canada et al., 2006);

Conservation Authorities Act, Ontario Regulation 161/06: Hamilton Conservation Authority;

Ecological Land Classification for Southern Ontario: 1st approximation (Lee et al. 1998);

Ecological Land Classification for Southern Ontario: 2nd approximation (OMNR, 2008);

Ecoregion 7E Significant Wildlife Habitat Criterion Schedule (OMNRF, 2015b);

Endangered Species Act, 2007 (Government of Ontario, 2007);

Fisheries Act (DFO, 2013);

Natural Heritage Characterization Report: Bond Street Bridge #248 (MMM, 2015);

Natural Heritage Information Centre (NHIC) Mapping and Databases (OMNRF, 2015a);

Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005 (OMNR, 2010);

Ontario Ministry of Natural Resources and Forestry (MNRF), Guelph District Office;
Ontario Reptile and Amphibian Atlas (Ontario Nature, 2016);
Provincial Policy Statement (OMMAH, 2014);
Rural Hamilton Official Plan (2012);
Urban Hamilton Official Plan (2013);
Significant Wildlife Habitat: Technical Guide (OMNR, 2000);
Species at Risk in Canada (SARA) list (Government of Canada, 2016); and,
Species at Risk in Ontario (SARO) list (OMNRF, 2016).

4 AGENCY CONSULTATION

A request for information was submitted to the Hamilton Conservation Authority (HCA) prior to conducting the field visits. This was to ensure that Natural Heritage Features and Species at Risk with the potential to be in the vicinity of the Study Area were identified.

5 SITE INFORMATION

5.1 SITE DESCRIPTION

Bridge #248 is located on King Street West approximately 160 m west of Bond Street in the community of Dundas, City of Hamilton (Figure 1). Vegetation communities within the Study Area have been mapped (Figure 3) using the standardized Ecological Land Classification (ELC) for southern Ontario – first approximation (Lee et al., 1998). For vegetation communities where the first approximation ELC does not provide an adequate description, the pending 2008 second approximation description has been used. Mapping for the Study Area has been completed at a larger scale than the criteria for ELC (1:10,000) and polygons are sometimes smaller than the 0.5 hectare minimum size criteria; however, this scale is appropriate for the management and development of the existing conditions in the Study Area.

The Study Area is bisected by Spencer Creek, a permanent coldwater creek of intermediate size running northeast to southwest and passing under Bridge #248. Spencer Creek is confined within vertical walls of concrete, armor stone and etched bedrock, from approximately 60 m upstream of Bridge #248 to approximately 40 m downstream of Bridge #248. A detailed assessment of Spencer Creek can be found in Section 6.1.1.

The immediate riparian corridor of Spencer Creek within the Study Area is wooded and has been classified using Ecological Land Classification (ELC) (Lee et al., 2008) as Mixed Woodland (WOM). The vegetation within the Mixed Woodland is representative of a disturbed area and contains a variety of native and non-native species. Common tree species within this area include Manitoba Maple (*Acer negundo*), Black Walnut (*Juglans nigra*) and White Ash (*Fraxinus americana*), with smaller numbers of Norway Maple (*Acer platanoides*), Siberian Elm (*Ulmus pumila*), Horse Chestnut (*Aesculus hippocastanum*), and White Mulberry (*Morus alba*). Staghorn Sumac (*Rhus typhina*) was frequently located along the edges of the forest boundary as well as along the shoulders of King Street West, while Common Buckthorn (*Rhamnus cathartica*) and Choke Cherry (*Prunus virginiana*) were the dominant shrub species in the understorey. Herbaceous species were limited within this woodland, and included Blue-stem Goldenrod (*Solidago caesia*), Herb Robert (*Geranium robertianum*), Poison-ivy (*Rhus radicans*), Riverbank Grape (*Vitis riparia*), Enchanter's Nightshade (*Circaea* sp.), Heart-leaved Aster (*Aster cordifolius*), and Dame's Rocket (*Hesperis matronalis*). Especially near the sunny edges of this woodland, weedy species typical of a disturbed environment were located, included Common Dandelion (*Taraxacum officinale*), Common Plantain (*Plantago major*), Common Ragweed (*Ambrosia artemisiifolia*), and Virginia Creeper (*Parthenocissus quinquefolia*).

Moving further from Spencer Creek and north of King Street West, the woodland transitions into a mid-aged Dry - Fresh Sugar Maple - Hardwood Deciduous Forest (FODR1) (Lee et al., 2008). While still appearing relatively disturbed, this forest contained a larger proportion of native species than the Mixed Woodland located immediately adjacent to Spencer Creek. Sugar Maple (*Acer saccharum*) was the dominant tree species while White Ash, Basswood (*Tilia americana*) and Black Walnut appeared in smaller numbers. Choke Cherry and Common Buckthorn were noted in the relatively sparse understorey. Ground cover was limited within this forest and contained non-native species that were likely once planted for ornamental purposes, including Day Lily (*Hemerocallis fulva*), Dame's Rocket and Daffodil (), as well as several native species in low numbers such as Blue-stem Goldenrod and Enchanter's Nightshade.

South of King Street West and west of Spencer Creek the forest composition was very similar to the Dry - Fresh Sugar Maple - Hardwood Deciduous Forest located north of King Street West; however, White Ash represented a higher proportion of the canopy. This forest has been identified as a Sugar Maple - White Ash Hardwood Deciduous Forest (FODM5-8). The understorey and ground cover composition was similar between these two forest ecotypes.

A CNR rail line runs roughly parallel to King Street West, between 60 and 180 m north of King Street West within the Study Area. At its closest point, this rail line is approximately 90 m from Bridge #248. Other constructed ecotypes within the Study Area include Business Sector (CVC_1) in the southwest portion of the Study Area as well as the northeast quadrant of the Study Area, and a sports field identified as Constructed Green Lands - Recreational (CGL_4) in the southeast quadrant. These areas were not assessed as part of the Study Area investigation.

5.2 SITE VISITS

Site visits were conducted in fall of 2016 and spring and summer of 2017. The purpose of the site visits was to confirm the presence of Natural Heritage Features, complete a three season vegetation assessment, document breeding birds, complete a fish habitat and community assessment, and determine the general characteristics of the Study Area. While conducting these site visits WSP biologists identified existing landforms and landscapes, land uses, vegetation composition and structure, wildlife usage, and the presence and extent of natural heritage features in or within 120 m of Bridge #248. Breeding bird surveys were completed on June 20 and July 10, 2017, vegetation surveys were completed on October 5, 2016, June 20, 2017 and July 10, 2017, and the fish habitat and community assessment was completed on July 10, 2017. Site visit details are provided in Table 1 and lists of observed species are provided in Appendix B-1.

Table 1 Site Visit Details

DATE	TIME/DURATION	WEATHER CONDITIONS
October 5, 2016	1:35 PM to 3:26 PM	Clear skies, ±25°C, light breeze, no trace of precipitation
June 20, 2017	8:30 AM to 11:20 AM	Mostly overcast skies, ±20°C, gentle breeze, no trace of precipitation
July 10, 2017	8:02 AM to 1:15 PM	Mostly overcast skies, ±24°C, light breeze, no trace of precipitation

6 ASSESSMENT OF NATURAL HERITAGE FEATURES

The following sections outline the Natural Heritage Features identified within 120 m of Bridge #248 and discuss the potential for species at risk based on available habitat and field observations.

6.1 FISH HABITAT

The conservation, management, and protection of fish and fish habitat are the responsibility of Fisheries and Oceans Canada (DFO). DFO is given authority to achieve this under the federal *Fisheries Act*. Fish habitat as defined in the *Fisheries Act*, c. F-14 as “spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes”. The Act also includes a broader definition of fish to include:

- Parts of fish;
- Shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals; and,
- Eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals.

The Study Area exists within the Spencer Creek watershed, and Spencer Creek runs through the Study Area from north to south, passing under Bridge #248 (Figure 2). Field investigations of Spencer Creek within the vicinity of Bridge #248 crossing were initially conducted by fisheries ecologists on January 15, 2012 as part of the Highway 8 Greensville Road Improvements EA with a follow up reconnaissance survey completed as part of the Natural Heritage Characterization Report for Bridge #248 on July 3, 2013 (MMM, 2015). Field investigations for this study were completed on July 10, 2017, as detailed in Table 1, above, and built upon this background information, and included documenting of the following habitat parameters (where applicable):

- Flow condition, clarity, general gradient and velocities;
- Channel dimensions and general character;
- Morphology (e.g., riffles, pools);
- Cover opportunities (i.e., woody debris, undercut banks, boulders, aquatic vegetation);
- Substrate type;
- Bank height, character and stability/evidence of erosion;
- Riparian vegetation;
- Any observations of fish presence and/or barriers to fish movement;
- Potential specialized and important habitat areas including potential spawning habitat, good nursery cover, holding habitat (deeper refuge pools);
- Evidence of groundwater discharge; and,
- Disturbances, habitat limitations and potential habitat enhancement opportunities.

Fish community surveys were undertaken using a backpack electrofisher downstream of the constructed channel bed, building on existing fish community data made available from the Ontario Ministry of Natural Resources and Forestry (OMNRF) - Guelph District as well as the Hamilton Harbor and Watershed Fisheries Management Plan (Bowlby, McCormack and Heaton 2010) and the Natural Resources and Values Information System (NRVIS) database.

6.1.1 AQUATIC HABITAT EXISTING CONDITIONS

As previously discussed, Spencer Creek passes under Bridge #248 along King Street West, approximately 160 m west of Bond Street in the community of Dundas. The aquatic assessments of this watercourse were conducted on July 10, 2017, building upon the previously completed work on January 15, 2012, and refined during a reconnaissance level survey completed on July 3, 2013 (MMM, 2015). A detailed description of the existing aquatic habitat conditions is provided below. A list of fish species captured during electrofishing surveys is provided below in Table 2.

Spencer Creek is a permanent coldwater¹ creek of intermediate size at the base of the Escarpment approximately ~130m downstream (south) of the CNR crossing of Highway 8 (Bowlby, McCormack and Heaton 2010). Within the Study Area reach of Spencer Creek, the watercourse is confined within vertical walls of concrete, armor stone and etched bedrock. Flows are impacted by a series of gradient changes (drop structures) upstream and downstream of the bridge, as well as a steep overall gradient to the channel bed through the crossing, all of which pose barriers to upstream movement of fish. These gradient changes include an approximately 8 m high drop structure immediately south of the CNR rail line crossing (waterfall) with additional channel gradient drops occurring at four separate locations (all approximately 1-2 m height) over concrete weirs constructed along the reaches associated with this road crossing. In addition, there is an overall steep gradient to the channel underneath the existing bridge, with run morphology and a sheet concrete substrate. These barriers to fish passage along with other characteristics of the creek are discussed in greater detail below.

CHANNEL REACH UPSTREAM OF BRIDGE CROSSING

Upstream of the Bridge Spencer Creek has a wetted / bankfull width ranging from 6.0 – 8.0 m and a bankfull depth ranging from 0.6-0.8 m. Wetted depth over the concrete sheet ranged from 0.01 to 0.05 m. The steep banks of the channel are 2-3 m high; both banks are terraced with heights increasing within the valley system and over the Escarpment. The banks within the reach are man-made and composed primarily of concrete brickwork with some naturally occurring shale materials further upstream. The banks immediately upstream of the existing bridge crossing are showing signs of undermining and collapse. In addition, the concrete brickwork on the left upstream bank immediately downstream of the first drop structure upstream of the bridge has collapsed and bank undercutting is occurring.

Flows at the time of the survey were high, with channel morphology dominated by runs (some falls) and knick points (drop structures). The channel bed is man-made from the CNR rail line crossing to approximately 30 m downstream of the bridge crossing, consisting of concrete sheeting augmented by drop structures strategically placed to control the gradient of the channel and erosion issues that may arise as a result of the steep change in gradient of the channel over the relatively short distance within the crossing reaches.

Cover habitat available within the reach consists of sparse overhanging vegetation. Riparian vegetation consists of a tree canopy of Manitoba Maple, Staghorn Sumac, Norway Maple, and Siberian Elm, with an understory of Honeysuckle (*Lonicera* species), Riverbank Grape, Poison-ivy and Choke Cherry. No in-stream vegetation was observed likely due to the high velocities and concrete lined channel bed (compact substrates) through the reach. No groundwater contributions (e.g. upwelling, iron floc) or fish were observed during the Study Area investigation upstream of the crossing.

No refuge habitat was observed upstream of the Bridge #248 crossing. A total of 3 drop structures and one steep gradient change through the crossing occur upstream and within close proximity to Bridge #248. These steep changes in gradient include an approximately 8 m drop from immediately downstream of the CNR railing crossing culvert, two weirs measuring 1-2 m changes in height located 45 m and 60 m upstream of the crossing, and a relatively steep incline of the man-made channel bed through the ROW respectively. As a result of the relatively high changes in elevation, and the fast moving, high velocity of the flows through the reach, these weirs are believed to pose permanent barriers to upstream fish movement. In addition to these barriers, the shallow wetted depth and lack of refuge habitat suggest that no fish reside upstream of the bridge crossing. It is possible that fish are occasionally washed down from habitat upstream of the weirs (North of CNR railing crossing), but it is unlikely they would permanently reside in the watercourse upstream of the crossing given the shallow depth, fast flows and lack of refuge habitat.

¹ Defined by the Hamilton Conservation Authority based on thermal characteristics of the watercourse.

CHANNEL REACH DOWNSTREAM OF BRIDGE CROSSING

The reach downstream of Bridge #248 flows through residential, industrial and institutional land uses as it progresses downstream to Hamilton Harbour, specifically Cootes Paradise. This downstream reach is highly incised and confined within the man-made banks of the channel immediately downstream of the crossing, and then vertical shale banks beyond. The reach is relatively straight, with only one meander/bend at the junction between the man-made portion of the channel and its natural planform beyond. The constructed channel is wider downstream than upstream, increasing in width by 3.0 m within the ROW. Downstream, the constructed channel is approximately 9.3 m in width with an average bankfull depth of 0.6 m, tapering to 5-8 m in wetted width beyond the constructed channel. Banks within the constructed portion of the channel are approximately 1.3 m in height and are composed of concrete. No erosion or scour is evident along these banks downstream of the Bridge.

As a result of the straightened, flat bottomed channel bed in the constructed channel, morphology is dominated by runs. These runs flow over a concrete weir/grade control structure 1.5 m in height, plunging into a scour pool immediately below the constructed channel bed and walls (~30 m downstream of crossing).

Habitat cover through this reach consists of overhanging woody debris and overhanging trees. Similar to the vegetation communities found along the north side of the bridge, the riparian vegetation here also consists of a tree canopy of Sugar Maple, White Ash and Manitoba Maple with an understory of Honeysuckle, Riverbank Grape, Poison-ivy, Common Buckthorn and Choke Cherry. No in-stream vegetation was observed, likely due to high velocities and concrete substrates of the channel bed through the reach.

A small tributary was found entering the constructed channel approximately 25 m downstream of Bridge #248 along the left upstream bank that is sourced by groundwater seepage from the Escarpment immediately upstream of the road. This tributary enters Spencer Creek immediately downstream of the constructed walls of the channel, cascading over a 1.5 m drop into the plunge pool below.

Downstream of the constructed portion of the channel, the morphology is dominated by riffles with some runs and plunge pools, with relatively large substrates composed of fragmented bedrock, boulders, cobbles and gravel. Flows are also high here, likely impeding rooting of instream vegetation. A second downstream concrete weir/grade control structure 0.8 m in height exists approximately 30 m downstream from the constructed channel bed (60 m from Bridge #248), likely forming a seasonal barrier to fish movement. Undermining of the concrete wall on the left upstream bank at the weir likely provides opportunity for fish passage during high flows as fish were captured between the two downstream weirs.

6.1.2 FISH COMMUNITY

Spencer Creek within the Study Area is classified as an intermediate riverine habitat that is cooled by Webster's Falls and known groundwater influx (Bowlby, McCormak and Heaton 2010). Background information collected suggests the community composition of this portion of the watercourse includes two coolwater species including Longnose Dace (*Rhinichthys cataractae*), and Creek Chub (*Semotilus atromaculatus*). Also present are four darter species representative of the high gradient nature of this section of the watercourse, including Johnny Darter (*Etheostoma nigrum*), Rainbow Darter (*Etheostoma caeruleum*), Fantail Darter (*Etheostoma flabellare*), and Blackside Darter (*Percina maculata*). Additional fish species were also in the NRVIS data collected during the background review, but it is important to note that these species are listed for a larger section of the creek than what is included in this report, and therefore some of the species listed by NRVIS may not be found at the existing bridge crossing or within the ROW reached.

Fish captured as part of electrofishing surveys on July 10, 2017 are listed below. All electrofishing surveys took place below the constructed portion of the channel downstream of Bridge #248. Children present within the channel at and upstream of the crossing prevented surveys within the constructed portion; however, the steep gradient changes (including constructed weirs), shallow depth (0.01 - 0.05 m) and lack of refuge habitat within the constructed portion of channel upstream of the bridge makes it unlikely fish migrate to or reside in this section. WSP Ecologists walked the length of the constructed portion and did not visually identify any fish within the section. The concrete sheet bed, shallow wetted depth and lack of refuge habitat allowed for the visual identification of fish species, had any resided in the constructed channel.

Background data collection has indicated the potential presence of eight aquatic Species of Conservation Concern within the ROW reaches for this study including American Eel (*Anguilla rostrata*), Eastern Pondmussel (*Ligumia nasuta*), Grass Pickerel (*Esox americanus vermiculatus*), Northern Brook Lamprey (*Ichthyomyzon fossor*), River Redhorse (*Moxostoma carinatum*), Rainbow Mussel (*Vilosa iris*), Redside Dace (*Clinostomus elongatus*), and Silver Shiner (*Notropis photogenis*). No suitable habitat for any Species of Conservation Concern was identified within the Study Area.

Table 2 Fish Captured Downstream of the Constructed Channel Bed / Walls

COMMON NAME	SCIENTIFIC NAME	# CAPTURED	MAX LENGTH (MM)	MIN LENGTH (MM)
Northern Hog Sucker	<i>Hypentelium nigricans</i>	2	111	109
Rainbow Darter	<i>Etheostoma caeruleum</i>	6	68	48
Longnose Dace	<i>Rhinichthys cataractae</i>	8	110	61
River Chub	<i>Nocomis micropogon</i>	13	150	60
Rainbow Trout	<i>Oncorhynchus mykiss</i>	1	175	-
White Sucker	<i>Catostomus commersonii</i>	3	180	91
Creek Chub	<i>Semotilus atromaculatus</i>	4	160	81
Smallmouth Bass	<i>Micropterus dolomieu</i>	1	109	-

6.2 AREAS OF NATURAL AND SCIENTIFIC INTEREST

Areas of Natural and Scientific Interest (ANSI) are defined as areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education (OMMAH, 2014). ANSIs can be ranked as Provincially or Regionally significant.

The MNRF Natural Heritage Areas Mapping (OMNRF, 2015a) was searched for the presence of ANSIs within 120 m of Bridge #248. The Spencer Gorge Escarpment Valley Life Sciences ANSI is located north of Bridge #248 on the north side of the CNR rail line, approaching to within approximately 110 m from the bridge location (Figure 2).

6.3 SIGNIFICANT HABITAT OF ENDANGERED OR THREATENED SPECIES

The PPS (OMMAH, 2014) defines the habitat of Endangered or Threatened species as the habitat, as approved by the MNRF, that is necessary for the maintenance, survival and/or the recovery of a naturally occurring or reintroduced population of Endangered or Threatened species as listed in the *Endangered Species Act*, 2007, and where those areas of occurrences are occupied or habitually occupied by the species during all or any part(s) of their life cycle. The MNRF is mandated to ensure accurate database information for the identification, listing and conduct of ongoing assessments for significant Endangered or Threatened species and their related habitats.

As part of a desktop review, a search of the OMNRF Natural Heritage Information Centre (NHIC) database (OMNRF, 2015a) was conducted to determine the existence and approximate location of recorded occurrences of Endangered or Threatened species in the general area. One (1) one square kilometer (1 km²) quadrat (17NH83_91) surrounding the Study Area was checked to ensure potential Species at Risk were accounted for in the search. Spotted Wintergreen (*Chimaphila maculata*) (END), American Chestnut (*Castanea dentata*) (END), Northern Bobwhite (*Colinus virginianus*) (END) and Yellow-breasted Chat (*Lictheria virens*) (END) had element occurrences within the area searched.

In addition to a search of the NHIC database, the Ontario Breeding Bird Atlas (OBBA) (Bird Studies Canada et al., 2006) and Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature, 2016) were consulted to determine if there were Endangered or Threatened species known to be present within the vicinity of the Study Area. The OBBA uses 100 km by 100 km blocks, further subdivided into 10 km by 10 km squares to compartmentalize geographical areas. The Study Area lies in the square identified as 17NH89. Least Bittern (*Ixobrychus exilis*) (THR), Eastern Whip-poor-will (*Caprimulgus vociferus*) (THR), Chimney Swift (THR), Bank Swallow (*Riparia riparia*) (THR), Barn Swallow (*Hirundo rustica*) (THR), Cerulean Warbler (*Setophaga cerulea*) (THR), Prothonotary Warbler (*Protonotaria citrea*) (END), Bobolink (*Dolichonyx oryzivorus*) (THR), and Eastern Meadowlark (*Sturnella magna*) (THR) had breeding evidence values within this square. The ORAA also uses 10 km by 10 km squares. Blanding's Turtle (*Emydoidea blandingii*) (THR) has records within this square between the years 1948-2013, and Jefferson Salamander (*Ambystoma jeffersonianum*) (END) has records within this square between the years 1986-1988.

A review of aerial photographs was also conducted to determine if there is suitable habitat for other Endangered or Threatened species within the vicinity of the Study Area. Butternut (*Juglans cinerea*) (END), American Columbo (*Frasera carolinensis*) (END), American Ginseng (*Panax quinquefolius*) (END) and Eastern Flowering Dogwood (*Cornus florida*) (END) may find habitat within the vicinity of the Study Area. Additionally, the wooded areas in the vicinity of the Study Area may provide habitat for several species of bat, including Eastern Small-footed Myotis (*Myotis leibii*) (END), Little Brown Myotis (*Myotis lucifugus*) (END), Northern Myotis (*Myotis septentrionalis*) and Tri-colored Bat (*Perimyotis subflavus*) (END). Refer to Table 3 below for details of the habitat potential of the Study Area for the above mentioned Endangered or Threatened species. Species of Special Concern (SC) are treated in Section 6.6.3 of this report.

Table 3 Endangered or Threatened Species Habitat Potential Assessment

SPECIES NAME	SARO ¹	COSEWIC ²	HABITAT DESCRIPTION ³	HABITAT POTENTIAL	FIELD ASSESSMENT AND OBSERVATIONS
American Chestnut	END	END	The American Chestnut prefers dry upland deciduous forests containing sandy soils, and is only found in the Carolinian Zone in Ontario.	Low-Moderate	This species was not observed during the Study Area investigations. Moderate habitat potential exists throughout the forest ecotypes throughout the Study Area.
American Columbo	END	END	This species prefers dry upland woods but can also be found in grasslands, moist woods, and swampy habitats.	Low-moderate	This species was not observed during the Study Area investigations. Moderate habitat potential exists throughout the forested ecotypes throughout the Study Area.
American Ginseng	END	END	American Ginseng prefers, moist rich, well-drained mature deciduous woodlands, particularly those dominated by Sugar Maple, White Ash and American Basswood.	Low-moderate	This species was not observed during the Study Area investigations. Low-moderate habitat potential exists throughout the forested ecotypes throughout the Study Area.

SPECIES NAME	SARO ¹	COSEWIC ²	HABITAT DESCRIPTION ³	HABITAT POTENTIAL	FIELD ASSESSMENT AND OBSERVATIONS
Bank Swallow	THR	THR	Bank Swallows nest in burrows in natural and man-made settings, wherever there are silt or sand deposits. Nests are often along riverbanks and in aggregate pits.	Low	This species was not observed and suitable habitat was not identified within 120 m of Bridge #248. Bank Swallows are found in the general area and may occasionally forage over the Study Area.
Barn Swallow	THR	THR	Barn Swallows often live in close association with humans, building their cup-shaped mud nests almost exclusively on human-made structures such as open barns, under bridges and in culverts. This species forages over a wide area.	Low-Moderate	This species was not observed during the 2016-2017 investigations. An unidentified nest which may have been a Barn Swallow nest was previously observed under the bridge during the 2013 investigations (MMM, 2015). The bridge was re-examined for nests during the 2016-2017 investigations and none were found.
Bobolink	THR	THR	This species builds its nests on the ground in dense grasses, such as those found in hay fields, tallgrass prairies and open meadows.	Low	This species was not observed and suitable habitat was not identified within 120 m of Bridge #248.
Butternut	END	END	The species is found in deciduous forests in areas with rich, moist, well-drained soils and is often found along streams. Due to its low tolerance for shade, this species is typically found in sunny openings or along forest edges.	Low-moderate	This species was not observed and suitable habitat does not exist within the immediate vicinity of Bridge #248. The Spencer Gorge Escarpment Valley Life Sciences ANSI, located north of the Study Area, likely contains habitat for this species.

SPECIES NAME	SARO ¹	COSEWIC ²	HABITAT DESCRIPTION ³	HABITAT POTENTIAL	FIELD ASSESSMENT AND OBSERVATIONS
Chimney Swift	THR	THR	The species feeds in flocks around waterbodies due to the large amount of insects present. Nesting occurs in large, hollow trees or in the chimneys of houses in urban and rural areas.	Low	This species was not observed and suitable habitat was not identified within 120 m of Bridge #248. Chimney Swifts nest in downtown Dundas and likely occasionally forage over the Study Area.
Cerulean Warbler	THR	END	The species is found in large, relatively undisturbed patches of mature, semi-open deciduous forest. More commonly found in Carolinian forest types in Ontario.	Low	This species was not observed and suitable habitat was not identified within 120 m of Bridge #248.
Eastern Flowering Dogwood	END	END	This species grows under trees in mid-age to mature mixed or deciduous forest. While commonly found in floodplains, slopes and ravines, it can also be sometimes found along roadsides.	Moderate	This species was not observed. Due to this species associations with forest edge habitats, suitable habitat may occur near Bridge #248.
Eastern Meadowlark	THR	THR	This species prefers native grasslands, pastures and savannahs though will use a variety of other grassland habitats such as hayfields, weedy meadows, etc.	Low	This species was not observed and suitable habitat was not identified within 120 m of Bridge #248.
Eastern Small-footed Myotis	END	-	This species roosts in a variety of habitats including rock outcrops, in buildings, under bridges, in caves, and in hollow trees. During the winter they hibernate, most often in caves and abandoned mines.	Low-Moderate	This species was not observed. Suitable man-made structures were not identified in the Study Area and potential for maternity roost habitat is limited due to the lack of suitable snag trees in the Study Area.
Eastern Whip-poor-will	THR	THR	This species avoids exposed, open areas or closed-canopy forests, and prefers rock or sand barrens with scattered trees, savannahs, and open conifer plantations.	Low	This species was not observed and suitable habitat was not identified within 120 m of Bridge #248.

SPECIES NAME	SARO ¹	COSEWIC ²	HABITAT DESCRIPTION ³	HABITAT POTENTIAL	FIELD ASSESSMENT AND OBSERVATIONS
Least Bittern	THR	THR	Least Bitterns can be found in a variety of wetland types but prefer cattail marshes with a mix of open channels and pools. They are typically found in large, quiet marshes.	Low	This species was not observed and suitable habitat was not identified within 120 m of Bridge #248.
Little Brown Myotis	END	END	During the summer, this species roosts in trees, abandoned buildings, attics, and barns close to water. This species overwinters in large groups in warm, moist caves or abandoned mines.	Low-Moderate	This species was not observed. Suitable man-made structures were not identified in the Study Area and potential for maternity roost habitat is limited due to the lack of suitable snag trees in the Study Area.
Northern Bobwhite	END	END	Northern Bobwhite can be found in savannahs, grasslands, and brushy hedgerows. Their range has protracted in recent years and their current Ontario range is restricted to Walpole Island and the Sarnia area. Occasional individuals of presumed captive origin are frequently seen in southern Ontario.	Low	This species was not observed, and suitable habitat was not identified. Northern Bobwhite is currently extirpated from this part of Ontario.
Northern Myotis	END	END	This mainly solitary species is most commonly associated with the boreal forest where they roost in tree cavities or under loose bark. Over-wintering occurs in caves or abandoned mines that remain above freezing.	Low-Moderate	This species was not observed. Suitable man-made structures were not identified in the Study Area and potential for maternity roost habitat is limited due to the lack of suitable snag trees in the Study Area.
Prothonotary Warbler	END	END	This species nests in the stumps of mature, dead or dying trees found in swamps and flooded woodlands. In Ontario, it is restricted to fewer than 20 sites, located along the north shore of Lake Erie.	Low	This species was not observed and suitable habitat was not identified within 120 m of Bridge #248.

SPECIES NAME	SARO ¹	COSEWIC ²	HABITAT DESCRIPTION ³	HABITAT POTENTIAL	FIELD ASSESSMENT AND OBSERVATIONS
Spotted Wintergreen	END	END	This species is found in dry pine-oak woodlands with sandy soils. In Ontario, it is known from only a few locations in Norfolk and Niagara, and it is believed to be extirpated over the rest of its former range in southwestern Ontario.	Low	This species was not observed and suitable habitat, such as pine-oak woodland was not identified within 120 m of Bridge #248.
Tri-colored Bat	END	END	Tri-colored Bats are found in a variety of mature forested habitats. Maternal colonies are usually in large trees and occasionally in man-made structures such as barns.	Low-Moderate	This species was not observed. Suitable man-made structures were not identified in the Study Area and potential for maternity roost habitat is limited due to the lack of suitable snag trees in the Study Area.
Yellow-breasted Chat	END	END	Yellow-breasted Chats find habitat in thickets and scrubby areas, such as overgrown clearings, savannahs, and utility line corridors. In recent years their range within Ontario has protracted, and currently only a few pairs are known to breed in southwestern Ontario.	Low	This species was not observed and suitable habitat was not identified within 120 m of Bridge #248.

Protection status: ¹ SARO - Species at Risk in Ontario and ² COSEWIC - Committee on the Status of Endangered Wildlife in Canada: END – Endangered, THR – Threatened, SC – Special concern, “-” – Not listed. ³ Habitat Description Source: COSEWIC reports and/or Species at Risk in Ontario (SARO) List.

While not observed, moderate habitat potential for Eastern Flowering Dogwood exists along the forest edges within the Study Area, and low-moderate habitat potential for American Chestnut, American Columbo, American Ginseng, and Butternut can be found in the forested portions of the Study Area. These species were not identified during either the 2012-2013 MMM Group (now WSP) investigations (MMM, 2015) or the 2016-2017 WSP investigations. Low-moderate potential for several species of bats, including Eastern Small-footed Bat, Little Brown Myotis, Northern Myotis and Tri-colored Bat exists in the Study Area. These species were not identified, and suitable man-made structures were not identified during the Study Area investigations. The Mixed Woodland located within the riparian corridor of Spencer Creek did not appear to have suitable snags which may represent candidate maternity roost habitat; however, low-moderate potential exists within the forest ecotypes throughout the Study Area (Figure 3). Future bridge rehabilitation works are not anticipated to impact the surrounding forest ecotypes where the above-mentioned species may find habitat. If it is determined at the detailed design stage that tree removal may be necessary, an assessment should be undertaken at that time to determine whether these trees provide bat maternity roost habitat.

6.4 SIGNIFICANT WETLANDS

Wetlands are defined in the PPS (OMMAH, 2014) as lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface. There are four major wetland types; which are classified as swamps, marshes, bogs, and fens. A significant wetland is defined as an area identified as provincially significant by the Ministry of Natural Resources using evaluation procedures established by the Province, as amended from time to time (OMMAH, 2014). Accordingly, it is the responsibility of the MNR to both identify and classify wetlands as significant in Ontario.

A review of the Natural Heritage Areas mapping (OMNRF, 2015a) did not identify wetlands within 120 m of Bridge #248, whether unevaluated or provincially significant.

6.5 SIGNIFICANT COASTAL WETLANDS

Wetlands are defined in the PPS (OMMAH, 2014) as lands that are seasonally or permanently covered by shallow water, as well as lands where the water table is close to or at the surface. There are four major wetland types; which are classified as swamps, marshes, bogs, and fens. Coastal wetlands are wetlands located on one of the Great Lakes or their connecting channels, or any other wetland that lies on a tributary to any of the above specified waterbodies and lies, either wholly or in part, downstream of a line located 2 km upstream of the 1:100 year floodline of the detention pond in which the tributary is connected.

A review of the Natural Heritage Areas mapping (OMNRF, 2015a) did not identify significant coastal wetlands within 120 m of Bridge #248.

6.6 SIGNIFICANT WILDLIFE HABITAT

Wildlife habitat is defined as areas where plants, animals, and other organisms live and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory or non-migratory species (OMMAH, 2014).

Wildlife habitat is referred to as significant if it is ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System (OMMAH, 2014).

Guidelines and criteria for the identification of significant wildlife habitat (SWH) are detailed in the Significant Wildlife Habitat: Technical Guide (OMNR, 2000), and the Significant Wildlife Habitat Criterion Schedule for Ecoregion 7E (OMNRF, 2015b). SWH is described under four main categories:

- Seasonal concentrations of animals;
- Rare vegetation communities or specialized habitats for wildlife;
- Wildlife movement corridors; and,
- Habitats of species of conservation concern.

6.6.1 SEASONAL CONCENTRATION AREAS

Areas of seasonal concentrations of animals are defined as “areas where animals occur in relatively high densities at specific periods in their life cycle and/or particular seasons.” At these times, species are vulnerable to ecological interferences or weather impacts. Areas of seasonal concentration are typically small in comparison to the larger habitat areas used by species at other times of the year. The identification of habitats associated with seasonal concentrations of species is typically based on known occurrences (OMNR, 2000).

An assessment was carried out to determine the potential for seasonal concentration areas within 120 m of Bridge #248. Resources and protocols outlined in the OMNR Significant Wildlife Habitat: Technical Guide (OMNR, 2000) and the Significant Wildlife Habitat Criterion Schedule for Ecoregion 7E (OMNRF, 2015b) were utilized to evaluate the potential for species concentration area occurrence. Seasonal concentration areas with the potential to be found within 120 m of Bridge #248 are examined in Table 4, below.

Table 4 Seasonal Concentration Areas within 120 m of Bridge #248

HABITAT TYPE	CANDIDATE SWH CRITERIA AND STUDY AREA INVESTIGATION RESULTS
Waterfowl Stopover and Staging Areas (Terrestrial)	Habitat is not present. No meadows or fields of a suitable size were identified within 120 m of Bridge #248.
Waterfowl Stopover and Staging Areas (Aquatic)	Habitat is not present. Large waterbodies were not located within 120 m of Bridge #248.
Shorebird Migratory Stopover Area	Suitable shoreline habitat or mudflats were not identified within 120 m of Bridge #248.
Raptor Wintering Area	Habitat is not present. Raptor wintering sites consist of a combination of fields and woodlands > 20 ha in size. Candidate species were not identified, and field habitat of a suitable size does not exist within 120 m of Bridge #248.
Bat Hibernacula	Habitat is not present. No caves, mine shafts, underground foundations or karsts were found within 120 m of Bridge #248.
Bat Maternity Colonies	Candidate habitat such as the presence of snag trees was not identified within the vicinity of Bridge #248; however, it may exist in some of the forested areas within the Study Area.
Bat Migratory Stopover Area	Criteria are not available at this time; therefore no evaluation is possible.
Turtle Wintering Areas	Candidate habitat is not present. Wetlands were not identified or mapped within 120 m of Bridge #248, and turtles were not observed during the Study Area investigations.
Snake Hibernacula	Suitable areas of bedrock and deep rock fissures were not identified within 120 m of Bridge #248, nor were caves or talus slopes. The rock and gravel shoulders of the CNR rail line may provide suitable hibernacula, however future development as part of this EA will be limited to the area immediately surrounding Bridge #248, and potential snake hibernacula near the CNR rail line will not be affected.
Colonially-nesting Bird Breeding Habitat (Bank/Cliff)	Habitat is not present. Exposed sand/gravel piles were not identified within 120 m of Bridge #248. Colonially-nesting bird species such as Bank Swallow were not identified during the Study Area investigations.
Colonially-nesting Bird Breeding Habitat (Tree/Shrub)	Habitat is not present. Nests within live or dead trees, shrubs or emergent vegetation that would signify the area is used by colonial tree/shrub-nesting birds were not observed, and wetlands were not identified within 120 m of Bridge #248.
Colonially-nesting Bird Breeding Habitat (Ground)	Habitat is not present. The Study Area does not contain areas with rocky islands or peninsulas that are suitable for colonial ground-nesting birds such as gulls and terns. In addition, preferred nesting habitat for Brewer's Blackbird (<i>Euphagus cyanocephalus</i>), which includes agricultural fields close to clear, flowing water is not present.

HABITAT TYPE**CANDIDATE SWH CRITERIA AND STUDY AREA INVESTIGATION RESULTS**

Migratory Butterfly Stopover Areas	Habitat is not present. The Study Area is not located within 5 km of the Lake Erie or Ontario shorelines. Furthermore, a combination of fields and forest habitats over 10 ha in size was not located in or within 120 m of Bridge #248.
Landbird Migratory Stopover Areas	Habitat is not present. The Study Area is not located within 5 km of the Lake Erie or Ontario shorelines.
Deer Winter Congregation Areas	Habitat is not present. The Study Area contains some forested areas which connect to larger woodlands to the north; however, the wooded areas immediately adjacent to Bridge #248 are heavily disturbed, and located adjacent to developed areas with heavy pedestrian and vehicle traffic.

The wooded portions of the Study Area are connected to larger forests to the north, associated with the Spencer Gorge Escarpment Valley Life Sciences ANSI (Figure 2), which likely contains Seasonal Concentration Areas. Within the vicinity of Bridge #248, potential Seasonal Concentration Areas are limited, due to the disturbed nature of the ecotypes adjacent to Bridge #248 and the presence of development in the immediate vicinity. High quality candidate bat maternity roost habitat was not identified within the vicinity of Bridge #248, but it may exist within the forested portions of the Study Area. Should tree removal be required as part of the Detailed Design stage, an assessment should be done by a qualified biologist to determine the potential for bat maternity roost habitat within the trees slated for removal.

6.6.2 RARE VEGETATION COMMUNITIES OR SPECIALIZED HABITATS

Rare or specialized habitats include rare vegetation communities or concentrations of rare plant species. These specialized areas may also support rare animal species. The Study Area lacked significant old growth forest features which, if present, might provide specialized habitats and food sources for other species dependent on these features. The vegetation communities identified within 120 m of Bridge #248 were not designated as rare or threatened in Ontario. An assessment of the presence/absence of rare vegetation communities and specialized wildlife habitat for this ecoregion is provided in Tables 5 and 6, below.

Table 5 Rare Vegetation Communities within 120 m of Bridge #248

HABITAT TYPE	CANDIDATE SWH CRITERIA AND STUDY AREA INVESTIGATION RESULTS
Cliffs and Talus Slopes	Habitat is not present. Exposed cliffs or talus slopes were not observed within 120 m of Bridge #248.
Sand Barren	Characteristic sand barren plant species and landforms were not observed within 120 m of Bridge #248.
Alvar	Habitat is not present. Calcareous bedrock is not present in this area. Furthermore, open areas of exposed bedrock containing plant species indicative of alvars were not observed in or within 120 m of Bridge #248.
Old Growth Forest	Habitat is not present. The forested portions of the Study Area consisted of mid-age deciduous forest. Within the immediate vicinity of Bridge #248, the wooded areas were heavily disturbed, lacking any characteristics of Old Growth Forest.
Savannah	Habitat is not present. Savannah vegetation communities and associated plant species were not identified in or within 120 m of Bridge #248.

HABITAT TYPE	CANDIDATE SWH CRITERIA AND STUDY AREA INVESTIGATION RESULTS
Tallgrass Prairie	Habitat is not present. Tallgrass prairie and associated plant species were not identified in or within 120 m of Bridge #248.
Other Rare Vegetation Communities	Habitat is not present.

Table 6 Specialized Wildlife Habitats within 120 m of Bridge #248

HABITAT TYPE	CANDIDATE SWH CRITERIA AND STUDY AREA INVESTIGATION RESULTS
Waterfowl Nesting Area	Habitat is not present. Grassy or shrubby fields at least 120 m in diameter or suitable wetlands were not present within 120 m of Bridge #248.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	Habitat is not present. Nests were not observed, and suitable forest communities next to wetlands were not identified within 120 m of Bridge #248.
Woodland Raptor Nesting Habitat	Habitat is not present. Raptors were not observed during the Study Area investigations, and suitable woodlands were not located within 120 m of Bridge #248.
Turtle Nesting Areas	Candidate habitat was not identified. Turtles were not found during the Study Area investigation and suitable large wetlands with adjacent sandy areas were not located within 120 m of Bridge #248.
Seep / Spring	Habitat is not present. Seeps or springs were not identified within 120 m of Bridge #248.
Amphibian Breeding Habitat (Woodland)	Candidate habitat is not present. Suitable wetland areas containing open water were not located within 120 m of Bridge #248.
Amphibian Breeding Habitat (Wetlands)	Candidate habitat is not present. Suitable wetland areas containing open habitat, and isolated from woodland habitat, were not identified within 120 m of Bridge #248.

Candidate rare vegetation communities or specialized wildlife habitats were not identified within 120 m of Bridge #248.

6.6.3 HABITAT/SPECIES OF CONSERVATION CONCERN

Species of conservation concern generally include the groups listed below:

- Species defined as Special Concern in Ontario;
- Species that are listed as rare or historical in Ontario based on records kept by the NHIC;
- Species whose populations are known to be experiencing significant declines in Ontario; and,
- Species that have a high percentage of their global population in Ontario and are rare or uncommon in the subject area.

A search of the OMNRF Natural Heritage Information Centre (NHIC) database (OMNRF, 2015a) was conducted to determine the existence and approximate location of recorded occurrences of species of Conservation Concern within the general area. One (1) one square kilometer (1 km²) quadrat (17NH83_91) surrounding the Study Area was checked. Of the twenty-five (25) element occurrences recorded for the area searched, twenty-two (22) are species of conservation concern that are tracked by the NHIC, but do not appear on the SARO or COSEWIC lists and as such are not afforded habitat protection. These species are Pignut Hickory (*Carya glabra*) (SRank = S3), Large Yellow Pond-Lily (*Nuphar lutea*) (SRank = S3), Erect Knotweed (*Polygonum erectum*) (SRank = SH), Downy Yellow False Foxglove (*Aureolaria virginica*) (SRank = S1), Perfoliate

Bellwort (*Uvularia perfoliata*) (SRank = S1), Puttyroot (*Aplectrum hyemale*) (SRank = S2), Clinton's Club-rush (*Trichophorum clintonii*) (SRank = S2S3), White-haired Panicgrass (*Dichanthelium villosissimum*) (SRank = S3), Forked Panicgrass (*Dichanthelium dichotomum*) (SRank = S2), Shiny Wedge Grass (*Spehnopholis nitida*) (SRank = S1), Northern Hawthorn (*Crataegus dissona*) (SRank = S3), White Milkweed (*Asclepia variegata*) (SRank = SX), Eastern Burning Bush (*Euonymus atropurpureus*) (SRank = S3), Yellow Stargrass (*Hyposix hirsuta*) (SRank = S3), Bowman's-root (*Gillenia trifoliata*) (SRank = SX), Eastern Few-fruited Sedge (*Carex oligocarpa*) (SRank = S3), Fern-leaved Yellow False Foxglove (*Aureolaria pedicularia*) (SRank = S2?), Woodland Pinedrops (*Pterospora andromedea*) (SRank = S2), Square-stemmed Rose Pink (*Sabatia angularis*) (SRank = SX), Scarlet Beebalm (*Monarda didyma*) (SRank = S3), White-tinged Sedge (*Carex albicans*) (SRank = S3) and Panicked Hawkweed (*Hieracium paniculatum*) (SRank = S2?). These species were not observed during the Study Area investigation and suitable habitat for these species was not identified; they will not be discussed further within this report. An additional species, Timber Rattlesnake (*Crotalus horridus*), is extirpated in Ontario. Woodland Vole (*Microtus pinetorum*) (SC) and Louisiana Waterthrush (*Parkesia motacilla*) (SC) have recorded occurrences within the areas searched.

In addition to a search of the NHIC database, the Ontario Breeding Bird Atlas (OBBA) (Bird Studies Canada et al., 2006) and Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature, 2016) were consulted to determine if there were species of Special Concern known to be present within the vicinity of the Study Area. The OBBA uses 100 km by 100 km blocks, further subdivided into 10 km by 10 km squares to compartmentalize geographical areas. The Study Area lies in the square identified as 17NH89. Black Tern (*Chlidonius niger*) (SC), Common Nighthawk (*Chordeiles minor*) (SC), Red-headed Woodpecker (*Melanerpes erythrocephalus*) (SC), Eastern Wood-Pewee (*Contopus virens*) (SC), Wood Thrush (*Hylocichla mustelina*) (SC), Golden-winged Warbler (*Vermivora chrysoptera*) (SC) and Louisiana Waterthrush (SC) have breeding evidence values within this square. The ORAA also uses 10 km by 10 km squares. Eastern Musk Turtle (*Sternotherus odoratus*) (SC) has records within this square from 1950, Northern Map Turtle (*Graptemys geographica*) (SC) between the years 1949-2015, Snapping Turtle (*Chelydra serpentina*) (SC) between the years 1946-2015, and Eastern Ribbonsnake (*Thamnophis sauritus*) (SC) between the years 1950-1985.

Refer to Table 7, below for details of the habitat potential of the Study Area for the above mentioned species of Conservation Concern. Special consideration was given to these species and their habitat during the Study Area investigation. Endangered or Threatened species are treated in Section 6.3 of this report.

Table 7 Species of Conservation Concern Habitat Potential Assessment

SPECIES NAME	SARO ¹	COSEWIC ²	HABITAT DESCRIPTION ³	HABITAT POTENTIAL	FIELD ASSESSMENT AND OBSERVATIONS
Black Tern	SC	-	The species requires large, shallow, quiet marshes where their floating nests are not subject to disturbance from humans or boat traffic.	Low	This species was not observed and suitable open marsh habitat was not identified within 120 m of Bridge #248.
Common Nighthawk	SC	THR	The species nests in areas with little to no ground vegetation, such as logged or burned-over areas, forest clearings and open rock barrens.	Low	This species was not observed and suitable habitat was not identified within 120 m of Bridge #248.

SPECIES NAME	SARO ¹	COSEWIC ²	HABITAT DESCRIPTION ³	HABITAT POTENTIAL	FIELD ASSESSMENT AND OBSERVATIONS
Eastern Musk Turtle	SC	THR	This species is found in lakes, slow-moving rivers, and marshes that have abundant emergent vegetation and muddy bottoms. In Ontario, this species is found mainly along the southern edge of the Canadian Shield, but with scattered populations in southeastern Ontario and at scattered locations in the lower Great Lakes.	Low	This species was not observed and suitable habitat, such as the presence of wetlands, was not identified within 120 m of Bridge #248.
Eastern Ribbonsnake	SC	SC	Eastern Ribbonsnakes are predominately found along the edges of large wetlands containing an abundance of shrubby vegetation. They can also be found in open woodlands that are adjacent to these wetlands.	Low	This species was not observed and suitable habitat was not identified within 120 m of Bridge #248.
Eastern Wood-Pewee	SC	SC	Eastern Wood-Pewees prefer deciduous and mixedwood forests. They are often observed sallying to capture flying insects from an exposed perch high in the canopy.	Moderate	This species was not observed during the breeding bird surveys (Section 6.9). While suitable habitat was not identified within the Mixed Woodland adjacent to Bridge #248, the other forest ecotypes in the Study Area, located further southwest as well as north of the bridge, provide moderate habitat potential.
Golden-winged Warbler	SC	THR	Golden-winged Warblers are found in shrubby areas surrounded by woodland, such as utility right-of-ways, field edges, and logged areas.	Low	This species was not observed and suitable habitat was not identified within 120 m of Bridge #248. The areas adjacent to the CNR rail line did not provide suitable habitat due to the lack of shrub habitat adjacent to the rail line.
Louisiana Waterthrush	SC	THR	This species prefers steep, forested ravines containing fast-flowing speeds. It nests among the roots of fallen trees or under the stream bank.	Low	This species was not observed and suitable habitat was not identified along the reach of Spencer Creek located within the Study Area.

SPECIES NAME	SARO ¹	COSEWIC ²	HABITAT DESCRIPTION ³	HABITAT POTENTIAL	FIELD ASSESSMENT AND OBSERVATIONS
Northern Map Turtle	SC	SC	Northern Map Turtle inhabit large rivers and lakeshores where they can commonly be seen basking on protruding rocks and logs in the spring and the summer. The water quality in their habitat must be high to support the mollusc prey of the females.	Low	This species was not observed and suitable habitat, such as the presence of wetlands or slow-moving rivers, was not identified within 120 m of Bridge #248.
Red-headed Woodpecker	SC	THR	Red-headed Woodpeckers are found in open deciduous or mixed woodlands, preferring areas with many dead trees including golf courses, cemeteries and parks.	Low	This species was not observed and suitable habitat, such as open woodland with standing dead trees, was not identified within 120 m of Bridge #248.
Snapping Turtle	SC	SC	The species is generally associated with shallow ponds, shallow lakes and streams with abundant vegetation. Suitable nesting habitat includes gravelly or sandy areas along streams, gravel shoulders along roadsides, dams and aggregate pits.	Low	This species was not observed and suitable habitat, such as the presence of wetlands, was not identified within 120 m of Bridge #248.
Wood Thrush	SC	THR	This species is strongly associated with woodlands containing tall trees, usually deciduous forests but occasionally mixed wood forests as well. The presence of a thick understorey is usually a prerequisite for site occupancy.	Low	This species was not observed and suitable habitat, such as woodlands containing a thick shrub understorey, was not identified within 120 m of Bridge #248. Wood Thrushes may find habitat in the forests north of the Study Area associated with the Spencer Gorge Escarpment Valley Life Sciences ANSL.
Woodland Vole	SC	SC	Woodland Voles are found in areas of mature deciduous woodland in the Carolinian region of Ontario, and require habitat with deep leaf litter.	Low	This species was not observed and suitable mature deciduous woodland was identified within 120 m of Bridge #248.

Protection status: ¹ SARO - Species at Risk in Ontario and ² COSEWIC - Committee on the Status of Endangered Wildlife in Canada: END – Endangered, THR – Threatened, SC – Special concern, “-” – Not listed. ³ Habitat Description Source: COSEWIC reports and/or Species at Risk in Ontario (SARO) List.

Based on the assessment there is moderate potential for Eastern Wood-Pewee within 120 m of Bridge #248. Eastern Wood-Pewees were not identified during the Study Area investigations by MMM Group (now WSP) ecologists in 2012-2013 (MMM, 2015). Additionally, as part of the 2016-2017 investigations, breeding bird surveys (refer to Section 6.9.1) did not detect this species within the Study Area. Suitable habitat was not identified within the Mixed Woodland adjacent to Bridge #248; however, the forest ecotypes located further southwest as well as north of the bridge provide moderate habitat potential (refer to Figure 3).

As an S-Ranked species or species of Special Concern (formerly Vulnerable) on the SARO list, Eastern Wood-Pewee does not receive habitat protection under the Endangered Species Act (Government of Ontario, 2007).

The forests north of the CNR rail line form the Spencer Gorge Escarpment Valley Life Sciences ANSI, where suitable habitat for several species of Conservation Concern may be found, including Eastern Wood-Pewee and Wood Thrush. As these lands were located at least 120 m from Bridge #248, they were not investigated as part of the Study Area investigations.

In addition to the species and habitats identified above, species of conservation concern are often associated with specific habitat types. The presence/absence of specific habitats for species of conservation concern within Ecoregion 7E (OMNRF, 2015b) is provided in Table 8, below.

Table 8 Habitats of Species of Conservation Concern within 120 m of Bridge #248

HABITAT TYPE	CANDIDATE SWH CRITERIA AND STUDY AREA INVESTIGATION RESULTS
Marsh Bird Breeding Habitat	Candidate habitat was not identified within 120 m of Bridge #248. Wetland areas containing shallow water with abundant emergent aquatic vegetation were not identified within 120 m of Bridge #248. None of the candidate species were observed during the Study Area investigations.
Woodland Area-Sensitive Bird Breeding Habitat	Candidate habitat was not identified within 120 m of Bridge #248. Large tracks of mature woodland were not identified, and none of the candidate species were observed during the Study Area investigations. The forests north of the Study Area form the Spencer Gorge Escarpment Valley Life Sciences ANSI where candidate habitat is present. As these forests were located at least 120 m from Bridge #248, they were not investigated.
Open Country Bird Breeding Habitat	Habitat is not present. Pastures, fallow fields, and meadows containing a high percentage of graminoids were not identified within 120 m of Bridge #248, and bird species associated with open country were not observed during the Study Area investigation.
Shrub Early Successional Bird Breeding Habitat	Habitat is not present. In addition, none of the candidate species associated with early successional habitat were observed during the Study Area investigations.
Terrestrial Crayfish	Habitat is not present. Meadows and shallow marshes were not identified within 120 m of Bridge #248, and evidence of terrestrial crayfish was not observed.
Habitat for Special Concern or Rare Wildlife Species	Candidate habitat is present within 120 m of Bridge #248. While suitable habitat for Eastern Wood-Pewee, a species of Special Concern, did not exist in the Mixed Woodland adjacent to Bridge #248, habitat for this species can be found in the forest ecotypes of the Study Area (Figure 3). This species was not detected during either the 2012-2013 MMM Group (now WSP) investigations, or the 2016-2017 investigations which included targeted breeding bird surveys. In the extreme north portion of the Study Area on the north side of the CNR rail line, the Spencer Gorge Escarpment Valley Life Sciences ANSI is located at its closest approximately 110 m from Bridge #248. Suitable habitat for several species of Special Concern can likely be found within this ANSI, including habitat for Eastern Wood-Pewee and Wood Thrush. These areas were located outside of the Study Area (120 m radius from Bridge #248) and were not investigated.

6.6.4 ANIMAL MOVEMENT CORRIDORS

The Natural Heritage Reference Manual (OMNRF, 2010) describes animal movement corridors as habitats that link two or more wildlife habitats that are critical to the maintenance of a population, species, or group of species, or habitats with a key ecological function to enable wildlife to move, with minimum mortality between areas of SWH or core natural areas. The Significant Wildlife Habitat Technical Guide (OMNRF, 2000) further describes animal movement corridors as elongated, naturally vegetated parts of the landscapes used by animals to move from one habitat to another. Examples may include riparian zones and shorelines, wetland buffers, stream and river valleys, woodlands, and anthropogenic features including hydro and pipeline corridors, abandoned road and rail allowances, and fencerows and windbreaks. The presence/absence of animal movement corridors within 120 m of Bridge #248 is provided in Table 9, below.

Table 9 Animal Movement Corridors

HABITAT TYPE	CANDIDATE SWH CRITERIA AND STUDY AREA INVESTIGATION RESULTS
Amphibian Movement Corridors	Amphibian movement corridors are only determined if amphibian breeding habitat (wetlands) is confirmed as SWH. As no candidate areas of amphibian breeding habitat (wetlands) were identified within 120m of the Study Area, amphibian movement corridors do not apply.

6.7 SIGNIFICANT WOODLANDS

Significant woodlands are defined as treed areas that provide environmental and economic benefits such as erosion prevention, water retention, and provision of habitat, recreation and the sustainable harvest of woodland products (OMMAH, 2014). Woodlands include treed areas, woodlots or forested areas and vary in their level of significance. The identification and assessment of significant woodlands is the responsibility of the local planning bodies, in this case the City of Hamilton, and should be identified using criteria established by the OMNRF. Woodland significance is typically determined by evaluating key criteria which relate to woodland size, ecological function, uncommon woodland species, and economic and social value.

The City of Hamilton Urban (2013) and Rural (2012) Official Plans identify Key Natural Heritage Feature Significant Woodlands on Schedule B-2 in their respective plans. All of the wooded areas found within the Study Area have been identified as Significant Woodlands. Within the riparian corridor of Spencer Creek the treed areas have been identified using Ecological Land Classification (ELC) (Lee et al., 2008) as Mixed Woodland (WOM). The vegetation within the Mixed Woodland is representative of a disturbed area and contains a variety of native and non-native species. Common tree species within this area include Manitoba Maple, Black Walnut and White Ash, with smaller numbers of Norway Maple, Siberian Elm, Horse Chestnut, Black Walnut and White Mulberry. Further away from Spencer Creek and north of King Street West, the woodland transitions into a mid-aged Dry - Fresh Sugar Maple - Hardwood Deciduous Forest (FODR1) (Lee et al., 2008). While still appearing relatively disturbed, this forest contained a larger proportion of native species than the Mixed Woodland located immediately adjacent to Spencer Creek. Sugar Maple was the dominant tree species while White Ash, Basswood and Black Walnut appeared in smaller numbers. South of King Street West and west of Spencer Creek the forest composition was very similar to the Dry - Fresh Sugar Maple - Hardwood Deciduous Forest located north of King Street West; however, White Ash represented a higher proportion of the canopy. This forest has been identified as a Sugar Maple - White Ash Hardwood Deciduous Forest (FODM5-8). The understorey and ground cover composition was similar between these two forest ecotypes. The wooded portions of the Study Area are connected to larger forests to the north, associated with the Spencer Gorge Escarpment Valley Life Sciences ANSI which is located as close as 110 m from Bridge #248 (Figure 2), on the north side of the CNR rail line (Figure 2). Refer to Figure 3 for Ecological Land Classification mapping of the Study Area.

Impacts to the significant woodland will be minor in nature, as disturbance will be limited to the immediate vicinity of Bridge #248. Further, the trees most likely to be impacted consist predominately of low quality, non-native and ornamental species, including Manitoba Maple, Siberian Elm, Norway Maple and White Mulberry. At the Detailed Design

stage, if impacts to trees are anticipated, a survey by a qualified arborist should be completed and an Arborist Report and Tree Preservation Plan should be submitted.

6.8 SIGNIFICANT VALLEYLANDS

The PPS (OMMAH, 2014) defines a significant valleyland as a natural area that occurs in a valley or other landform depression that has water flowing through or standing for some period of the year and is ecologically important in terms of features, functions, representation or amount, and contributes to the quality or diversity of an identifiable geographic region or natural heritage system. The local planning authority is responsible for identifying and evaluating significant valleylands.

The City of Hamilton has not prepared criteria to identify Significant Valleylands within the Urban (2013) and Rural (2012) Official Plans. Given the criteria established by the PPS, the riparian corridor surrounding Spencer Creek qualifies as a Significant Valleyland. From 60 m north of Bridge #248 to 40 m south of the bridge, the channel of the watercourse is man-made and composed primarily of concrete, armor stone and etched bedrock. Impacts to the Significant Valleyland will be limited to the area immediately adjacent to Bridge #248 and will temporary in nature. Tree removal, if required, is anticipated to be limited in scope. During the Detailed Design phase, mitigation measures must ensure that impacts to the Significant Valleyland are minimized and follow the criteria established by regulating agencies.

6.9 BIOPHYSICAL INVENTORIES/OBSERVATIONS

6.9.1 BIRD POPULATIONS

SURVEY METHODOLOGY

Breeding bird survey protocols were designed and completed based on recommendations given by the Forest Bird Monitoring Protocol (FBMP) and Ontario Breeding Bird Atlas (OBBA). The Forest Bird Monitoring Protocol recommends completing standardized point counts to survey an area for breeding birds. However, these point counts are required to be at least 250 m apart and at least 100 m from the edge of a habitat type. Due to the small size of the Study Area, point counts would be ineffective and impractical as only one or two point counts could be completed in the Study Area. An active search was determined to be the most accurate and efficient way to sample the breeding bird species within the Study Area. This involved looking and listening for birds while moving between the different habitats in the Study Area.

Breeding bird surveys were conducted on June 20 and July 10, 2017. In accordance with accepted protocols, at least six days separated each site visit, and the surveys were completed within 5 hours after sunrise. The three breeding bird surveys were completed before July 10, 2017, as recommended by the OBBA.

Breeding evidence was noted for each species observed in the Study Area. Breeding evidence is divided into four categories: confirmed (CONF), probable (PROB), possible (POSS), and none (NONE). Confirmed breeding evidence includes observations involving young or eggs; observations of adult birds carrying food, nesting material, or a fecal sac; observations of adult birds involved in a distraction display; or observations of adult birds exhibiting physiological evidence of a brood patch. Probable breeding evidence includes observations of a bird occupying territory for at least 7 days, visiting a nest site, or exhibiting territorial behaviour; observations of a pair in appropriate habitat; or observations of a pair copulating. Possible breeding evidence includes observations of a singing male or observations of a bird in suitable breeding habitat. Migrant or vagrant birds are considered to have no breeding evidence.

BIRD SURVEY RESULTS

A cumulative total of 27 bird species were observed in the Study Area over the two survey periods. Breeding was confirmed for 4 species, considered probable for 7 species, and considered possible for 10 species (Appendix B-1). Breeding evidence was not identified for 6 species.

Provincially (OMNRF, 2016) or federally (Government of Canada, 2016) listed Species at Risk were not identified during the Study Area investigation.

6.9.2 OTHER WILDLIFE OBSERVATIONS

Visual observations of area wildlife (including mammals and insects) were recorded during the Study Area investigation. Wildlife observations were based on incidental contact, scat evidence, and tracks, and were consistent with species known to occupy this area. There were no Species at Risk observed within the Study Area during the Study Area investigation. Incidental wildlife observations for the Study Area are provided in Appendix B-1.

General reptile surveys were completed by visual observation during each site visit, including an assessment of the potential for reptile hibernacula. Field surveys were conducted along the edges of the hedgerow, in the ditches, along the edges of Spencer Creek and under Bridge #248. Debris, logs, and other suitable cover objects were randomly lifted and inspected.

Reptiles were not observed within the Study Area. No other Species at Risk were noted within the Study Area.

6.10 NATURAL HERITAGE FEATURE SUMMARY

A summary of the significant Natural Heritage Features identified on or adjacent to the Study Area are provided in Table 10 below. This summary is based on observations from the Study Area investigations, as well as a review of available documentation pertaining to the Study Area and adjacent lands.

Table 10 Natural Heritage Feature Summary

FEATURE	PRESENT	COMMENT
Fish Habitat	Yes	Spencer Creek, identified as a coolwater creek, runs under Bridge #248. Characteristic coolwater fish species found in this reach of Spencer Creek include Longnose Dace and Creek Chub. Four darter species representative of the high gradient nature of this reach of Spencer Creek include Johnny Darter, Rainbow Darter, Fantail Darter and Blackside Darter. Electrofishing surveys completed on July 10, 2017 captured eight species of fish within Spencer Creek, including Northern Hog Sucker, Rainbow Darter, Longnose Dace, River Chub, Rainbow Trout, White Sucker, Creek Chub and Smallmouth Bass.

FEATURE	PRESENT	COMMENT
Habitats of Endangered or Threatened Species	Yes	While not observed, moderate habitat potential for Eastern Flowering Dogwood exists along the forest edges within the Study Area, and low-moderate habitat potential for American Chestnut, American Columbo, American Ginseng and Butternut can be found in the forested portions of the Study Area. These species were not identified during either the 2012-2013 investigations (MMM, 2015) or the 2016-2017 WSP investigations. Low-moderate potential for several species of bats, including Eastern Small-footed Bat, Little Brown Myotis, Northern Myotis and Tri-colored Bat exists in the Study Area. These species were not identified, and suitable man-made structures were not identified during the Study Area investigations. The Mixed Woodland located within the riparian corridor of Spencer Creek did not appear to have suitable snags which may represent candidate maternity roost habitat; however, low-moderate potential exists within the forest ecotypes throughout the Study Area (Figure 3). Future bridge rehabilitation works are not anticipated to impact the surrounding forest ecotypes where the above-mentioned species may find habitat. If it is determined at the detailed design stage that tree removal may be necessary, an assessment should be undertaken at that time to determine whether these trees provide bat maternity roost habitat.
Areas of Natural and Scientific Interest (ANSI)	Yes	The Spencer Gorge Escarpment Valley Life Sciences ANSI is located north of Bridge #248 on the north side of the railroad tracks, approaching to within approximately 110 m of the bridge location.
Significant Wetlands	No	Wetland features, including significant wetlands, were not identified within 120 m of Bridge #248.
Significant Coastal Wetlands	No	N/A
Significant Wildlife Habitat	Yes	The wooded portions of the Study Area are connected to larger forests to the north, associated with the Spencer Gorge Escarpment Valley Life Sciences ANSI (Figure 2) which is located as close as 110 m from Bridge #248. This feature contains Significant Wildlife Habitat (SWH), including several classes of SWH which can also be found in the forest ecotypes in the southwest and north portions of the Study Area. These include candidate bat maternity roost habitat and habitat for Species at Risk including American Chestnut, American Columbo, American Ginseng, Butternut, Eastern Small-footed Bat, Little Brown Myotis, Northern Myotis, Tri-colored Bat, Eastern Wood-Pewee and Eastern-Wood Pewee. Impacts to this feature are not anticipated, as proposed development as part of the Municipal Class EA will be limited to the immediate vicinity of Bridge #248. Additionally, the presence of a CNR rail line is located between the bridge and the ANSI. Within the Study Area, moderate habitat potential for Eastern Flowering Dogwood was identified, though the species was not observed during either the 2012-2013 MMM Group (now WSP) investigations or the 2016-2017 investigations.

FEATURE	PRESENT	COMMENT
Significant Woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River)	Yes	All of the wooded areas found within the Study Area have been identified as Significant Woodlands according to the City of Hamilton Urban (2013) and Rural (2012) Official Plans. Within the riparian corridor of Spencer Creek the treed areas have been identified using Ecological Land Classification (ELC) (Lee et al., 2008) as Mixed Woodland (WOM). Further away from Spencer Creek and north of King Street West, the woodland transitions into a mid-aged Dry - Fresh Sugar Maple - Hardwood Deciduous Forest (FODR1), while south of King Street West and west of Spencer Creek the forest composition was very similar to the Dry - Fresh Sugar Maple - Hardwood Deciduous Forest located north of King Street West; however, White Ash represented a higher proportion of the canopy.
Significant Valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River)	Yes	The City of Hamilton has not prepared criteria to identify Significant Valleylands within the Urban (2013) and Rural (2012) Official Plans. Given the criteria established by the PPS, the riparian corridor surrounding Spencer Creek qualifies as a Significant Valleyland. From 60 m north of Bridge #248 to 40 m south of the bridge, the channel of the watercourse is man-made and composed primarily of concrete, armor stone and etched bedrock. Impacts to the Significant Valleyland will be limited to the area immediately adjacent to Bridge #248 and will temporary in nature. Tree removal, if required, is anticipated to be limited in scope. During the Detailed Design phase, mitigation measures must ensure that impacts to the Significant Valleyland are minimized and follow the criteria established by regulating agencies.

7 CONCLUSIONS

The following conclusions and recommendations are provided based on the study findings presented in this report:

- WSP has been retained to complete a Natural Heritage Inventory (NHI) as part of a Municipal Class Environmental Assessment. This report aims to update the findings from the Natural Heritage Characterization Report completed by MMM Group (now WSP) (MMM, 2015), as well as provide new information based on the results of our 2016-2017 investigations.
- The natural environment surveys focused on lands within the 120 m area of influence surrounding Bridge #248, located on King Street West approximately 160 m west of Bond Street in the community of Dundas, described as Part of Lot 13, Concession 1 West Flamborough, City of Hamilton.
- Spencer Creek, identified as a coolwater creek, runs under Bridge #248 from northeast to southeast (Figure 2). Characteristic coolwater fish species found in this reach of Spencer Creek include Longnose Dace and Creek Chub. Four darter species representative of the high gradient nature of this reach of Spencer Creek include Johnny Darter, Rainbow Darter, Fantail Darter and Blackside Darter. Electrofishing surveys completed on July 10, 2017 captured eight species of fish within Spencer Creek, including Northern Hog Sucker, Rainbow Darter, Longnose Dace, River Chub, Rainbow Trout, White Sucker, Creek Chub and Smallmouth Bass. During the Detailed Design phase, mitigation measures should take place which insure that impacts to the watercourse are minimized and in accordance with the measures established by the Department of Fisheries and Oceans (DFO, 2013).
- The Spencer Gorge Escarpment Valley Life Sciences ANSI is located north of Bridge #248 on the north side of the railroad tracks, approaching to within approximately 110 m from the bridge location (Figure 2).

- All of the wooded areas found within the Study Area have been identified as Significant Woodlands according to the City of Hamilton Urban (2013) and Rural (2012) Official Plans. Within the riparian corridor of Spencer Creek the treed areas have been identified using Ecological Land Classification (ELC) (Lee et al., 2008) as Mixed Woodland (WOM). Further away from Spencer Creek and north of King Street West, the woodland transitions into a mid-aged Dry - Fresh Sugar Maple - Hardwood Deciduous Forest (FODR1), while south of King Street West and west of Spencer Creek the forest composition was very similar to the Dry - Fresh Sugar Maple - Hardwood Deciduous Forest located north of King Street West; however, White Ash represented a higher proportion of the canopy. Impacts to the significant woodland will be minor in nature, as disturbance will be limited to the immediate vicinity of Bridge #248. Further, the trees most likely to be impacted consist predominately of low quality, non-native and ornamental species, including Manitoba Maple, Siberian Elm, Norway Maple and White Mulberry. At the Detailed Design stage, if impacts to trees are anticipated, a survey by a qualified arborist should be completed and an Arborist Report and Tree Preservation Plan should be submitted.
- While not identified as a Significant Valleyland in the City of Hamilton Urban (2013) and Rural (2012) Official Plans, the riparian corridor surrounding Spencer Creek meet the qualifications of a Significant Valleyland established by the Provincial Policy Statement (OMMAH, 2014). From 60 m north of Bridge #248 to 40 m south of the bridge, the channel is man-made and composed primarily of concrete, armor stone and etched bedrock.
- While the species was not observed, moderate habitat potential for Eastern Flowering Dogwood exists along the forest edges within the Study Area, and low-moderate habitat potential for American Chestnut, American Columbo, American Ginseng and Butternut can be found in the forested portions of the Study Area. These species were not identified during either the 2012-2013 investigations (MMM, 2015) or the 2016-2017 WSP investigations. Low-moderate potential for several species of bats, including Eastern Small-footed Bat, Little Brown Myotis, Northern Myotis and Tri-colored Bat exists in the Study Area. These species were not identified, and suitable man-made structures were not identified during the Study Area investigations. The Mixed Woodland (WOM) (Lee et al., 1998) located within the immediate vicinity of Bridge #248 did not appear to have suitable snags which may represent candidate maternity roost habitat, however low-moderate potential exists in the Dry - Fresh Sugar Maple - White Ash Deciduous Forest (FODM5-8) and Dry - Fresh Sugar Maple Hardwood Deciduous Forest (FODR1) (Figure 3). Future bridge rehabilitation works are not anticipated to impact the forest ecotypes where the above-mentioned species may find habitat. However, if it is determined at the detailed design stage that tree removal may be necessary, an assessment should be undertaken at that time to determine whether these species may find habitat, including the potential for bat maternity roost habitat.
- The wooded portions of the Study Area are connected to larger forests to the north, associated with the Spencer Gorge Escarpment Valley Life Sciences ANSI which is located as close as 110 m from Bridge #248 (Figure 2). This feature contains Significant Wildlife Habitat (SWH), including several classes of SWH which can also be found in the forest ecotypes in the southwest and north portions of the Study Area. These include candidate bat maternity roost habitat and habitat for Species at Risk including American Chestnut, American Columbo, American Ginseng, Butternut, Eastern Small-footed Bat, Little Brown Myotis, Northern Myotis, Tri-colored Bat, Eastern Wood-Pewee and Wood Thrush. Impacts to this feature are not anticipated, as proposed development as part of the Municipal Class EA will be limited to the immediate vicinity of Bridge #248. Additionally, the presence of a CNR rail line is located between the bridge and the ANSI.

8 CLOSURE

This report has been prepared by WSP Canada Inc. The assessment represents the conditions in the Study Area only at the time of the assessment, and is based on the information referenced and contained in this report. WSP Canada Inc. attests that to the best of our knowledge, the information presented in this report is accurate. The use of this report for other projects without written permission of the Client and WSP Canada Inc. is solely at the user's own risk. This report must be reviewed and approved by the relevant regulating agencies prior to being relied upon for planning and/or construction purposes.

Thank you for the opportunity to complete this report. We trust that this information is satisfactory for your current requirements. Please contact us if we can be of further assistance.

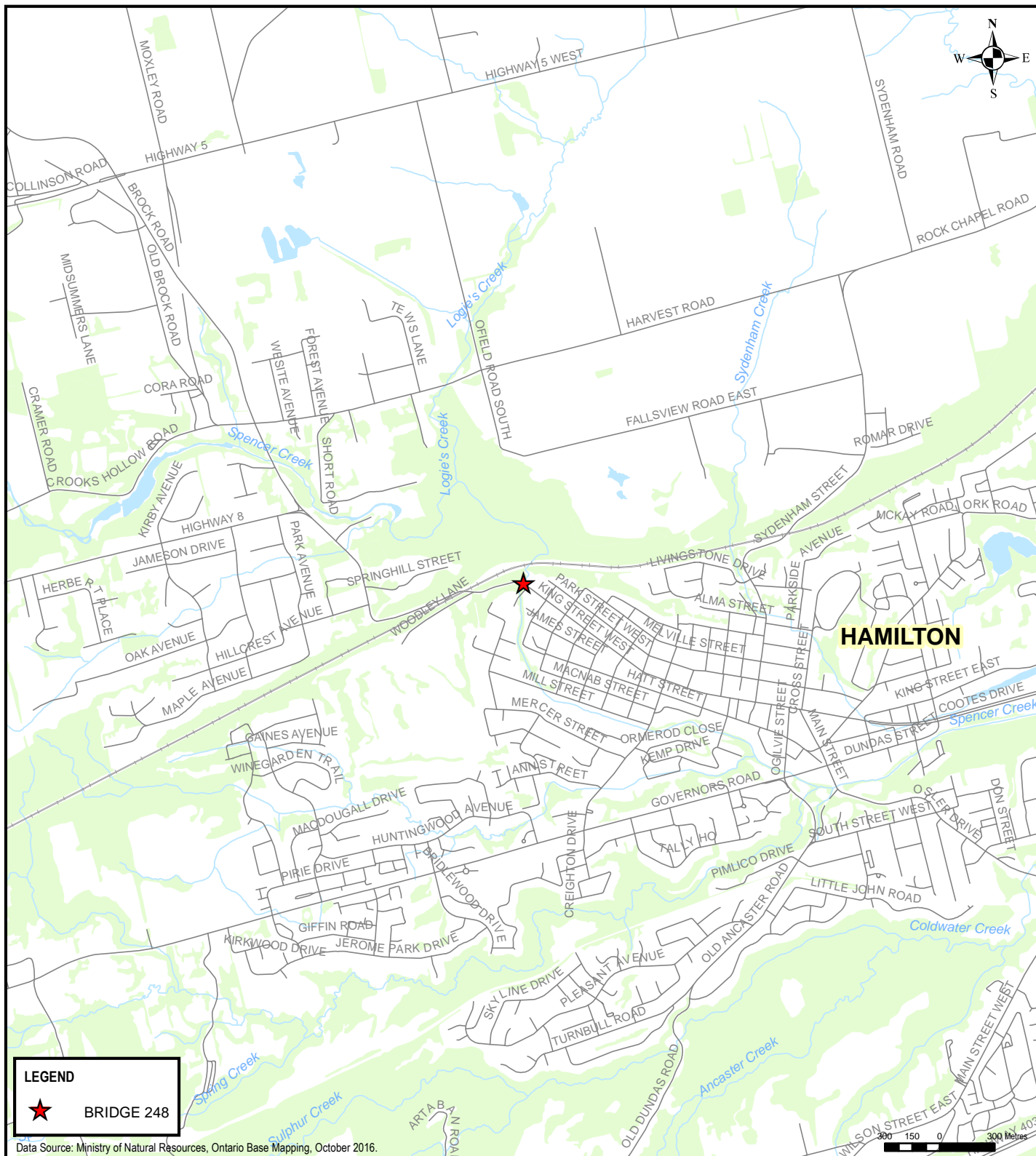
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FIGURES

FIGURE 1 – SITE LOCATION MAP
FIGURE 2 – NATURAL HERITAGE FEATURES
FIGURE 3 – ECOLOGICAL LAND CLASSIFICATION





Data Source: Ministry of Natural Resources, Ontario Base Mapping, October 2016.



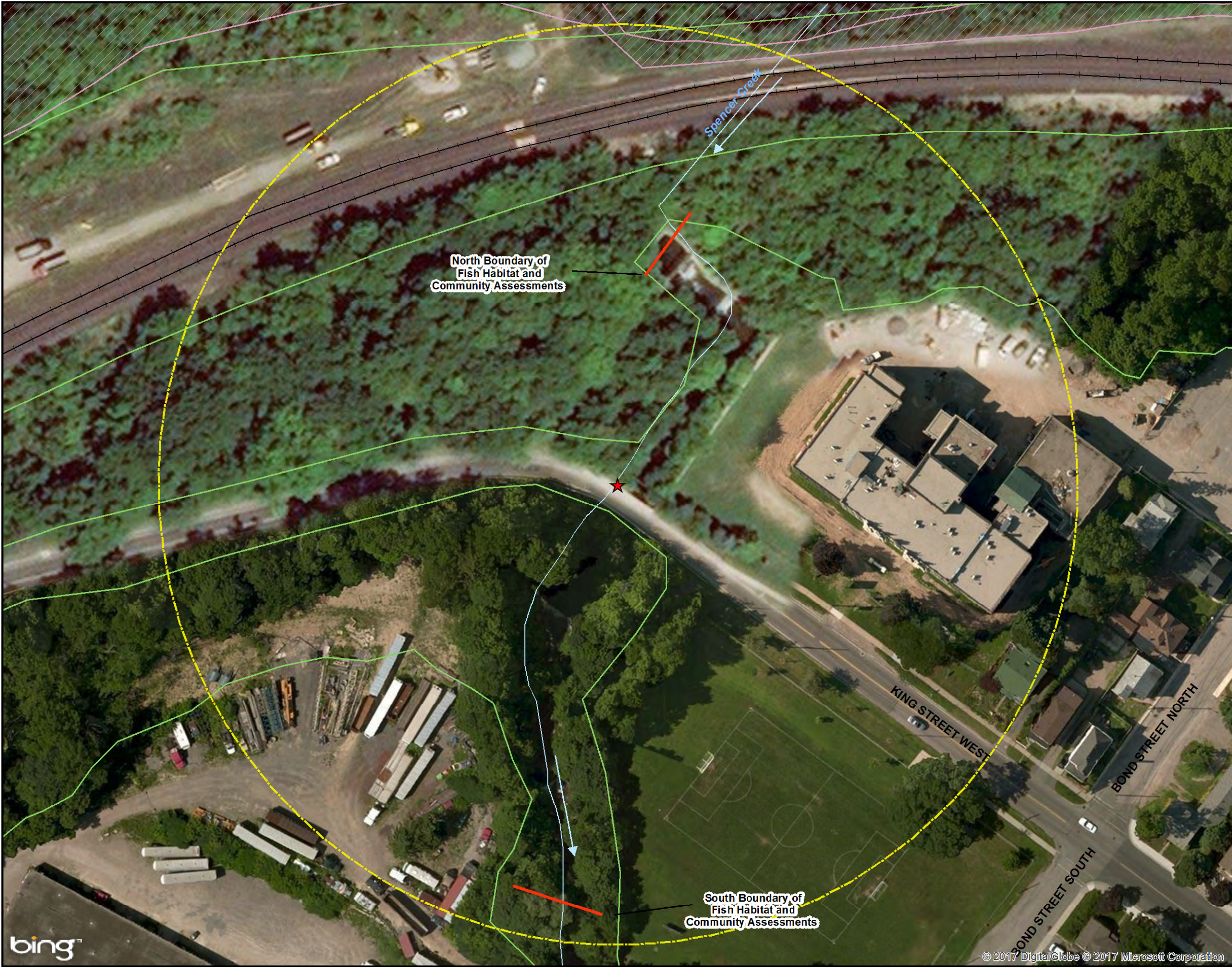
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ST. CATHARINES, ONTARIO CANADA L2R 3H5
TEL.: 905-687-1771 | FAX: 905-687-1773 | WWW.WSP.COM

PROJECT: MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT
BRIDGE #248
KING STREET WEST, COMMUNITY OF DUNDAS, CITY OF HAMILTON

TITLE: SITE LOCATION MAP

CLIENT: CITY OF HAMILTON

SCALE: 1:30,000	
DRAWN BY: TP	CHECKED BY: -
PROJECT NO: 161-09178-00 122	
DATE: JULY 2017	
FIGURE NO: 1	REV.: -



55 KING STREET, SUITE 600
ST. CATHARINES, ONTARIO CANADA L2R 3H5
TEL.: 905-687-1771 | FAX: 905-687-1773 | WWW.WSP.COM

LEGEND

- ★ BRIDGE 248
- 120 m STUDY AREA
- ANSI (SPENCER GORGE ESCARPMENT VALLEY)
- WOODED AREA (MNR)
- WATERCOURSE



10 5 0 5 10 Meters
Data Source: Ministry of Natural Resources, Ontario Base Mapping, October 2016.

CLIENT:

CITY OF HAMILTON

PROJECT:
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT
BRIDGE #248
KING STREET WEST,
COMMUNITY OF DUNDAS, CITY OF HAMILTON

PROJECT NO: 161-09178-00 122	DATE: JULY 2017
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DESIGNED BY:
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DRAWN BY:
T.P.

CHECKED BY:
-

FIGURE NO: 2	SCALE: 1:1,000
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TITLE:

NATURAL HERITAGE FEATURES

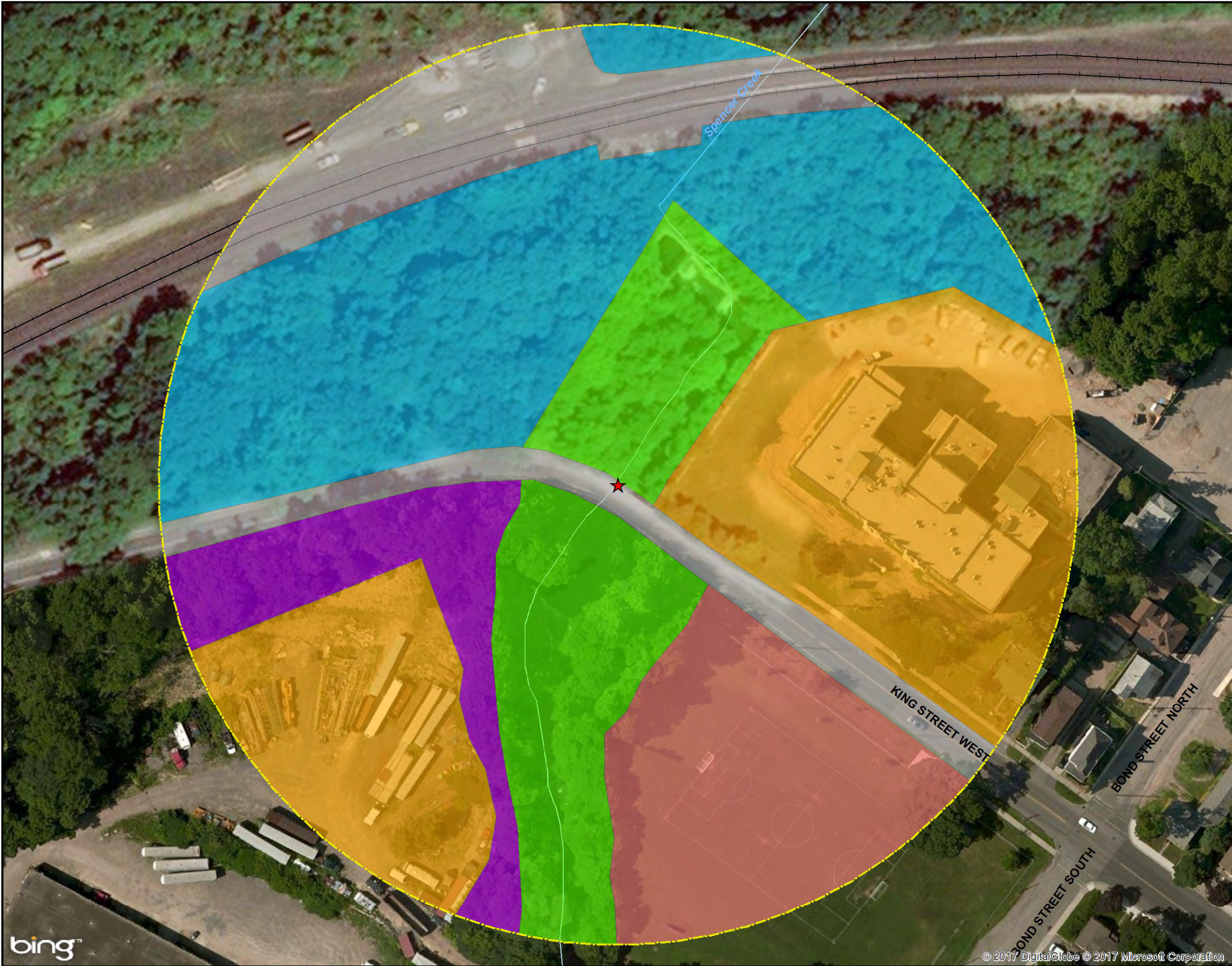
DISCIPLINE:

ENVIRONMENT

ISSUE: -	REV.: -
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- LEGEND**
- ★ BRIDGE 248
 - 120 m STUDY AREA
 - WATERCOURSE
 - CONSTRUCTED GREEN LANDS-RECREATIONAL (CGL_4)
 - BUSINESS SECTOR (CVC_1)
 - TRANSPORTATION (CVL_1)
 - DRY-FRESH SUGAR MAPLE-WHITE ASH DECIDUOUS FOREST (FODM5-8)
 - DRY-FRESH SUGAR MAPLE-HARDWOOD DECIDUOUS FOREST (FODR1)
 - MIXED WOODLANDS (WOM)



10 5 0 10 Meters
Data Source: Ministry of Natural Resources, Ontario Base Mapping, October 2016.

CLIENT:

CITY OF HAMILTON

PROJECT:
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT
BRIDGE #248
KING STREET WEST,
COMMUNITY OF DUNDAS, CITY OF HAMILTON

PROJECT NO: 161-09178-00 122	DATE: JULY 2017
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DESIGNED BY: -

DRAWN BY: T.P.

CHECKED BY: -

FIGURE NO: 3	SCALE: 1:1,000
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TITLE:

ECOLOGICAL LAND CLASSIFICATION

DISCIPLINE: ENVIRONMENT

ISSUE: -	REV.: -
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APPENDICES

B-1 SPECIES LIST



Appendix B-1 - Species Lists

Table 1: Bird Observations

Scientific Name	Common Name	GRank ¹	SRank ¹	COSEWIC ²	SARO ³	Breeding ⁴
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	G5	S4	-	-	NONE
<i>Bombycilla cedrorum</i>	Cedar Waxwing	G5	S5B	-	-	POSS
<i>Branta canadensis</i>	Canada Goose	G5	S5	-	-	NONE
<i>Buteo jamaicensis</i>	Red-tailed Hawk	G5	S5	-	-	POSS
<i>Carduelis tristis</i>	American Goldfinch	G5	S5B	-	-	PROB
<i>Cathartes aura</i>	Turkey Vulture	G5	S5B	-	-	POSS
<i>Colaptes auratus</i>	Northern Flicker	G5	S4B	-	-	POSS
<i>Columba livia</i>	Rock Pigeon	G5	SNA	-	-	PROB
<i>Corvus brachyrhynchos</i>	American Crow	G5	S5B	-	-	POSS
<i>Cyanocitta cristata</i>	Blue Jay	G5	S5	-	-	POSS
<i>Haemorhous mexicanus</i>	House Finch	G5	SNA	-	-	POSS
<i>Larus argentatus</i>	Herring Gull	G5	S5B, S5N	-	-	NONE
<i>Larus delawarensis</i>	Ring-billed Gull	G5	S5B, S4N	-	-	NONE
<i>Melospiza melodia</i>	Song Sparrow	G5	S5B	-	-	NONE
<i>Passer domesticus</i>	House Sparrow	G5	SNA	-	-	PROB
<i>Picoides pubescens</i>	Downy Woodpecker	G5	S5	-	-	POSS
<i>Poecile atricapillus</i>	Black-capped Chickadee	G5	S5	-	-	CONF
<i>Quiscalus quiscula</i>	Common Grackle	G5	S5B	-	-	CONF
<i>Setophaga ruticilla</i>	American Redstart	G5	S5B	-	-	POSS
<i>Sitta canadensis</i>	Red-breasted Nuthatch	G5	S5	-	-	POSS
<i>Sitta carolinensis</i>	White-breasted Nuthatch	G5	S5	-	-	PROB
<i>Sturnus vulgaris</i>	European Starling	G5	SNA	-	-	CONF
<i>Tachycineta bicolor</i>	Tree Swallow	G5	S5B	-	-	NONE
<i>Troglodytes aedon</i>	House Wren	G5	S5B	-	-	PROB
<i>Turdus migratorius</i>	American Robin	G5	S5B	-	-	CONF
<i>Vireo olivaceus</i>	Red-eyed Vireo	G5	S5B	-	-	PROB
<i>Zenaidura macroura</i>	Mourning Dove	G5	S5	-	-	PROB

¹ Nature Conservancy conservation concern rankings (NHIC, 2010): G - Global Level, S - Sub-national Rank (Ontario), B - Breeding, N - Non-breeding, 1 - Critically Imperiled, 2 - Imperiled, 3 - Vulnerable, 4 - Apparently Secure, 5 - Secure.

Protection status: ²COSEWIC - Committee on the Status of Endangered Wildlife in Canada; ³SARO - Species at Risk in Ontario; END - Endangered, THR - Threatened, SC - Special concern, "-" - Not listed. ⁴Ontario Breeding Bird Atlas breeding evidence (Bird Studies Canada, 2006): CONF - Confirmed, PROB - Probable, POSS - Possible

Table 2: Incidental Wildlife Observations

Family	Scientific Name	Common Name	GRank ¹	SRank ¹	COSEWIC ²	SARO ³
Mammals						
Procyonidae	<i>Procyon lotor</i>	Raccoon	G5	S5	-	-
Sciuridae	<i>Tamias striatus</i>	Eastern Chipmunk	G5	S5	-	-
Butterflies						
Hesperiidae	<i>Thymelicus lineola</i>	European Skipper	G5	SNA	-	-
Lycaenidae	<i>Celastrina neglecta</i>	Summer Azure	G5	S5	-	-
Nymphalidae	<i>Megisto cymela</i>	Little Wood-Satyr	G5	S5	-	-
Nymphalidae	<i>Phyciodes cocyta</i>	Northern Crescent	G5	S5	-	-
Pieridae	<i>Colias eurytheme</i>	Orange Sulphur	G5	S5	-	-
Pieridae	<i>Pieris rapae</i>	Cabbage White	G5	SNA	-	-
Dragonflies						
Aeshnidae	<i>Aeshna</i> species	Mosaic darter species	-	-	-	-
Libellulidae	<i>Libellula luctuosa</i>	Widow Skimmer	G5	S5	-	-
Libellulidae	<i>Sympetrum obtrusum</i>	White-faced Meadowhawk	G5	S5	-	-

¹ Nature Conservancy conservation concern rankings (NHIC, 2010): G - Global Level, S - Sub-national Rank (Ontario), B - Breeding, N - Non-breeding, 1 - Critically Imperiled, 2 - Imperiled, 3 - Vulnerable, 4 - Apparently Secure, 5 - Secure.
Protection status: ²COSEWIC - Committee on the Status of Endangered Wildlife in Canada; ³SARO - Species at Risk in Ontario;
END - Endangered, THR - Threatened, SC - Special concern, "-" - Not listed.

Table 3: Plant Observations

Family	Scientific Name	Common Name	CC ¹	CW ²	GRank ³	SRank ³
Aceraceae	<i>Acer negundo</i>	Manitoba Maple	0	-2	G5	S5
Aceraceae	<i>Acer platanoides</i>	Norway Maple	0	5	G?	SE5
Aceraceae	<i>Acer saccharum</i>	Sugar Maple	4	3	G5	S5
Hippocastanaceae	<i>Aesculus hippocastanum</i>	Horse Chestnut	0	5	G?	SE2
Brassicaceae	<i>Alliaria petiolata</i>	Garlic Mustard	0	0	G?	SE5
Asteraceae	<i>Ambrosia artemisiifolia</i>	Common Ragweed	0	3	G5	S5
Asteraceae	<i>Arctium minus</i>	Common Burdock	0	5	G?	SE5
Asteraceae	<i>Aster cordifolius</i>	Heart-leaved Aster	5	5	G5	S5
Asteraceae	<i>Aster novae-angliae</i>	New England Aster	2	-3	G5	S5
Asteraceae	<i>Aster</i> sp.	Aster species				
Poaceae	<i>Bromus inermis</i>	Smooth Brome	0	5	G4G5	SE5
Cyperaceae	<i>Carex</i> sp.	Sedge species				
Papaveraceae	<i>Chelidonium majus</i>	Greater Celandine	0	5	GNRTNR	SNA
Asteraceae	<i>Chrysanthemum leucanthemum</i>	Ox-eye Daisy	0	5	G?	SE5
Asteraceae	<i>Cichorium intybus</i>	Chicory	0	5	G?	SE5
Onagraceae	<i>Circaea</i> sp.	Enchanter's Nightshade				
Cornaceae	<i>Cornus alternifolia</i>	Alt-leaved Dogwood	6	5	G5	S5
Betulaceae	<i>Corylus cornuta</i>	Beaked Hazelnut	5	5	G5	S5
Poaceae	<i>Dactylis glomerata</i>	Orchard Grass	0	3	G?	SE5
Apiaceae	<i>Daucus carota</i>	Wild Carrot	0	5	G?	SE5
Asteraceae	<i>Erigeron philadelphicus</i>	Philadelphia Fleabane	1	-3	G5	S5
Oleaceae	<i>Fraxinus americana</i>	White Ash	4	3	G5	S5
Oleaceae	<i>Fraxinus pennsylvanica lanceolata</i>	Green Ash	3	-3	G5	S5
Rubiaceae	<i>Galium triflorum</i>	Fragrant Bedstraw	4	2	G5	S5
Geraniaceae	<i>Geranium robertianum</i>	Herb Robert	0	5	G5	SE5
Rosaceae	<i>Geum canadense</i>	White Avens	3	0	G5	S5
Xanthorrhoeaceae	<i>Heemerocallis fulva</i>	Tawny Day-lily	0	5	G?	SE5
Brassicaceae	<i>Hesperis matronalis</i>	Dame's Rocket	0	5	G4G5	SE5
Balsaminaceae	<i>Impatiens capensis</i>	Spotted Jewel-weed	4	-3	G5	S5
Juglandaceae	<i>Juglans nigra</i>	Black Walnut	5	3	G5	S4
Caprifoliaceae	<i>Lonicera tatarica</i>	Tartarian Honeysuckle	0	3	G?	SE5
Faboideae	<i>Lotus corniculatus</i>	Bird's-foot Trefoil	0	1	G?	SE5
Fabaceae	<i>Medicago lupulina</i>	Black Medick	0	1	G?	SE5
Moraceae	<i>Morus alba</i>	White Mulberry	0	0	G?	SE5
Oxalidaceae	<i>Oxalis</i> sp.	Wood-sorrel species				
Vitaceae	<i>Parthenocissus quinquefolia</i>	Virginia Creeper	6	1	G5	S4?
Poaceae	<i>Phleum pratense</i>	Timothy	0	3	G?	SE5
Plantaginaceae	<i>Plantago major</i>	Common Plantain	0	-1	G5	SE5
Rosaceae	<i>Potentilla</i> sp.	Cinquefoil species				
Rosaceae	<i>Prunus virginiana</i>	Choke Cherry	2	1	G5	S5
Ranunculaceae	<i>Ranunculus acris</i>	Tall Buttercup	0	-2	G5	SE5
Rhamnaceae	<i>Rhamnus cathartica</i>	Common Buckthorn	0	3	G?	SE5
Anacardiaceae	<i>Rhus radicans</i>	Poison-ivy	5	-1	G5	S5
Anacardiaceae	<i>Rhus typhina</i>	Staghorn Sumac	1	5	G5	S5
Rosaceae	<i>Rubus idaeus</i>	Wild Red Raspberry	0	5	G5	SE1
Rosaceae	<i>Rubus occidentalis</i>	Black Raspberry	2	5	G5	S5
Asteraceae	<i>Solidago altissima</i>	Tall Goldenrod	1	3	G?	S4?
Asteraceae	<i>Solidago caesia</i>	Blue-stem Goldenrod	5	3	G5	S5
Asteraceae	<i>Solidago canadensis</i>	Canada Goldenrod	1	3	G5	S5
Oleaceae	<i>Syringa vulgaris</i>	Common Lilac	0	5	G?	SE5

Family	Scientific Name	Common Name	CC ¹	CW ²	GRank ³	SRank ³
Asteraceae	<i>Taraxacum officinale</i>	Common Dandelion	0	3	G5	SE5
Cupressaceae	<i>Thuja occidentalis</i>	Eastern White Cedar	4	-3	G5	S5
Tiliaceae	<i>Tilia americana</i>	Basswood	4	3	G5	S5
Fabaceae	<i>Trifolium pratense</i>	Red Clover	0	2	G?	SE5
Fabaceae	<i>Trifolium repens</i>	White Clover	0	2	G?	SE5
Ulmaceae	<i>Ulmus americana</i>	American Elm	3	-2	G5?	S5
Ulmaceae	<i>Ulmus pumila</i>	Siberian Elm	0	5	G?	SE3
Fabaceae	<i>Vicia cracca</i>	Cow Vetch	0	5	G?	SE5
Vitaceae	<i>Vitis riparia</i>	Riverbank Grape	0	-2	G5	S5

¹CC - Coefficient of Conservatism: From 0 – 10, “10” being most conservative, or only found only in relatively undisturbed habitats. ²

CW - Coefficient of Wetness: From -5 – 5, “-5” being obligate wetland species, “5” being obligate upland species. ³ Nature Conservancy conservation concern rankings (NHIC, 2010): G - Global Level, S - Sub-national Rank (Ontario), E – Exotic, 1 - Critically Imperiled, 2 - Imperiled, 3 - Vulnerable, 4 - Apparently Secure, 5 - Secure.