6th Line Municipal Class Environmental Assessment

County Road 27 to St John's Road
Town of Innisfil, ON

September 6, 2016

APPENDIX I: NATURAL HERITAGE ASSESSMENT

NATURAL HERITAGE REPORT

IMPROVEMENTS TO 6TH LINE FROM COUNTY ROAD 27 TO 20TH SIDEROAD, TOWN OF INNISFIL, COUNTY OF SIMCOE

IMPROVEMENTS TO 6TH LINE FROM 20TH SIDEROAD TO ST. JOHN'S ROAD, TOWN OF INNISFIL, COUNTY OF SIMCOE

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT STUDY

prepared for:

HDR

prepared by:

LGL LIMITED
environmental research associates

JUNE 2016
REVISED AUGUST 2016

NATURAL HERITAGE REPORT

IMPROVEMENTS TO 6TH LINE FROM COUNTY ROAD 27 TO 20TH SIDEROAD, TOWN OF INNISFIL, COUNTY OF SIMCOE

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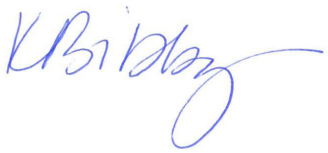

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JUNE 2016
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LGL Project # TA8487

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6TH LINE FROM COUNTY ROAD 27 TO 20TH SIDEROAD

1.0 STUDY AREA

The Town of Innisfil is undertaking a Schedule 'C' Municipal Class Environmental Assessment (Class EA) for improvements to 6th Line from County Road 27 to St. John's Road. The study limits are presented in **Figure 1**.

This Class EA Study is being conducted by HDR Corporation on behalf of the Town of Innisfil. LGL Limited, as a sub-consultant to HDR, is providing natural heritage services. This Natural Heritage Report documents the results of data collection and analysis in the fall of 2014 and spring/summer of 2015, and the potential effects of this project on natural heritage, including environmental protection measures.

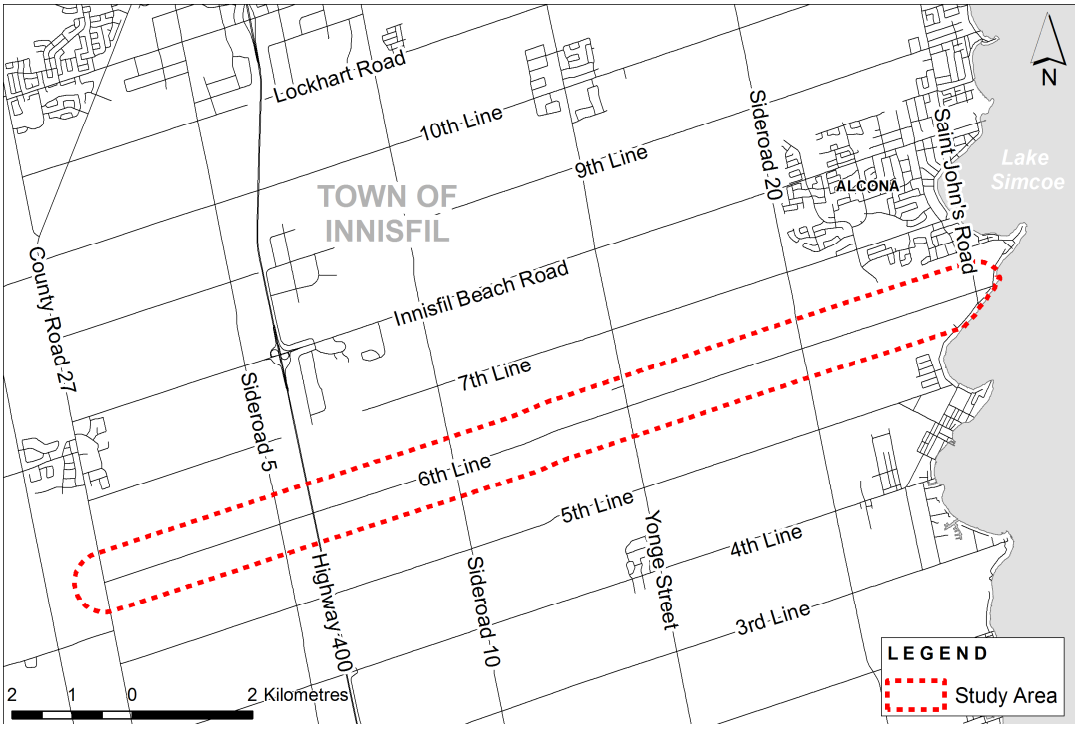


FIGURE 1. KEY PLAN OF STUDY AREA

2.0 EXISTING CONDITIONS

The following discussion outlines the existing environmental conditions within the study area and identifies natural heritage areas and/or features of environmental sensitivity and/or significance.

2.1 Physiography and Soils

The study area is located within the Peterborough drumlin field physiographic region (Chapman and Putnam 1984). The Peterborough drumlin field covers an area extending east to Hastings County, west to Simcoe County, as well as drumlins south of the Oak Ridges Moraine in Northumberland County. The study area is located within an area of drumlins and drumlin uplands rising from sand plains (Chapman and Putnam 1984).

The study area is comprised of Dundonald sandy loam, Simcoe clay loam, Smithfield silty clay loam, Bondhead sandy loam and loam, Guerin loam, Tioga sandy loam, Lyons loam, and Muck (Hoffman, Wicklund, and Richards 1962). These soils are described further in the following subsections.

2.1.1 Dundonald sandy loam

Dundonald soils occur in large areas of Simcoe County (approximately 17,000 acres). Topography in areas with this soil type is typically gently to moderately rolling and these soils are well drained (Hoffman, Wicklund, and Richards 1962). Dundonald soils are present at the very west limit of the study area at County Road 27.

2.1.2 Simcoe clay loam

Simcoe clay loam soils are poorly drained and part of the Schomberg catena and are often in association with Schomberg and Smithfield soils. They tend to be present in slight depressional areas. Although this soil type is poorly drained, it can be productive for agriculture with artificial drainage (Hoffman, Wicklund, and Richards 1962). Simcoe clay loam is present just east of the Dundonald sandy loam generally in the vicinity of Egbert Creek.

2.1.3 Smithfield silty clay loam

Smithfield soils are developed from the same materials as Schomberg soils, and are often found in small areas scattered across the County of Simcoe. Smithfield soils are typically found in areas with low lying area between Schomberg soil series and streams. These soils are free of stones and have little to no erosion potential, with imperfect drainage (Hoffman, Wicklund, and Richards 1962). Smithfield soils are found within the study area in two locations, near the tributary of Innisfil Creek at 5th Sideroad and Lovers Creek Provincially Significant Wetland, east of 10th Sideroad.

2.1.4 Bondhead sandy loam and loam

Bondhead soils are found in the southwestern part of the County of Simcoe. These soils are found in areas with smooth, moderately sloping topography. These are part of the stony phase, and contain stones and boulders throughout the surface soils. Drainage in this soil series is good and these soils are prone to erosion, particularly in areas without vegetation cover (Hoffman, Wicklund, and Richards 1962). Bondhead sandy loam is present between 5th Sideroad and Highway 400, and Bondhead loam is present just west of 10th Sideroad and between east of Lover's Creek Provincially Significant Wetland and Yonge Street.

2.1.5 Guerin loam

Guerin soils are associated with the Bondhead and Vasey soils in the County of Simcoe. Topography in areas with this soil type is typically gently sloping. The Guerin soils have imperfect drainage, and due to the topography, are less susceptible to erosion. The soils within the study area are part of 5,100 acres of a stony phase, due to a large amount of stones in the surface soils (Hoffman, Wicklund, and Richards 1962). Guerin loam soils are found in the study area at three locations, along the tributary of Innisfil Creek near Highway 400, the easterly edge of the Lover's Creek Provincially Significant Wetland, and along the tributary of Banks Creek, west of Sideroad 20.

2.1.6 Tioga sandy loam

The Tioga soil series comprises approximately 15% of the land area in the County of Simcoe. Tioga soils formed on calcareous outwash sands and are generally stone free. Areas with this soil type are typically gently undulating and slopes are smooth. These soils are well drained with a low moisture holding capacity. Areas within the study area with this soil type include: the area east of Highway 400 beside the Guerin loam, and an area at the intersection of 6th Line and Yonge Street.

2.1.7 Lyons loam

The Lyons soil series occupies depressional areas associated with the Bondhead soil series. Surface runoff is low and drainage is very poor. One area with Lyons loam is present east of Sideroad 10, within the Lover's Creek Provincially Significant Wetland.

2.1.8 Muck

Muck is found in approximately 6% of the land area of the County of Simcoe. Muck is present in depressions within upland areas, and tend to hold water, resulting in the build-up of organic debris. A large area of the Lover's Creek Provincially Significant Wetland on the north side of 6th Line is classified as Muck.

2.2 Aquatic Habitats and Communities

The study area at 6th Line from County Road 27 to 20 Sideroad occurs within the jurisdiction of the Nottawasaga Valley Conservation Authority (NVCA) and Lake Simcoe Region Conservation Authority (LSRCA). Within the west end of the study area, tributaries of the Innisfil Creek and Egbert Creek Subwatersheds within the Nottawasaga River watershed intersect 6th Line. These watercourses are managed by NVCA and the Ministry of Natural Resources and Forestry (MNRF) Midhurst District Office. Within the east end of the study area, tributaries of the Banks Creek subwatershed within the Lake Simcoe Watershed intersect 6th Line. These watercourses are managed by LSRCA and the MNRF Midhurst District Office.

Background Data
LGL conducted a secondary source review to identify the fish community within the watersheds. The secondary source review included species at risk screening though aquatic species at risk mapping (DFO/MNRF/NVCA/LSRCA, 2015), the Natural Heritage Information Centre (NHIC) database (MNRF 2015), correspondence with the MNRF Midhurst District Office (November 13, 2014), correspondence with the LSRCA regarding fish sensitivity and fisheries collection records in the study area watercourses (March 27, 2015), correspondence with NVCA regarding fish sensitivity and fisheries collection records (November 13, 2014), in addition to a review of the Fisheries Management Plan for the Innisfil Creeks Subwatershed (LSRCA 2012). A summary of the fish communities present within the watercourses in the vicinity of the study area are presented in **Table 1**.

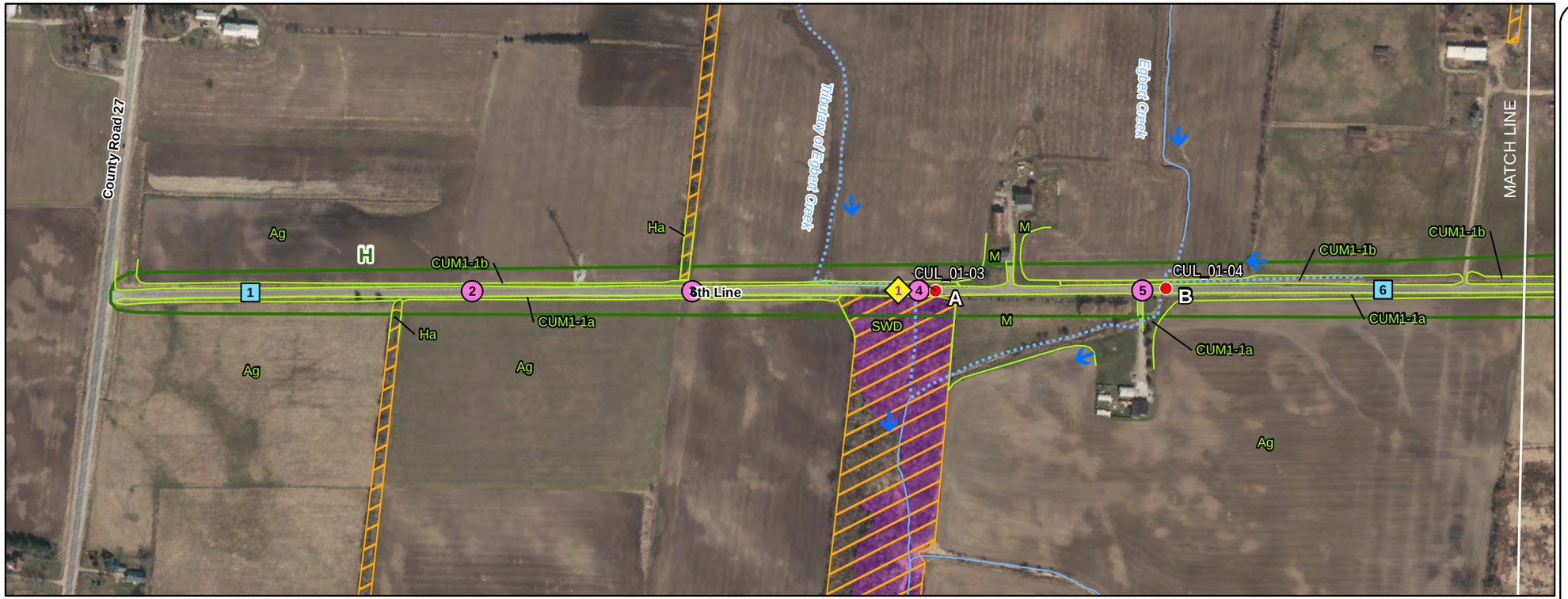
Field Investigations
LGL fisheries specialists visited 6th Line between County Road 27 and 20 Sideroad on May 7, 2015 and July 30, 2015 to observe and document existing aquatic habitat conditions. The weather conditions during the May site visit were sunny and 25°C, with southwest winds less than 10 km/h. The weather conditions during the July site visit were sunny and 26°C with west winds 25km/h with no recent rains recorded.

Physical habitat features were surveyed in sufficient detail to enable mapping and identification of key habitat types. The physical habitat attributes assessed included: (a) instream cover, (b) bank stability, (c) substrate characteristics, (d) stream dimensions, (e) barriers, (f) stream morphology, (g) terrain characteristics, (h) stream canopy cover, (i) stream gradient, (j) aquatic vegetation, (k) ground water seepage areas, and (l) general comments. Fish collection records based on secondary source review and LGL field investigations (dip net sampling), are presented in **Table 1**. **Figures 2A to 2D** present the location of the crossings identified within this section of the study area. An aquatic habitat summary is presented below which describes existing conditions observed during field investigations. Representative photographs of the crossings were also taken during investigations and are provided in **Appendix A**.

TABLE 1.
HISTORICAL FISH COLLECTION RECORDS WITHIN THE STUDY AREA

Scientific Name	Common Name	Banks Creek	Innisfil Creek	Egbert Creek	COSEWIC	SARA	MNR	Provincial
Chrosomus eos	Northern Redbelly Dace		x		-	-	-	S5
Luxilus cornutus	Common Shiner				-	-	-	S5
Notropis atherinoides	Emerald Shiner				-	-	-	S5
Notropis heterodon	Blackchin Shiner				-	-	-	S4
Notropis hudsonius	Spottail Shiner				-	-	-	S5
Notropis volucellus	Mimic Shiner				-	-	-	S5
Pimephales notatus	Bluntnose Minnow	x			-	-	-	S5
Pimephales promelas	Fathead Minnow	v			-	-	-	S5
Rhinichthys atratulus	Blacknose Dace	x, v	v		-	-	-	SNR
Semotilus atromaculatus	Creek Chub		x,y,v		-	-	-	S5
Catostomus commersonii	White Sucker		y		-	-	-	S5
Oncorhynchus mykiss	Rainbow Trout		x,y		-	-	-	SNA
Salvelinus fontinalis	Brook Trout		x,y	y	-	-	-	S5
Esox lucius	Northern Pike				-	-	-	S5
Fundulus diaphanus	Banded Killifish				-	-	-	S5
Culaea inconstans	Brook Stickleback	x	x		-	-	-	S5
Cottus bairdii	Mottled Sculpin		x,y		-	-	-	S5
Ambloplites rupestris	Rock Bass				-	-	-	S5
Micropterus salmoides	Largemouth Bass				-	-	-	S5
Lepomis gibbosus	Pumpkinseed				-	-	-	S5
Etheostoma exile	Iowa Darter				-	-	-	S5

Note: x = Fish Collection Data, personal correspondence (MNRF 2014)
y = LSRCA/NVCA personal correspondence and Fisheries Management Plans
v = LGL Sampling (May 2015)



LEGEND

- Seasonal Watercourse
- Watercourse not assessed
- Water Flow Direction Arrow
- Watercourse Crossing
- Provincially Significant Wetland (Lover's Creek Swamp) (County of Simcoe)
- Unevaluated Wetland (County of Simcoe)
- Wooded Area
- Tree Survey Polygon
- Vegetation Communities Boundary

Vegetation Communities

CUM1-1(a-b)	Dry-Moist Old Field Meadow
CUP3-2	White Pine Coniferous Plantation
SWD	Deciduous Swamp
SWT2-2a	Willow Mineral Thicket Swamp
Ag	Agricultural
Ha	Hedgerow
M	Manicured

- Anuran Survey Station
- Breeding Bird Point Count Station (Cadman et al., 2007)
- Breeding Bird Point Count Station (MNRF, 2011)
- Culvert
- Sideroad Culvert

N

100 50 0 100

Meters

Data Source: LGL Limited Field Survey (2014), County of Simcoe and Ministry of Natural Resources and Forestry.

NATURAL HERITAGE EXISTING CONDITIONS
6th Line
County Road 27 to 20th Sideroad

LGL LIMITED
environmental research associates

Project:	TA8487A	Figure:	2A
Date:	February 2016	Prepared By:	KDR
Scale:	1 : 5000	Checked By:	KSB

LEGEND

- Seasonal Watercourse
- Watercourse not assessed
- Water Flow Direction Arrow
- Crossing Identification Letter
- Provincially Significant Wetland (Lover's Creek Swamp) (County of Simcoe)
- Unevaluated Wetland (County of Simcoe)
- Wooded Area
- Tree Survey Polygon
- Vegetation Communities Boundary

Vegetation Communities

CUM1-1(a-b)	Dry-Moist Old Field Meadow
CUP3-2	White Pine Coniferous Plantation
SWM1-1	White Cedar-Hardwood Mineral Mixed Swamp
SWT2a	Mineral Thicket Swamp
SWT2-2a	Willow Mineral Thicket Swamp
H(a-d)	Hedgerow
M	Manicured

- Anuran Survey Station
- Breeding Bird Point Count Station (Cadman et al., 2007)
- Breeding Bird Point Count Station (MNRF, 2011)
- Culvert

N

100 50 0 100

Meters

Data Source: LGL Limited Field Survey (2014), Simcoe County and Ministry of Natural Resources and Forestry.

NATURAL HERITAGE EXISTING CONDITIONS
6th Line
County Road 27 to
20th Sideroad

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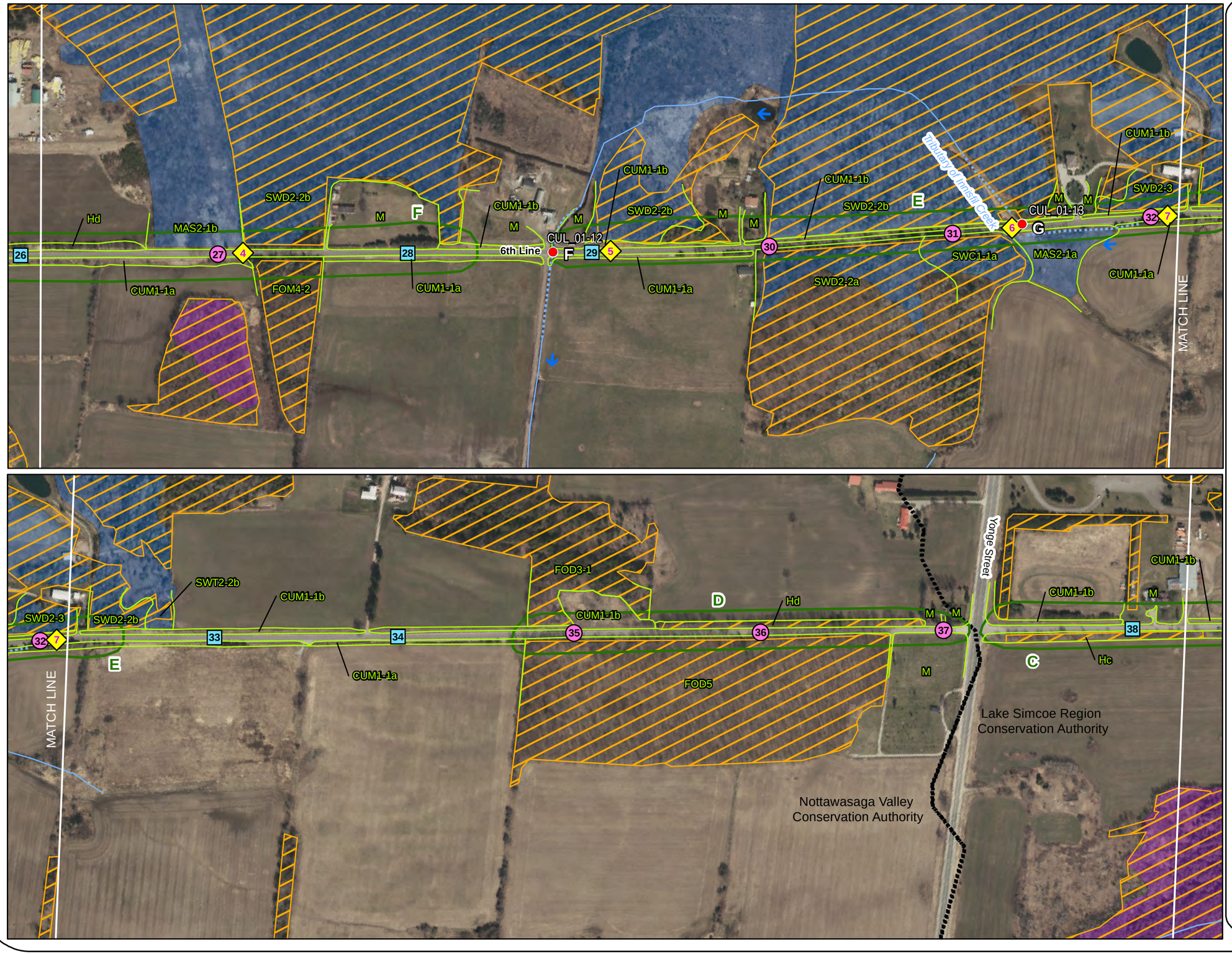
Project:	TA8487A	Figure:	2B
Date:	February 2106	Prepared By:	KDR
Scale:	1 : 5000	Checked By:	KSB



LEGEND

- Seasonal Watercourse
- Watercourse not assessed
- Water Flow Direction Arrow
- Crossing Identification Letter
- Provincially Significant Wetland (Lover's Creek Swamp) (County of Simcoe)
- Unevaluated Wetland (County of Simcoe)
- Wooded Area
- Conservation Authority Boundary
- Tree Survey Polygon
- Vegetation Communities Boundary

Vegetation Communities

CUM1-1(a-b)	Dry-Moist Old Field Meadow
FOD3-1	Dry-Fresh Poplar Deciduous Forest
FOD5	Dry-Fresh Sugar Maple Deciduous Forest
FOM4-2	Dry-Fresh White Cedar-Poplar Mixed Forest
MAS2-1(a-b)	Cattail Mineral Shallow Marsh
SWC1-1a	White Cedar Mineral Coniferous Swamp
SWD2-2(a-b)	Green Ash Mineral Deciduous Swamp
SWT2-2b	Willow Mineral Thicket Swamp
H(c-d)	Hedgerow
M	Manicured

- Anuran Survey Station
- Breeding Bird Point Count Station (Cadman et al., 2007)
- Breeding Bird Point Count Station (MNRF, 2011)
- Culvert

N

100 50 0 100

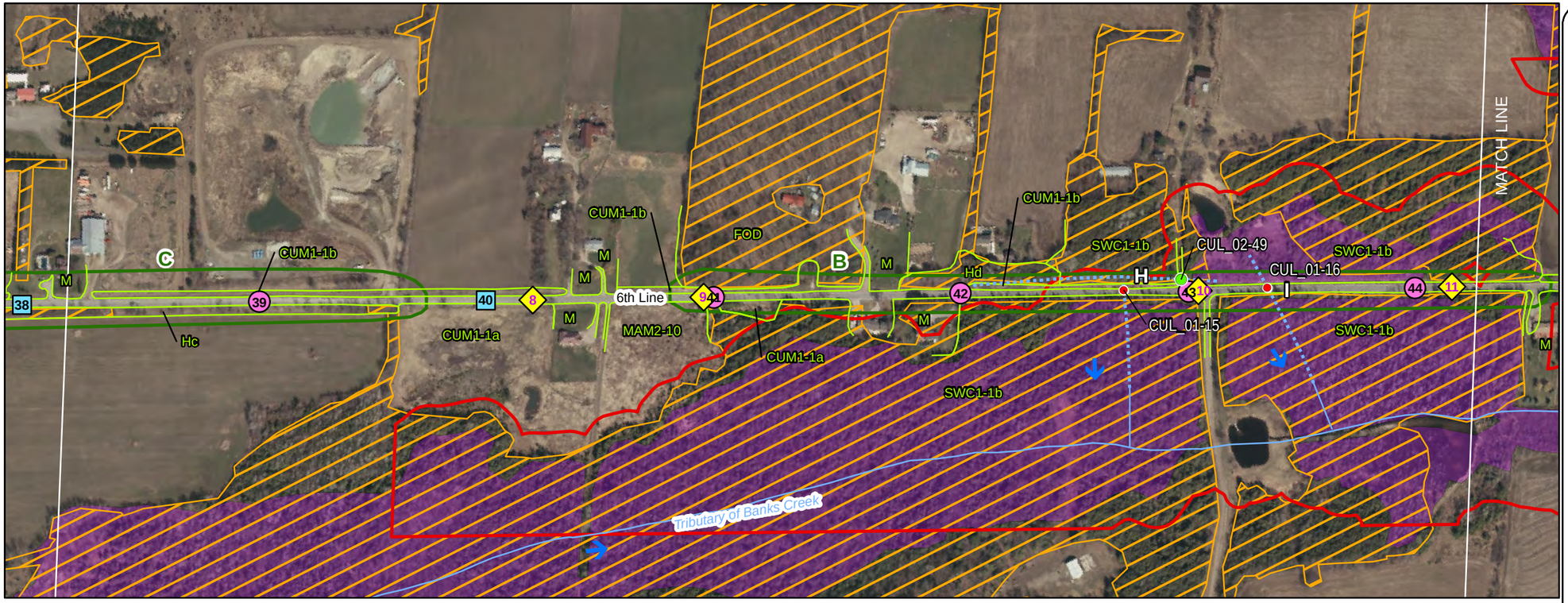
Meters

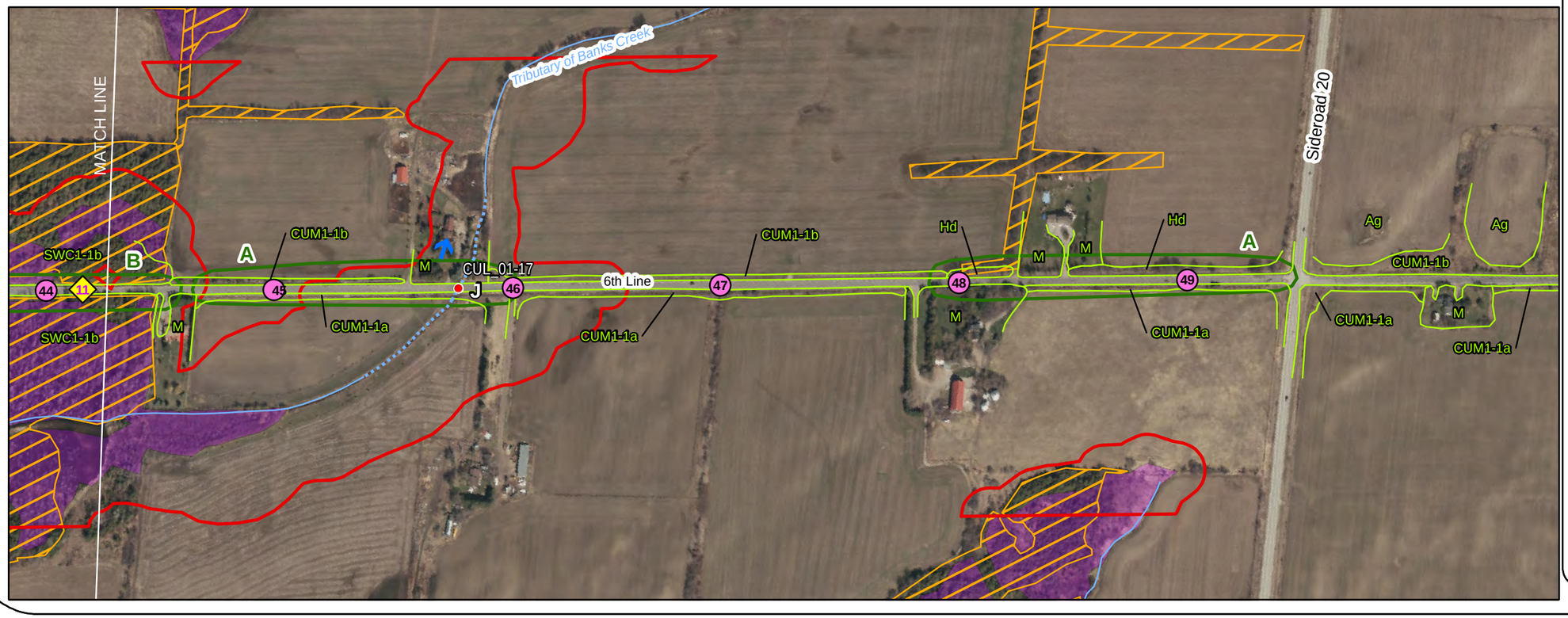
Data Source: LGL Limited Field Survey (2014), Simcoe County and Ministry of Natural Resources and Forestry.

NATURAL HERITAGE EXISTING CONDITIONS
6th Line
County Road 27 to
20th Sideroad

LGL LIMITED
environmental research associates

Project:	TA8487A	Figure:	2C
Date:	February 2016	Prepared By:	KDR
Scale:	1 : 5000	Checked By:	KSB





LEGEND

- Seasonal Watercourse
- Watercourse not assessed
- Water Flow Direction Arrow
- Watercourse Crossing
- Provincially Significant Wetland (Lover's Creek Swamp) (County of Simcoe)
- Unevaluated Wetland (County of Simcoe)
- Wooded Area
- LSRCA Regulation Limit
- Tree Survey Polygon
- Vegetation Communities Boundary

Vegetation Communities

CUM1-1(a-b)	Dry-Moist Old Field Meadow
FOD	Deciduous Forest
MAM2-10	Forb Mineral Meadow Marsh
SWC1-1b	White Cedar Mineral Coniferous Swamp
Ag	Agricultural
H(c-d)	Hedgerow
M	Manicured

- Anuran Survey Station
- Breeding Bird Point Count Station (Cadman et al., 2007)
- Breeding Bird Point Count Station (MNRF, 2011)
- Culvert
- Sideroad Culvert

N

100 50 0 100

Meters

Data Source: LGL Limited Field Survey (2014), Simcoe County, Lake Simcoe Region Conservation Authority and Ministry of Natural Resources and Forestry.

NATURAL HERITAGE EXISTING CONDITIONS
6th Line
County Road 27 to 20th Sideroad

LGL LIMITED
environmental research associates

Project:	TA8487A	Figure:	2D
Date:	February 2016	Prepared By:	KDR
Scale:	1 : 5000	Checked By:	KSB

2.2.1 Crossing A [CUL_01-03] (Tributary of Egbert Creek)

This tributary of Egbert Creek was directed south in a channelized form through an active agricultural field. The channel spans approximately 2 m in width and was <10 cm in depth and stagnant during the spring site visit. This tributary was dry during the summer site visit with the exception of standing water within the 6th Line culvert. Riparian cover was very limited upstream (north) of 6th Line. Emergent instream vegetation, cattails and grasses provide cover. This watercourse was directed along the north ditch easterly for 80 m before crossing 6th Line to the south via an 1100mm CSP. South of 6th Line the channel immediately enters a woodlot before entering a tributary of Egbert Creek approximately 100 m south of 6th Line.

According to secondary source data (NVCA, 2014), this watershed supports coldwater Brook Trout habitat approximately 2.5 km downstream of 6th Line. However, this watercourse within the study area supports seasonal flow and fish habitat indirectly. Conditions are degraded due to agricultural activities.

2.2.2 Crossing B [CUL_01_04] (Tributary of Egbert Creek)

This tributary of Egbert Creek upstream (north) of 6th Line is directed south in a channelized form through an active agricultural field. The channel spans approximately 2 m in width and ranged from 20-30 cm in depth during the spring field investigation. During the summer visit, the channel was dry.

The channel was relatively open with limited riparian cover during the spring visit, however was choked with cattails during the summer site visit. Ploughed fields exist nearly to the edge of the channel to the north of 6th Line. Significant amounts of algae were observed instream during the spring visit indicating highly productive conditions resulting from agricultural activities. Substrates were fine and flow was relatively stagnant during the spring site visit. As this tributary reaches 6th line, the channel runs west briefly along the north ditch of 6th line for approximately 20 m, before flowing south under 6th line via an 1800 mm CSP. A wetted ditch, dry during the summer investigation, which extends along the north ditch to approximately 75 m to the east of the channel, was identified. This ditch, like the channel has relatively little cover provided by cattails and grasses, and choked with algae. Although no critical habitat features were identified, fish were observed within this ditch, thus providing seasonal fish habitat. Downstream of 6th Line the channel was completely choked within a corridor of cattails approximately 4 m in width, and bordered by a manicured lawn. The channel is directed southwest though similar conditions until it enters a woodlot approximately 200 m downstream of 6th Line.

According to secondary source data (NVCA, 2014), this watershed supports coldwater Brook Trout habitat approximately 2.5 km downstream of 6th Line. This watercourse however, within the study area supports seasonal flow and fish habitat. Conditions are degraded due to agricultural activities.

2.2.3 Crossing C [CUL-01_06 and 01_07] (Tributary of Innisfil Creek - Wilson Drain)

Crossing C along 6th Line is a convergence of two tributaries of Innisfil Creek. The first tributary appears to originate as an agricultural swale to the southwest of the 6th Line/Sideroad 5 junction. This tributary flows east along a hedgerow and crosses Sideroad 5 approximately 140 m south of 6th Line outside of the study limits. After crossing, the tributary flows north along the east ditch of Sideroad, into the study area before crossing 6th Line to the north via an 800 mm CSP (CUL_01_06) approximately 40 m east of Sideroad 5 and joining the second tributary (Wilson Drain). At this junction, a second culvert (CUL_01_07), a 1200 X 800 mm concrete box also exists at this location. This structure is elevated and was not conveying any flow during either site visit. Conditions within this ditch were stagnant during the spring visit, and dry during the summer site visit. Riparian cover is very low and provided by grasses, however is manicured nearly to the edge of the ditch. In the vicinity of 6th Line, the ditch was choked with algae during the spring visit. Conditions are degraded throughout the channel. Fish were observed within

this watercourse during the spring site visit, therefore this tributary should be classified as having seasonal flow and fish habitat.

The second tributary at this location is a tributary of Innisfil Creek (Wilson Drain) and designated as a class "C" municipal drain. This tributary enters the study area from northwest of the 6th Line and Sideroad 5 junction. It flows southeast through an agricultural field and the creek appears exposed to free ranging cows. The creek was incised and appears to have been channelized in the past. Grasses line the creek, riparian area and the adjacent field which is an active pasture. The channel was composed of primarily fine substrates. During the spring visit, the watercourse was flowing through run/pool morphology and with low riparian and instream cover. During the summer visit, the channel was dry and was overgrown with grasses and terrestrial vegetation. Watercress was observed within this channel in the vicinity of the Sideroad 5 culvert. This tributary crosses Sideroad 5 to the east via a 1500 mm CSP (CUL_03_01) immediately north of 6th Line and parallels the north ditch of 6th Line for approximately 45 m before joining the second tributary of Innisfil Creek. Where the channel parallels the ditch, it meanders slightly, and remains with little riparian and instream cover. The channel was then directed north into another field, where the channel follows a willow hedgerow. Conditions in this field appear grazed, with an incised channel and highly eroding banks. This channel throughout the study area had an average channel width of 0.5 m and depth of 40 cm during the spring site visit.

Based on investigations, this channel supports seasonal flow and fish habitat. Conditions are degraded due to agricultural activities. According to secondary source data (NVCA, 2014), this watershed supports coldwater Brook Trout habitat downstream of the study area.

2.2.4 Crossing D [CUL_01_08] (Tributary of Innisfil Creek - Wilson Drain)

This crossing is the Municipal Drain downstream of Crossing C. The channel between crossings C and D meanders back south and crosses 6th Line to the south approximately 340 m east of Sideroad 5. At this crossing upstream of 6th Line the channel remains open to cattle grazing and during the spring site visit cattle were observed in the creek. Like the previous crossing, this watercourse was incised and characterized by the adjacent pasture/grazed fields throughout. Instream and riparian cover was low. A small online pond was present within the channel approximately 50 m north (upstream) of 6th Line. The wetted channel throughout this section during the spring visit averaged 0.3 m in width and 20 cm deep, however the dug channel itself averages 5 m in width, wetted with grazed grasses. Morphology was run dominant with the exception of the pond, and a small pool (2 m width 50 cm depth) at the culvert inlet. The watercourse crosses 6th Line from north to south via a 1800 mm CSP. During the summer site visit, standing water was present within the channel, up to 1.5 m in width in some locations. Cyprinids were observed within the channel during both the spring and summer site visits.

Downstream of 6th Line, conditions appear more natural. The channel was directed southeast though a grassy meadow with scattered tree cover. Riffles and runs dominated the morphology and the channel dimensions average 0.4 m in width and 20-30 cm in depth during the spring visit. Substrates are predominately silt with some scattered cobble. The channel meanders through this section slightly, and some minor bank erosion was noted on outside banks.

Based on the field investigations, this channel supports seasonal flow and fish habitat. Conditions are degraded due to agricultural activities. According to secondary source data (NVCA, 2014), this watershed supports coldwater Brook Trout habitat downstream of the study area.

2.2.5 Tributary of Innisfil Creek (Wilson Drain) crossing of Highway 400

This crossing is the Municipal Drain downstream of Crossing D. Conditions upstream (west) of Highway 400 are meandering, with a diverse mix of riffles, runs and pools observed during the spring visit. The riparian area was meadow with scattered trees. Riparian cover was relatively low, however instream cover

was fairly high and being provided by overhanging grasses and undercut banks. The channel averaged 0.4 m in width and 20 cm in depth during the spring visit. During the summer investigation, standing water was observed. Substrate in this location remains silt dominant. Several pools were noted within the channel in the vicinity of the culvert inlet during the spring visit. They average 3 m in width and 40 cm in depth. The channel then crosses Highway 400 to the east via an arched box culvert. Flow though the culvert can be described as sheet flow, as no low flow channel is present within the channel, and it was dry within the culvert during the summer investigation. Downstream (east) of Highway 400 flow outlets from the culvert over a concrete lip which is perched ~50 cm and functioning as a barrier to small fish. Downstream of the lip, during the spring investigation a pool was present, approximately 5 m in width and 40 cm deep. As the channel continues east, morphology was diverse including riffles, runs and pools and also has diverse substrates including cobble, gravel, sand silt and boulders. During the summer investigation, standing water was observed at this location as well. Iron staining was identified within this channel indicating groundwater inputs. The watercourse enters a woodlot to the east and from this point is highly shaded from riparian trees, instream cobble and boulders and instream and riparian grasses.

Based on the field investigations, this channel supports seasonal flow and fish habitat. According to secondary source data (NVCA, 2014), this watershed supports coldwater Brook Trout habitat downstream of the study area.

2.2.6 Crossing E [CUL_01_09] (Tributary of Innisfil Creek)

This crossing appears to originate just north of 6th Line in the vicinity of a dug well in an agricultural field. In this location iron staining and standing water was present during the spring visit. The ditches in the vicinity were also wetted during the spring visit, however no critical habitat features were identified. A defined channel was not present upstream of 6th Line. The watercourse feature is directed south of 6th Line via a 500 mm CSP. Downstream of 6th Line a more formal channel was evident, averaging 0.5 m width and <10 cm depth, however the water in the channel was stagnant during the spring site visit. This feature was noted to be dry during the summer site visit. Silt is the dominant substrate and overhanging grasses and emergent vegetation are providing instream and riparian cover. The watercourse is then directed south into a woodlot approximately 40 m south (downstream) of 6th Line.

Based on the field investigations, this watercourse is seasonal and provides fish habitat indirectly. According to secondary source data (NVCA, 2014), this watershed supports coldwater Brook Trout habitat downstream of the study area.

2.2.7 Crossing F [CUL_01_12] (Tributary of Innisfil Creek)

This watercourse crosses 6th Line from north to south and downstream of Crossing G. North (upstream) of 6th Line this watercourse according to air photo interpretation emerges from a woodlot approximately 170 m north of 6th Line. Downstream of this point it appeared this watercourse flows through a manicured lawn of a private residence with a narrow strip of riparian grasses. As the channel continues south approaching 6th Line the channel averaged 2.5 m in width and 40 cm depth during the spring visit. Flat/run morphology were characteristic of the channel in the spring and substrates are fine including; silt, sand, and fine gravel During the summer visit, standing water was observed upstream of 6th Line averaging 2 m in width and 30 cm depth. The channel crosses 6th Line to the south via a 1200 mm CSP.

Downstream of 6th Line, the watercourse appears channelized as it is directed south, adjacent to a driveway to the west and bordered by an agricultural field to the east. The channel averaged 1.5 m wide and 30 cm deep and morphology consisting of riffles and runs during the spring visit. Standing water was present during the summer site visit. A strip of riparian cover follows the channel south and is comprised of immature willow and dogwood. Creek Chub and Blacknose Dace were observed within this channel during the spring site investigation.

Based on field investigations, this watercourse supports seasonal flow and fish habitat. According to secondary source data (NVCA, 2014), this watershed supports coldwater Sculpin habitat downstream of the study area.

2.2.8 Crossing G [CUL_01_13] (Tributary of Innisfil Creek)

This watercourse appears to originate along the south ditch along 6th Line approximately 70 m east of Crossing G. At this location iron staining was evident, and small inflows of water were observed entering the ditch from the woodlot to the south of 6th Line during the spring visit. The ditch is directed west to the crossing, had trickle flow during the spring site visit and was dry during the summer site visit. Cover is provided by instream and overhanging grasses. The watercourse crosses 6th Line to the north via an 800 mm CSP stabilized by timber supports. The watercourse is outletted from the CSP into a diffuse grassy buffer, before crossing underneath a fence into what appears to be an incised dug channel. The channel continues northwest with a meadow/woodlot habitat bordering. Riparian cover was moderate due to trees and grasses, however insteam cover was minimal. The channel averaged 1.5 m in width, <10 cm in depth within the area of assessment during the spring visit, and was dry during the summer site visit. Substrates comprise of gravel and silt with algae present within the channel during the spring visit downstream of the area of investigation.

Based on the field investigations, this watercourse crossing supports seasonal flow and indirect fish habitat. According to secondary source data (NVCA, 2014), this watershed supports coldwater Sculpin habitat downstream of the study area.

2.2.9 Crossing H [CUL_01_15] (Tributary of Banks Creek)

This channel appears to originate along the north Side of 6th Line. Several small inputs of water were identified entering the north ditch of 6th Line from the woodlot to the north at the location of the crossing during the spring site visit. In addition, several indications of groundwater contribution (watercress and iron staining) were noted along the north ditch approximately 120 m easterly from the crossing and 160 m westerly of Crossing H. The substrates were mainly silt with abundant emergent aquatic vegetation.
This watercourse crosses 6th Line to the south via a 400 mm CSP, perched ~10 cm at the outlet. A small pool, 1.5 m wide, 30 cm depth was present immediately at the culvert outlet and several cyprinids were noted within this pool during the spring visit. The substrates were mainly silt, however at the outlet, where flow was present during the spring visit, a small section of gravel was observed. Standing water was observed upstream and downstream of this crossing during the summer site visit. Emergent vegetation including watercress was present within this channel. Riparian and instream cover was abundant and provided by vegetation and woody debris. The watercourse is directed south into a cedar woodlot, and appears from the ROW to be diffuse as it enters the woodlot. Due to property access restrictions, it is suspected that this crossing is connected to the Tributary of Banks Creek located approximately 150 m south of 6th Line. During detail design, the connection, or lack thereof to Banks Creek should be verified.

Based on the field investigations, this watercourse crossing supports seasonal flow and fish habitat. According to secondary source data (MNR, 2015) Banks Creek supports a tolerant warmwater baitfish community.

2.2.10 Crossing I [CUL_01_16] (Tributary of Banks Creek)

Based on air photo interpretation, it appears that this watercourse originates from a pond approximately 80 m north of 6th Line. At 6th Line to the north a flow was observed entering from the north during the spring site visit, however it was nearly completely choked with cattails. A formal channel was not evident. Flow is directed south of 6th Line via a 600 mm CSP. To the south, a more defined channel was present. The wetted channel averaged 0.3 m in width and 30 cm in depth during the spring site visit. The channel upstream and downstream of 6th Line was dry during the summer site visit. Substrates include

silt, detritus and sand. It is directed south into a cedar woodlot. Instream and riparian cover are abundant due to emergent vegetation and the riparian woodlot. It appears that this crossing is connected to the Tributary of Banks Creek located approximately 150 m south of 6th Line. During detail design, the connection, or lack thereof to Banks Creek, should be verified.

Based on the field investigations, this watercourse crossing supports seasonal flow and indirect fish habitat. According to secondary source data (MNR, 2015) Banks Creek supports a tolerant warmwater baitfish community.

2.2.11 Crossing J [CUL_01_17] (Tributary of Banks Creek)

This tributary flows through the study area from south to north. The watercourse enters the study area from the south, between agricultural fields bordered by a buffer of grasses and meadow species. During the spring visit, riffle/run habitat morphology was observed, with the channel averaging 30 cm in width and 20 cm in depth. Substrates within the channel include gravel, sand, silt and detritus. Riparian and instream cover is provided by cattails and grasses. The watercourse is directed north via a 600 mm CSP into a residential property, and is bordered by grasses and mature trees. The watercourse flows channelized for approximately 20 m, before it opens up into a small online pond feature, then narrows again and continues north. During the spring site visit, the watercourse at the culvert was the deepest, flowing slowly and averaged 1 m in width and 30 cm in depth. As the watercourse continues north toward the pond, the flow appeared nearly stagnant. Fathead minnows were observed and captured by dipnet at this crossing during the spring site visit. During the summer site visit, this watercourse was dry, with the exception of some standing water at the culvert outlet to the north of 6th Line.

Based on the field investigations, this watercourse crossing supports seasonal flow and fish habitat. According to secondary source data (MNR, 2015) Banks Creek supports a tolerant warmwater baitfish community.

2.2.12 Species at Risk

Based upon a review of the MNRF Natural Heritage Information Centre database, Species at Risk data provided by MNRF, and the LSCRA/NVCA/Department of Fisheries and Oceans Species at Risk mapping 2014, and personal correspondence with MNRF, LCRCA and NVCA there are no aquatic species at risk recorded within the study area.

2.3 Vegetation and Vegetation Communities

The geographical extent, composition, structure and function of the vegetation communities were identified through air photo interpretation and a field investigation. Air photos were interpreted to determine the limits and characteristics of the vegetation communities in the study area. A field investigation of the vegetation communities along 6th Line between Country Road 27 and 20 Sideroad was conducted on June 22 and July 25, 2015 within the right-of-way, to the extent possible. The field investigation was carried out to ground truth the boundaries of the vegetation communities and to conduct a botanical survey.

The vegetation communities were classified according to the *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (Lee *et al*. 1998). A plant list and a description of the general structure of vegetation were obtained during the field investigations. Plant species status was reviewed for Ontario (Oldham 2009), Lake Simcoe Region Conservation Authority (Lake Simcoe Environmental Management Strategy State of the Lake Simcoe Watershed 2003), and Simcoe County (Riley 1989). Vascular plant nomenclature follows Newmaster *et al*. (1998) with a few exceptions that have been updated to Newmaster *et al.* (2005).

2.3.1 Vegetation Communities

Vegetation communities within the study area consist of a mixture of forest, wetland and cultural communities. The majority of lands adjacent to 6th Line between County Road 27 and 20th Sideroad have been cleared to accommodate the existing infrastructure, residential properties and for agricultural purposes. Cleared vegetation communities have various degrees of colonization and disturbance. Evidence of disturbance includes a high proportion of non-native plant species that are well adapted to persist in areas that are regularly disturbed including species that are adapted to high light conditions, limited soil moisture, and species that are tolerant of salt spray. Anthropogenic/cultural communities consist of Dry-Moist Old Field Meadow (CUM1-1) and White Pine Coniferous Plantation (CUP3). The cultural meadow communities were identified immediately adjacent to the roadways, and within these communities there is generally an inclusion of a small meadow marsh or shallow marsh as these were prevalent within the ditches.

The natural/semi-natural features within the study area consists of wetland and forest communities. The upland forest communities consist of a mixture of deciduous and mixed forest communities including Deciduous Forest (FOD), Dry-Fresh Poplar Deciduous Forest (FOD3-1), Dry-Fresh Sugar Maple Deciduous Forest (FOD5), and Dry-Fresh White Cedar-Poplar Forest (FOM4-2). The forest communities are generally of higher quality and contain a high number of specialized and native plant species. In addition, the forest communities throughout the study area are considered to be mature and contain a number of large diameter trees.

The wetlands are found in the low lying areas and areas associated with the Lover's Creek Provincially Significant Wetland Complex, unevaluated wetlands, and associated watercourses. A total of eight wetland communities types were identified within the study area including White Cedar Mineral Coniferous Swamp (SWC1-1), White Cedar-Hardwood Mineral Mixed Swamp (SWM1-1), Deciduous Swamp (SWD), Green Ash Mineral Deciduous Swamp (SWD2-2), Mineral Swamp Thicket (SWT2), Willow Mineral Swamp Thicket (SWT2-2), Forb Mineral Meadow Marsh (MAM2-10), and Cattail Mineral Shallow Marsh (MAS2-1). The swamp communities throughout the study area are considered to be mature and of high quality. These swamp communities generally support a high number of specialized and native wetland plant species. The meadow marsh and cattail marsh communities contain a high number of non-native and invasive plant species as a result of infiltration from the existing right-of-way. These communities are considered to be of moderate quality.

A total of 14 Ecological Land Classification (ELC) vegetation community types were identified by LGL Limited during botanical surveys within the study area. All of the vegetation communities identified within the study area are considered widespread and common in Ontario and are secure globally. These communities are delineated in **Figures 2A to 2D** and are described in **Table 2**.

There are several areas that are not identified as ELC vegetation communities including manicured areas (M) which include mown lawns, gardens and planted trees, and hedgerows (H) which include trees that have been planted or that have been maintained for the purposes of preserving windbreaks between agricultural fields and screens between residential units and local roadways.

2.3.2 Flora

A total of 186 plant species have been recorded within the study area. Four of these plants could only be identified to genus and are not included in the following calculations. Of the 182 plants identified to species, 119 (65%) plant species identified are native to Ontario and 63 (35%) plant species are considered introduced and non-native to Ontario. A list of vascular plants is presented in **Appendix B.** Definitions of the acronyms and species ranks used in **Appendix B** are described in **Appendix C.**

TABLE 2.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
TERRESTRIAL – CULTURAL			
CUM	Cultural Meadow		
CUM1-1 (a and b)	Dry-Moist Old Field Meadow	**Emergent Trees/Shurbs:** includes apple (*Malus pumila*), Manitoba maple (*Acer negundo*), red-osier dogwood (*Cornus sericea* ssp. *sericea*), and staghorn sumac (*Rhus typhina*). **Ground cover:** includes wild carrot (*Daucus carota*), orchard grass (*Dactylis glomerata*), awnless brome (*Bromus inermis* ssp. *insermis*), blueweed (*Echium vulgare*), and butter-and-eggs (*Linaria vulgaris*).	• Cultural communities (CU). • Tree cover and shrub cover < 25 % (M). • This community can occur on a wide range of soil moisture regimes (Dry-Moist) (-1).
CUP	Cultural Plantation		
CUP3-2	White Pine Coniferous Plantation	**Canopy:** includes eastern white pine (*Pinus strobus*).	• Cultural community (CU). • Tree cover > 75 % (P). • Coniferous tree cover (3). • Eastern white pine dominant (-2).
TERRESTRIAL – NATURAL/SEMI-NATURAL			
FOD	Deciduous Forest		
FOD	Deciduous Forest	**Canopy:** includes trembling aspen (*Populus tremuloides*), sugar maple (*Acer saccharum* ssp. *saccharum*), and red ash (*Fraxinus pennsylvanica*). **Understory:** includes alternate-leaved dogwood (*Cornus alternifolia*), red panicled dogwood (*Cornus racemosa*), and black walnut (*Juglans nigra*). **Ground cover:** includes graceful sedge (*Carex gracillima*), wild lily-of-the-valley (*Maianthemum canadense*), and yellow avens (*Geum aleppicum*).	• Tree cover > 60 % (FO). • Deciduous trees > 75 % of canopy cover (D).

TABLE 2.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
FOD3-1	Dry-Fresh Poplar Deciduous Forest	**Canopy:** includes trembling aspen, balsam poplar (*Populus balsamifera* ssp. *balsamifera*), and basswood (*Tilia americana*). **Understory:** includes common buckthorn (*Rhamnus cathartica*), and trembling aspen. **Ground cover:** includes garlic mustard (*Alliaria petiolata*), tall goldenrod (*Solidago canadensis* var. *scabra*), and orchard grass.	• Tree cover > 60 % (FO). • Deciduous trees > 75 % of canopy cover (D). • Moderately dry (0) to fresh (1, 2, 3) soil moisture regime (3). • Trembling aspen or largetooth aspen dominant (-1).
FOD5	Dry-Fresh Sugar Maple Deciduous Forest	**Canopy:** includes sugar maple, eastern white pine, American beech (*Fagus grandifolia*), red oak (*Quercus rubra*), and white ash (*Fraxinus americana*). **Understory:** includes ironwood (*Ostrya virginiana*), sugar maple, choke cherry (*Prunus virginiana* var. *virginiana*), and alternate-leaved dogwood. **Ground cover:** includes white baneberry (*Actaea pachypoda*), wild columbine (*Aquilegia canadensis*), blue cohosh (*Caulophyllum thalictroides*), stellate sedge (*Carex rosea*), and herb-robert (*Geranium robertianum*).	• Tree cover > 60 % (FO). • Deciduous trees > 75 % of canopy cover (D). • Sugar maple dominant (5).
FOM	Mixed Forest		
FOM4-2	Dry-Fresh White Cedar-Poplar-Conifer Mixed Forest	**Canopy:** includes eastern white cedar (*Thuja occidentalis*), trembling aspen, and red ash. **Understory:** includes trembling aspen, alternate-leaved dogwood, and choke cherry. **Ground cover:** includes oak fern (*Gymnocarpium dryopteris*), stellate sedge, and wild lily-of-the-valley.	• Tree cover > 60 % (FO). • Coniferous trees > 25 % and deciduous trees > 25 % of canopy cover (M). • White cedar mixed forest (4). • Poplar (-1).

TABLE 2.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
WETLAND			
SWD	Deciduous Swamp		
SWD	Deciduous Swamp	**Canopy:** includes trembling aspen, balsam poplar, white willow (*Salix alba*), and eastern white cedar. **Understory:** includes large-tooth aspen (*Populus grandidentata*), crack willow (*Salix fragilis*), trembling aspen, and red ash. **Ground cover:** includes perfoliate thoroughwort (*Eupatorium perfoliatum*), reed canary grass (*Phalaris arundinacea*), fringed loosestrife (*Lysimachia ciliata*), and American wild mint (*Mentha arvensis*).	• Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Deciduous tree cover >75% of canopy cover (D).
SWD2-2 (a and b)	Ash Mineral Deciduous Swamp	**Canopy:** includes red ash, trembling aspen, eastern white cedar, Manitoba maple, and basswood. **Understory:** includes red-osier dogwood, hawthorn (*Craaegus* sp.), Missouri willow (*Salix eriocephla*), and red ash. **Ground cover**: includes Canada rush (*Juncus canadensis*), fox sedge (*Carex vulpinoidea*), blue vervain (*Verbena hastata*), spotted touch-me-not (*Impatiens capensis*), and hemlock water-parsnip (*Sium suave*).	• Tree or shrub cover > 25% and dominated by hydrophytic shrub and tree species (SW). • Deciduous tree cover > 75% of canopy cover (D). • Ash species dominant (2).
SWC	Coniferous Swamp		
SWC1-1 (a and b)	White Cedar Mineral Coniferous Swamp	**Canopy:** includes eastern white cedar and trembling aspen. **Understory:** includes choke cherry. **Ground cover:** includes reed canary grass and tall goldenrod (*Solidago canadensis* var. *scabra*).	• Tree or shrub cover > 25% and dominated by hydrophytic shrub and tree species (SW). • Conifer tree cover > 75% of canopy cover (1). • Almost entirely dominated by white cedar (-1).

TABLE 2.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
SWM	Mixed Swamp		
SWM1-1	White Cedar Mineral Mixed Swamp	**Canopy:** includes eastern white cedar, trembling aspen, balsam poplar, and sugar maple. **Understory:** includes Missouri willow, red-osier dogwood, speckled alder (*Alnus incana* spp. *rugosa*), and trembling aspen. **Ground cover:** includes sensitive fern (*Onoclea sensibilis*), pointed broom sedge (*Carex scoparia*), American great bulrush (*Schoenoplectus tabernaemontani*), and spotted touch-me-not (*Impatiens capensis*).	• Tree or shrub cover > 25% and dominated by hydrophytic shrub and tree species (SW). • Coniferous trees > 25 % and deciduous trees > 25 % of canopy cover (M). • White cedar (1). • Mixed Hardwood (-1).
SWT	Swamp Thicket		
SWT2	Mineral Swamp Thicket	**Canopy:** includes white willow, tamarack (*Larix laricina*), and white spruce (*Picea glauca*). **Understory:** includes speckled alder, choke cherry, and balsam poplar. **Ground cover:** includes reed canary grass, thimble-berry (*Rubus occidentalis*), and Canada anemone (*Anemone canadensis*).	• Tree cover < 25% and hydrophytic shrub > 25% (SWT). • Mineral soil (2).
SWT2-2 (a and b)	Willow Mineral Thicket Swamp	**Canopy:** includes white willow, crack willow, eastern white cedar, and tamarack. **Understory:** includes white birch (*Betula papyrifera*), crack willow, slender willow (*Salix petiolaris*), and white willow. **Ground cover:** includes tall white aster (*Aster lanceolatus* ssp. *lanceolatus*), reed canary grass, dark-green bulrush (*Scirpus atrovirens*), and perfoliate thoroughwort.	• Tree cover < 25% and hydrophytic shrub > 25% (SWT). • Mineral soil (2). • Willow species dominant (-2).
MAM	Meadow Marsh		
MAM2-10	Forb Mineral Meadow Marsh	**Emergent Trees/shrubs:** includes willow species (*Salix* spp.) **Ground cover:** includes tall white aster, flat-topped bushy goldenrod (*Euthamia graminifolia*), dark-green bulrush, reed canary grass, and American great bulrush.	• Tree and shrub cover < 25% with variable flooding regimes (water depth < 2 m) (MA). • Species less tolerant of prolonged flooding (M). • Mineral soil (2). • Forb dominant (-10).

TABLE 2.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
MAS	Shallow Marsh		
MAS2-1 (a and b)	Cattail Mineral Shallow Marsh	**Emergent Trees/Shrubs:** includes willow species. **Ground cover:** includes broad-leaved cattail (*Typha latifolia*), dark-green bulrush, reed canary grass, pointed broom sedge, and hop sedge (*Carex lupulina*).	• Tree and shrub cover < 25% with variable flooding regimes (water depth < 2 m) (MA). • Water up to 2 m deep (MAS). • Mineral soil (2).
OTHER*			
H (a to d)	Hedgerow	Areas where large expanses of grass/shrubs/trees are maintained and/or planted. **Includes:** white spruce, balsam poplar, basswood, red ash, sugar maple, and common buckthorn.	
M	Manicured grasses and planted shrubs and/or trees	Areas where large expanses of grass/shrubs/trees are maintained and/or planted. **Includes**: Norway spruce (*Picea abies*), eastern white cedar, Norway maple (*Acer platanoides*), and sugar maple (*Acer saccharum* ssp. *saccharum*).	

* Not identified as an ELC community by Lee, H., W. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurray. 1998. *Ecological Land Classification for Southern Ontario: First Approximation and Its Application*. Natural Heritage Information Centre.

2.3.3 Species at Risk

One plant species regulated under the Ontario *Endangered Species Act, 2007* was identified during LGL's botanical investigation. Due to the sensitive nature of species at risk information, the details for this species has been omitted from this report, as requested by the MNRF. Information for this plant species has been provided to the MNRF under separate cover.

Eleven plant species that are rare in Simcoe County were identified within the study area. **Table 3** presents the list of those rare species and in which vegetation community each species was identified. A description of the rare species ranks (R1-R4) in Simcoe County and LSRCA species ranks (w) is presented in **Appendix C**. A list of rare plant species in the NVCA jurisdiction was not available at the time of field work and reporting for this project.

2.4 Tree Resources

Methodology

Field investigations were conducted on May 19, 2015 within the study area. A preliminary tree inventory was completed for trees within the existing right-of-way. Areas beyond the existing right-of-way were accessed where permission to enter has been secured by the study team. The purpose of this tree inventory was to collect general information regarding the tree resources within the study area to assist the study team in avoiding Endangered or Threatened species, or trees of significant size or maturity. All trees recorded along the study area were grouped into polygons (A to H). The following information was collected: tree species, health assessment; assessed as poor, fair, or good based on qualities such as trunk integrity, crown structure, and vigour, assessment of the maturity of trees within each polygon, and associated vegetation community.

Findings

A total of 30 tree species were documented within the study area. Overall, trees within the study area were generally considered to be in good to fair condition with the exception of ash trees. Ash trees throughout the study area have varying levels of decline, which is most likely as a result of the Emerald Ash borer. In addition, epicormic branching and varying degrees of crown dieback were prevalent throughout the study area which is often an indication of stress in trees found in urban settings. **Table 4** provides a summary of the results from the tree inventory. The boundaries of each tree polygon are presented on **Figures 2A to 2D**.

2.5 Wildlife and Wildlife Habitat

Field investigations were conducted with the purpose of documenting wildlife and wildlife habitat and to characterize the nature, extent and significance of wildlife usage within the study area. Wildlife investigations were focused within and adjacent to the existing 6th Line right-of-way, between 6th Line from County Road 27 to 20 Sideroad, within the Town of Innisfil. Direct observations, calls and tracks were used to record wildlife present within the study area. A summary of survey date(s), tasks and weather is presented in **Table 5**.

TABLE 3.
SUMMARY OF REGIONALLY RARE PLANT SPECIES IDENTIFIED WITHIN THE STUDY AREA

Scientific Name	Common Name	Simcoe County Species Ranks			ELC Vegetation Community/Hedgerow																	
		SRank	Simcoe	LSRCA	FOD	FOD3-1	FOD5	FOM4-2	Hedgerow A	Hedgerow B	Hedgerow C	Hedgerow D	MAS2-1a	MAS2-1b	SWD	SWD2-2a	SWD2-2b	SWC1-1b	SWM1-1	SWT2-2b	CUM1-1a	CUM1-1b
Equisetum pratense	meadow horsetail	S5	R-2	w			X								X							
Juglans nigra	black walnut	S4	R-1 Nat	w	X				X		X											
Ribes hirtellum	smooth gooseberry	S5		w	X											X						
Acer nigrum	black maple	S4?		w	X						X	X										
Juncus canadensis	Canada rush	S5		w												X	X					
Carex scoparia	pointed broom sedge	S5		w									X			X			X			
Carex viridula ssp. *viridula*	greenish sedge	S5		w												X	X					
Cladium mariscoides	water bog-rush	S5		w													X					
Anemone quinquefolia var. *quinquefolia*	wood anemone	S5	R-1					X														
Cornus racemose	red panicled dogwood	S5	R-2		X																	
Solidago canadensis var. *scabra*	tall goldenrod	S5	R-4			X			X		X	X	X	X	X	X		X	X	X	X	X

TABLE 4.
SUMMARY OF TREE SURVEY

Polygon	Tree Species Present		General Health Condition	Maturity*	Associated Vegetation Community
A	• Austrian pine (*Pinus nigra*) • eastern red cedar (*Juniperus virginiana*) • basswood (*Tilia americana*) • white elm *(Ulmus americana*) • eastern white cedar (*Thuja occidentalis*) • apple (*Malus* sp.)	• red ash (*Fraxinus pennsylvanica*) • Manitoba maple (*Acer negundo*) • Norway maple (*Acer platanoides*) • blue spruce (*Picea pungens*) • sugar maple (*Acer saccharum* ssp. *saccharum*) • European mountain ash (*Sorbus aucuparia*)	• generally good condition • ash trees in decline	• Mature	• hedgerow • manicured lands
B	• balsam poplar (*Populus balsamifera*) • tamarack (*Larix laricina*) • eastern white cedar • white spruce (*Picea glauca*) • trembling aspen (*Populus tremuloides*) • apple • red ash • willow (*Salix* sp.)	• Norway spruce (*Picea abies*) • paper birch (*Betula papyrifera*) • white ash (*Fraxinus americana*) • basswood • white pine (*Pinus strobus)* • sugar maple • silver maple (*Acer saccharinum*)	• generally good condition • ash trees in decline	• Mature	• coniferous swamp • deciduous forest
C	• sugar maple • sliver maple • eastern white cedar • red ash • basswood • willow	• trembling aspen • eastern cottonwood (*Populus deltoides*) • Austrian pine • eastern white cedar • Norway maple • white spruce	• generally good condition • ash trees in poor condition	• Mature	• hedgerow • manicured lands
D	• Manitoba maple • eastern white cedar • European mountain ash • Scots pine (*Pinus sylvestris*) • sugar maple • Austrian pine • basswood	• trembling aspen • white spruce • American beech (*Fagus grandifolia*) • white ash • ironwood (*Ostrya virginiana*) • black locust (*Robinia pseudoacacia*) • white elm	• generally good condition • ash trees in decline	• Mature	• deciduous forest • hedgerow
E	• basswood • eastern white cedar • trembling aspen • tamarack • white birch • white ash • apple	• Scots pine • blue spruce • white pine • silver maple • balsam poplar • white spruce • willow	• generally good condition • ash trees in poor condition	• Mature	• deciduous swamp

TABLE 4.
SUMMARY OF TREE SURVEY

Polygon	Tree Species Present		General Health Condition	Maturity*	Associated Vegetation Community
	• white elm • yellow birch (*Betula alleghaniensis*)	• eastern hemlock (*Tsuga canadensis*)			
F	• basswood • apple • willow • eastern white cedar • white spruce • black cherry (*Prunus serotina*)	• sugar maple • trembling aspen • red ash • scots pine • Austrian pine	• generally good condition • ash trees in decline	• Mature	• deciduous swamp • mixed forest
G	• eastern white cedar • red ash • trembling aspen	• white elm • Scots pine	• generally good condition • ash trees in poor condition	• Mature	• mixed forest
H	• basswood • red ash • Manitoba maple • white elm • sugar maple • trembling aspen	• white pine • American beech • Austrian pine • Norway maple • blue spruce • European mountain ash	• generally good condition • ash trees in poor condition	• Mature	• hedgerow • manicured lands

* As defined by Lee, H., W. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurray. 1998. *Ecological Land Classification for Southern Ontario: First Approximation and Its Application*.

TABLE 5.
SUMMARY OF DATE OF INVENTORY, TASK, WEATHER AND PERSONNEL

Date of Inventory	Task	Weather	Personnel Involved
October 23, 2014	General wildlife survey	Partial cloud cover, 8C, calm	David Smith (LGL)
April 20, 2015	Anuran survey	Overcast, 15C, calm	David Smith (LGL)
May 18, 2015	Anuran survey	Overcast, 25C, calm	David Smith (LGL)
June 3, 2015	Breeding Bird survey and incidental wildlife survey	Clear, 8C, calm.	David Smith (LGL)
June 15, 2015	Breeding Bird survey and incidental wildlife survey	Overcast, 16C, calm	David Smith (LGL)
June 18, 2015	Breeding bird survey, incidental wildlife surveys and anuran survey	Clear, 11C, calm.	David Smith (LGL)
June 22, 2015	Breeding bird survey and incidental wildlife survey	Partial cloud cover, 19C, calm	David Smith (LGL)
June 23, 2015	Breeding bird survey and incidental wildlife survey	Partial cloud cover, 15C, calm	David Smith (LGL)
June 25, 2015	Breeding bird survey and incidental wildlife survey	Partial cloud cover, 15C, calm	David Smith (LGL)

2.5.1 Wildlife Habitat

Wildlife and wildlife habitat was found to be distributed across the entire study area; however, given the predominantly cleared landscape practices (agriculture and residential area) and disturbed nature of the study area, natural heritage features were generally restricted to several areas. A summary of natural heritage features identified within the study area is provided below.

Lover's Creek Swamp Provincially Significant Wetland (PSW) is located just east of 10th Sideroad and predominantly north of 6th Line. Given the relatively large and contiguous nature of this natural area, it is likely that it provides locally significant habitat for wildlife species typically associated with wetland/swamp, aquatic, riparian zone and forest/forest edge habitat types. Lover's Creek Swamp PSW maintains connectivity with natural areas to the north and to a lesser extent the south. On the local landscape scale, this natural area is likely to provide significant wildlife movement opportunity and function.

A number of watercourse features cross through the study area. Many of these watercourses provide only seasonal flows, contain little vegetation and are found within cleared agricultural settings limiting their capacity to support wildlife species. Watercourse crossings such as crossings D, E, G, B, H and I (see **Figures 2A to 2D**) are found within more naturalized areas and consequently offer higher quality wildlife habitat, including wildlife movement/corridor function.

Deciduous and coniferous swamp and shallow marsh communities are located across the study area. Anuran (frogs and toads) breeding evidence and bird species identified within or in the vicinity of these aquatic habitats indicate that they provide anuran breeding habitat and habitat for aquatic and semi-aquatic bird species (see below). A number of relatively small farm ponds or man-made ponds are located across the study area, generally some distance north or south of 6th Line. These ponds were found to provide similar habitat function to the swamp and marsh communities identified above.

Forested (deciduous, mixed and coniferous types) habitats were found to be distributed across much of the study area. These communities provide interior forest (where units are large enough) and forest edge habitat for a number of species and also serve as corridor/movement habitat for wildlife species.

Cultural meadow, manicured, agricultural and hedgerow habitat types were found across the study area and were generally associated with agricultural lands. Agricultural lands which experience less management (e.g., pastureland and fallow fields) were found to contain a more diverse wildlife assemblage than more actively managed lands such as row crops (e.g., corn, soy, etc.). Cultural meadow and hedgerow inclusions were also found to contain a moderately diverse wildlife assemblage. These communities provide nesting habitat for open country bird species.

Since natural areas within the study area are generally limited and given the cleared landscape practices associated with agriculture, natural areas found within and in the vicinity of the study area likely provide locally significant wildlife habitat. However, outside of these natural areas, the disturbed landscape supports limited natural heritage features, resulting in the presence of low to moderately diverse assemblage of wildlife species which are generally considered urban or tolerant of anthropogenic features and disturbance.

2.5.2 Fauna

Based on field observations, 66 species of wildlife could be verified in the study area and the majority of these recordings came from identification (through calls and sightings) of bird species with more modest numbers of herpetofauna and mammal species identified. A summary of wildlife species documented in the study area during field investigations is presented in **Table 6**.

TABLE 6.
WILDLIFE SPECIES DOCUMENTED IN THE STUDY AREA BY LGL (2015)

Wildlife	Scientific Name	Common Name	SARA	ESA	Legal Status	Other
Herpetofauna	*Bufo americanus*	American Toad				
	Hyla versicolor	Gray Treefrog			FWCA (P)	
	Pseudacris crucifer	Spring Peeper				
	Pseudacris triseriata	Western Chorus Frog	THR	-		
	Rana sylvatica	Wood Frog				
	Lithobates pipiens	Leopard Frog				
	Lithobates clamitans	Green Frog				
	Thamnophis sirtalis	Eastern Gartersnake				
Birds	*Cathartes aura*	Turkey Vulture			FWCA(P)	
	Charadrius vociferus	Killdeer			MBCA	
	Actitis macularius	Spotted Sandpiper			MBCA	
	Bartramia longicauda	Upland Sandpiper			MBCA	SWH
	Larus delawarensis	Ring-billed Gull			MBCA	
	Columba livia	Rock Dove				
	Zenaida macroura	Mourning Dove			MBCA	
	Melanerpes carolinus	Red-bellied Woodpecker			MBCA	
	Picoides pubescens	Downy Woodpecker			MBCA	
	Colaptes auratus	Northern Flicker			MBCA	
	Dryocopus pileatus	Pileated Woodpecker			MBCA	SWH/INT
	Contopus virens	Eastern Wood Pewee	-	SC	MBCA	
	Empidonax traillii	Willow Flycatcher			MBCA	
	Sayornis phoebe	Eastern Phoebe			MBCA	
	Myiarchus crinitus	Great-crested Flycatcher			MBCA	
	Tyrannus tyrannus	Eastern Kingbird			MBCA	
	Vireo gilvus	Warbling Vireo			MBCA	
	Vireo olivaceus	Red-eyed Vireo			MBCA	INT
	Cyanocitta cristata	Blue Jay			FWCA (P)	
	Corvus brachyrhynchos	American Crow			MBCA	

TABLE 6.
WILDLIFE SPECIES DOCUMENTED IN THE STUDY AREA BY LGL (2015)

Wildlife	Scientific Name	Common Name	SARA	ESA	Legal Status	Other
Birds (continued)	*Eremophila alpestris*	Horned Lark			MBCA	
	Tachycineta bicolor	Tree Swallow			MBCA	
	Petrochelidon pyrrhonota	Cliff Swallow			MBCA	
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
	Poecile atricapillus	Black-capped Chickadee			MBCA	
	Troglodytes aedon	House Wren			MBCA	
	Cathartes fuscescens	Veery			MBCA	SWH/INT
	Turdus migratorius	American Robin			MBCA	
	Dumetella carolinensis	Gray Catbird			MBCA	
	Toxostoma rufum	Brown Thrasher			MBCA	
	Sturnus vulgaris	European Starling				
	Bombycilla garrulus	Cedar Waxwing			MBCA	
	Dendroica petechia	Yellow Warbler			MBCA	
	Dendroica virens	Black-throated Green Warbler			MBCA	SWH
	Mniotilta varia	Black and White Warbler			MBCA	SWH/INT
	Seiurus aurocapilla	Ovenbird			MBCA	SWH/INT
	Geothlypis trichas	Common Yellowthroat			MBCA	
	Spizella passerina	Chipping Sparrow			MBCA	
	Spizella pusilla	Field Sparrow			MBCA	
	Passerculus sanwichensis	Savannah Sparrow			MBCA	SWH
	Melospica melodia	Song Sparrow			MBCA	
	Melospiza georgiana	Swamp Sparrow			MBCA	
	Zonotrichia albicollis	White-throated Sparrow			MBCA	
	Cardinalis cardinalis	Northern Cardinal			MBCA	
	Passerina cyanea	Indigo Bunting			MBCA	
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Agelaius phoeniceus	Red-winged Blackbird				
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Quiscalus quiscula	Common Grackle				

TABLE 6.
WILDLIFE SPECIES DOCUMENTED IN THE STUDY AREA BY LGL (2015)

Wildlife	Scientific Name	Common Name	SARA	ESA	Legal Status	Other
Birds (continued)	*Icterus galbula*	Baltimore Oriole			MBCA	
	Carduelis tristis	American Goldfinch			MBCA	
	Passer domesticus	House Sparrow				
Mammals	*Tamias striatus*	Eastern Chipmunk			FWCA(P)	
	Sciurus carolinensis	Eastern Gray Squirrel			FWCA(G)	
	Tamiasciurus hudsonicus	Red Squirrel			FWCA(F)	
	Castor canadensis	Beaver			FWCA(F)	
	Procyon lotor	Northern Raccoon			FWCA(F)	
	Odocoileus virginianus	White-tailed Deer			FWCA(G)	

SARA – federal *Species at Risk Act*:
END - Endangered
THR – Threatened
SC - Special Concern

ESA - *Ontario Endangered Species Act*, 2007
END – Endangered
THR – Threatened
SC - Special Concern

Other:
Significant Wildlife Habitat Technical Guide:
SWH – Area Sensitive Species
INT - Interior Species
For definitions of species ranks, refer to **Appendix C**.

Legal Status:
MBCA - *Migratory Birds Convention Act*
ESA - E*ndangered Species Act*
SARA - *Species at Risk Act*
FWCA - *Fish and Wildlife Conservation Act*
(P) Protected Species (G) Game species (F) Furbearing mammals

2.5.2.1 Anuran Survey

Methodologies outlined in the Marsh Monitoring Program Protocol (2000) were applied to confirm presence/absence of anuran species, document potential breeding habitat/areas, and confirm the nature, extent and significance of amphibian usage. Stations were strategically placed where amphibian breeding habitat was suspected, based on air-photo interpretation and a review of the study area (see **Figure 2A to 2D**). Field investigations within the study area were conducted on three separate nights during the spring and summer of 2015, ran from one half hour after sunset and ended prior to midnight and were conducted during appropriate weather conditions (see **Table 5**). Investigations were undertaken during periods of peak anuran breeding activity and vocalization.

Fauna

Anuran breeding evidence was documented for seven species during 2015 surveys. Vocalizing male American Toad (*Anaxyrus americanus*), Gray Treefrog (*Hyla versicolor*), Spring Peeper (*Pseudacris crucifer*), Western Chorus Frog (*Pseudacris triseriata*), Wood Frog (*Lithobates sylvaticus*), Leopard Frog (*Lithobates pipiens*) and Green Frog (*Rana clamitans*) were noted within the study area or in the immediate vicinity. A summary of anuran species and their respective call level codes is presented in **Table 7**.

Mammal Species

Six mammal species were identified during field investigations in the study area. Northern racoon (*Procyon lotor*) tracks were commonly identified along the roadside, as well as eastern chipmunk (*Tamias striatus*) and red squirrel (*Tamiasciurus hudsonicus*). A road-killed beaver (*Castor canadensis*) was also observed. The mammal species documented represent an assemblage that readily utilizes human influenced landscapes.

Herpetofauna Species

Eight herpetofauna species (one reptile and seven amphibians) were observed in the study area during field investigations. The majority of these species were identified during anuran call surveys conducted over three separate surveys.

2.5.2.2 Breeding Bird Survey

Breeding bird surveys were conducted on a number of dates during the 2015 breeding bird season to document breeding bird evidence (BBE) and to characterize the nature, extent and significance of breeding bird usage of the habitats within the study area (see **Table 5**). Breeding bird survey methodology varied depending on the habitat type present. Where potentially suitable habitat for Bobolink (*Dolichonyx oryzivorus*) and/or Eastern Meadowlark (*Sturnella magna*) was identified, surveys were undertaken in accordance with MNRF survey protocol for Bobolink (MNRF 2011). In all other habitat types, survey methodology and breeding bird behaviours used as evidence of breeding success were categorized according to the Breeding Bird Atlas five-year surveys organized by Bird Studies Canada (Cadman et al., 2007). Locations of breeding bird point count stations are shown on **Figures 2A to 2D**.

Fauna

The study area contained a moderate number of breeding bird species representing several habitat types. Breeding evidence was obtained for 52 species of birds. Breeding evidence was confirmed in nine species and suspected in twenty-nine. An additional 14 species were identified as having the potential to breed within the study area. Confirmed breeding by bird species was generally documented based on adults carrying food for young, including species such as Red-winged Blackbird (*Agelaius phoeniceus*, Song Sparrow (*Melospica melodia*), Savannah Sparrow (*Passerculus sanwichensis*), American Robin (*Turdus migratorius*), Tree Swallow (*Tachycineta bicolor*), Eastern Kingbird (*Tyrannus tyrannus*) and a species at risk (omitted as per MNRF). These same species which were confirmed as breeding were also

TABLE 7.
AMPHIBIAN SURVEY OF STUDY AREA AND ADJACENT LANDS BY LGL LIMITED

Station	Scientific Name	Common Name	SARA	ESA	Local	Legal Status	Call Level Code
*1**	-	-					
2	*Bufo americanus*	American Toad					2
	Hyla versicolor	Gray Treefrog				FWCA(P)	1
	Rana clamitans	Green Frog					1
3	*Pseudacris crucifer*	Spring Peeper					3
4	*Pseudacris crucifer*	Spring Peeper					3
	Pseudacris triseriata	Western Chorus Frog	THR	-			1
	Lithobates pipiens	Leopard Frog					2
	Rana clamitans	Green Frog					1
5	*Hyla versicolor*	Gray Treefrog				FWCA(P)	2
	Pseudacris crucifer	Spring Peeper					3
6	*Hyla versicolor*	Gray Treefrog				FWCA(P)	2
	Rana sylvatica	Wood Frog					2
	Pseudacris crucifer	Spring Peeper					2
7	*Rana sylvatica*	Wood Frog					2
	Pseudacris crucifer	Spring Peeper					2
8	*Hyla versicolor*	Gray Treefrog				FWCA(P)	3
	Pseudacris crucifer	Spring Peeper					3
	Rana clamitans	Green Frog					1
9	*Hyla versicolor*	Gray Treefrog				FWCA(P)	3
	Pseudacris crucifer	Spring Peeper					3
10	*Bufo americanus*	American Toad					2
	Hyla versicolor	Gray Treefrog				FWCA(P)	2
	Pseudacris crucifer	Spring Peeper					2
	Rana clamitans	Green Frog					1
11	*Pseudacris crucifer*	Spring Peeper					3
	Rana sylvatica	Wood Frog					2

* - No anuran species/individuals documented
Call Level Codes – Abundance Count (according to Bird Studies Canada):
Call Level One (1) – Individual males can be counted accurately.
Call Level Two (2) - Frogs can be generally counted but calls overlap thus no exact number can be obtained.
Call Level Three (3) - Calls continuous and overlapping, no reasonable estimate of numbers.

commonly encountered species across the study area. A single Cliff Swallow (*Petrochelidon pyrrhonota*) nest was found under the south side of the Highway 400 bridge structure. Species which were most commonly encountered across the study area were generally species associated with open-country/agricultural or highly disturbed habitat types. There are also multiple species that are considered area-sensitive and/or interior species according to the Significant Wildlife Habitat Technical Guide (MNRF 2000) as indicated in **Table 6**.

A summary of the breeding birds documented in the study area during field investigations is presented in **Appendix D**.

2.5.3 Species at Risk

Forty-five recorded species of bird are protected under the *Migratory Birds Convention Act* (MBCA) and two bird species are protected under the *Fish and Wildlife Conservation Act* (FWCA). Six mammals and a single herpetofauna species are also afforded protection under the FWCA. Several species that are considered area-sensitive and/or interior species according to the Significant Wildlife Habitat Technical Guide (MNRF 2000) were identified within the study area (see **Table 6**).

Of the 66 wildlife species recorded within the study area, four are regulated under the Ontario *Endangered Species Act, 2007* (ESA) and/or the federal *Species at Risk Act*.

Each of the eight species identified above, their respective legal status, biological requirements, habitat suitability of the study area, likelihood of presence within the study area and survey results (if completed) are discussed below and summarized in **Table 8**. As per MNRF direction, the details for these species has been omitted from this report but has been provided under separate cover to MNRF.

2.6 Designated Natural Areas

Designated natural areas include areas identified for protection by the Ontario Ministry of Natural Resources and Forestry (OMNRF), Lake Simcoe Region Conservation Authority, Nottawasga Valley Conservation Authority (NVCA), County of Simcoe, and the Town of Innisfil. A review of the Natural Heritage Information Centre (2015) indicates there are no Areas of Natural and Scientific Interest (ANSIs) or Environmentally Sensitive Areas (ESAs) located within 120 m of the study area.

Provincially Significant Wetlands
The Lover's Creek Provincially Significant Wetland (PSW) is a large wetland complex located on the north and south side of 6th Line between 10th Sideroad and Yonge Street. The boundary of the PSW is presented on **Figures 2A to 2D**. The Lover's Creek PSW is comprised of four individual wetlands and two wetland types including swamp and marsh (NHIC 2015). The Lover's Creek PSW provides breeding and/or feeding habitat for the provincially significant marsh hawk, regionally significant slender wedge grass, and black duck. In addition, the Lover's Creek PSW provides the following ecological values: active feeding area for Great Blue Herons; winter cover for locally significant for deer; locally significant waterfowl production; and, brook and rainbow trout spawning and rearing habitat.

Unevaluated Wetlands
A number of unevaluated wetlands are also located in the vicinity of the study area including on the south side of 6th Line east of Highway 400, on the north and south side of 6th Line west of 20th Sideroad and on the south side of 6th Line east of County Road 27th. The boundary of the unevaluated wetlands is presented on **Figures 2A to 2D**.

Town of Innisfil Official Plan
A review of the Town of Innisfil Official Plan (2011) identifies the forest, deciduous and coniferous wetland communities within the study area as 'significant woodland.'

TABLE 8.
WILDLIFE SPECIES AT RISK SUMMARY

Scientific Name	Common Name	Location (s)	ESA	SARA	Last Observed Date	Preferred Habitat*	Potential Habitat in Study Area
Pseudacris triseriata	Western Chorus Frog	Anuran Survey Station(s): 1	-	THR	2015	Around wooded areas but can also be found in meadows, marshes, agricultural fields and urban areas	Habitats suitable to support this species are present within the study area and included communities such as meadow, thicket and agricultural fields.
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 8.
WILDLIFE SPECIES AT RISK SUMMARY

Scientific Name	Common Name	Location (s)	ESA	SARA	Last Observed Date	Preferred Habitat*	Potential Habitat in Study Area
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 8.
WILDLIFE SPECIES AT RISK SUMMARY

Scientific Name	Common Name	Location (s)	ESA	SARA	Last Observed Date	Preferred Habitat*	Potential Habitat in Study Area
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

*Preferred habitat is based on a review of secondary sources; however, these species may be found in other habitats.
For definitions of the acronyms used in this table, refer to **Appendix C**

3.0 PROJECT DESCRIPTION

Currently 6th Line is a two-lane road with a rural cross-section and a posted speed of 80 km/hour. The preliminary design for this section of 6th Line includes the reconstruction from a 20 m two lane local road to a two lane rural arterial road with paved shoulders. Given that widening may occur for this section of 6th Line in the future, the protection (property acquisition) of a 30 m right-of-way is recommended. The design has been prepared to accommodate a potential future interchange at Highway 400 and 6th Line. Improvements are recommended for intersections throughout the study area. A number of culvert improvements are proposed throughout the study area, many of which support fish or fish habitat.

The study team has minimized impacts to the Provincially Significant Wetland, by modifying the road cross section, shifting the road centreline, and reducing the grading impact of the road reconstruction, where feasible. A review of the preliminary design drawings has been completed to determine the potential environmental impacts and to recommend appropriate environmental protection and mitigation measures. The results of this assessment have been summarized in **Section 4.0**.

4.0 IMPACT ASSESSMENT AND ENVIRONMENTAL PROTECTION

4.1 Soil Disturbance and Potential for Erosion

Soil disturbance within the 6th Line study area will be limited to the previously disturbed areas, with some exceptions, where grading will be required in natural areas. Impacts resulting from any excavating or cut and fill operations will be temporary in nature. Erosion and sedimentation mitigation measures will be implemented prior to and during the construction phase.

A Sediment and Erosion Control Plan will be prepared during detail design. These control measures will include:

- limiting the geographical extent and duration that soils are exposed to the elements;
- implementing standard erosion and sedimentation control measures in accordance with Ontario Provincial Standard Specification (OPSS) 805 Construction Specification for Temporary Erosion and Sediment Control Measures. These standard measures include: silt fence placed along the margins of areas of soil disturbance; applying conventional seed and mulch and/or erosion control blanket in areas of soil disturbance to provide adequate slope protection and long term slope stabilization; and,
- managing surface water outside of work areas to prevent water from coming in contact with exposed soils.

Monitoring of these erosion and sedimentation control measures during and after construction will be implemented to ensure their effectiveness. These environmental measures will greatly reduce/minimize adverse environmental impacts.

4.2 Aquatic Habitats and Communities

The proposed widening of 6th Line will directly affect fish habitat within the project limits. All watercourses within the study area support seasonal or indirect fish habitat. Crossings B,C,D,F,H and J within the project limits support seasonal fish habitat, and crossings A,E,G and I support indirect fish habitat. **Figures 2A, 2B, 2C and 2D** presents the locations of all crossings. Because the crossing locations provide fish habitat (directly or indirectly), the proposed widening works have the potential to result in 'serious harm' (with reference to the federal *Fisheries* Act) to fish due to the following effects:

- temporary and/or permanent disruption of site-specific habitat;

- changes to water quality and quantity;
- changes in water temperature; and
- barriers to fish passage.

As a result of recent changes to the federal *Fisheries Act*, DFO has introduced a self-assessment process for proponents to determine if 'serious harm' to fish or fish habitat is expected as a result of activities from the project. Previously, all screenings under the *Fisheries Act* in the LSRCA and NVCA jurisdiction were undertaken by the Conservation Authority in accordance with an agreement with DFO. With the new process, proponents use the DFO screening criteria to determine if a review of the project by DFO is required.

The proposed preliminary design works at all crossings along 6th Line verified as fish habitat do not meet the self-assessment criteria, due to the necessity of culvert extensions and some potential channel realignments to facilitate the road widening. DFO review will be required, and 'serious harm' to fish may occur. A 'Request for Review' will be submitted to DFO during detail design to determine if an authorization under the *Fisheries Act* is required. If it is required, the completed Application Form for Paragraph 35(2)(b) *Fisheries Act* Authorization (Normal Circumstances) will be submitted to DFO for review. This submission will be made during detail design.

Further details regarding works at the crossing locations including, net environmental effects and site specific mitigation proposed can be found below and summarized in **Table 9**.

4.2.1 Temporary Disruption or Permanent Loss of Site-Specific Habitat

The culvert replacements/removals and potential channel realignments have the potential to result in temporary or permanent disruption of the localized fish habitat. In order to minimize the potential for 'serious harm', the new structure/culvert lengths will be as short as possible and all works will be performed in-the-dry by constructing during the driest time of the year or by using temporary flow bypass systems and cofferdams to isolate the work areas. The need for channel realignments in locations where fish habitat is present within roadside ditches is currently based on preliminary design, and may be avoided by the refinement of design in later stages of this project. Where watercourse realignments are required, natural channel design options will be proposed. Where proposed realignment may impact adjacent natural heritage features (i.e. wetlands, woodlands, etc.) an evaluation will be completed to determine appropriate mitigation and design to minimize impacts, to the satisfaction of the LSRCA. Culvert lengths and extensions are also based on the current grading limits and may be refined during detail design. Timing windows were determined based on the secondary source review, and field investigations for fish communities at 6th Line, and downstream of the study area. These timing windows will need to be confirmed by MNRF during detail design.

Crossing A

The existing CSP at crossing A, which functions as indirect fish habitat measures 12.4 m in length with a diameter of 1100 mm. This structure is being extended to match the new ditch alignment. This culvert is being extended by 3.75 which will result in an enclosure of 4.1 m^2 of indirect fish habitat. The additional culvert length is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.

This watercourse flows parallel to 6th Line along the north ditch for approximately 100 m before crossing to the south of 6th Line; therefore, the widening of the ROW will result in alteration of this channel, necessitating channel realignment. As this watercourse is functioning as a headwater feature, mitigation and enchantment measures outlined in the CVC/TRCA Headwater Feature Guidelines should be

TABLE 9.
SUMMARY OF PROPOSED WORKS AND SITE-SPECIFIC MITIGATION

Name	Fish Habitat	Existing	Proposed	Net Environmental Effects	Site Specific Mitigation
Crossing A (CUL_01_03): Tributary of Egbert Creek	• Seasonal Flow • Indirect Fish Habitat • Coldwater fishery downstream of the study area	Corrugated Steel Pipe Diameter: 1100mm Culvert Length: 12.4 m	• 3.75 m culvert extension to the new ditch alignment • New culvert length 15. 8 m	• The new structure will enclose an additional 4.1m^2 of indirect fish habitat based on the current design. • Alteration of ~100 linear metres of indirect fish habitat along the north ditch of 6th Line due to the road widening • Exact dimensions of impacts will be determined during detail	• All works to be conducted within the coldwater timing window (July 1- September 15). • Work will be done "in the dry", as feasible • Realigned channel should replicate functions with low impact development measures • Realigned channel should be relocated away from the road platform to the extent possible and new channel should incorporate natural channel design principles
Crossing B (CUL_01_04): Tributary of Egbert Creek	• Seasonal Flow • Seasonal Fish Habitat • Coldwater fishery downstream of the study area	Corrugated Steel Pipe Diameter: 1800mm Culvert Length: 12.5 m	• Culvert replacement, length to be increased to match the new ditch alignment • New culvert length 21.6 m	• The new structure will enclose an additional 16.4m^2 of seasonal fish habitat based on the current design. • Alteration of ~85 linear metres of seasonal fish habitat along the north ditch of 6th Line due to the road widening • Exact dimensions of impacts will be determined during detail	• All works to be conducted within the coldwater timing window (July 1- September 15). • Work will be done "in the dry", as feasible • Realigned channel should replicate surface/groundwater contributions • Realigned channel should be relocated away from the road platform to the extent possible and new channel should incorporate natural channel design principles
Crossing C (CUL_01_06): Tributary of Innisfil Creek	• Seasonal Flow • Seasonal Fish Habitat • Coldwater fishery	Corrugated Steel Pipe Diameter: 800 mm Culvert Length: 13 m	• Culvert extension to the new ditch alignment • If hydraulic analysis reveals that Culvert 2 has	• The potential structure removal would result in a net gain of 10.4m^2 of seasonal fish habitat.	• All works to be conducted within the coldwater timing window (July 1- September 15). • Work will be done "in the dry", as feasible

TABLE 9.
SUMMARY OF PROPOSED WORKS AND SITE-SPECIFIC MITIGATION

Name	Fish Habitat	Existing	Proposed	Net Environmental Effects	Site Specific Mitigation
	downstream of the study area		adequate capacity to carry flow, this culvert will be removed		
Crossing C: Tributary of Innisfil Creek (Culvert 2)(CUL_01_07)	• Not Fish Habitat currently • If channel is realigned into culvert, it will support Seasonal Fish Habitat	Concrete box Dimensions: 1200*800mm Culvert Length: 9.5 m	• 16.5 m culvert extension to the new ditch alignment • New culvert length 26.0 m • Potential channel realignment into this culvert	• The new structure will enclose an additional 19.8m^2 of potential seasonal fish habitat if the structure is extended and channel is realigned into this structure.	• All works to be conducted within the coldwater timing window (July 1- September 15). • Work will be done "in the dry", as feasible
Crossing C: Sideroad 5 culvert, north of 6th Line (CUL_03-01)	• Seasonal flow • Seasonal Fish habitat • Coldwater fishery downstream of the study area	Corrugated Steel Pipe Diameter: 1500 mm Culvert Length: 15.5 m	• Culvert extension to the new ditch alignment • A channel realignment will be necessary between CUL_03_01 and CUL_01_06	• The new structure will not enclose additional seasonal fish habitat. • Alteration of ~45 m of seasonal fish habitat along the north ditch of 6th Line due to the road widening	• All works to be conducted within the coldwater timing window (July 1- September 15). • Work will be done "in the dry", as feasible • Realigned channel should replicate surface/groundwater contributions • Realigned channel should be relocated away from the road platform to the extent possible and new channel should incorporate natural channel design principles
Crossing D:Tributary of Innisfil Creek (CUL_01_08)	• Seasonal Flow • Seasonal Fish Habitat • Coldwater fishery downstream of the study area	Corrugated Steel Pipe Diameter: 1800 mm Culvert Length:17.8 m	• 3.5 m extension of the culvert to match the new ditch alignment • New culvert length 21.3 m	• The new structure will enclose 6.3m^2 of seasonal fish habitat	• All works to be conducted within the coldwater timing window (July 1- September 15). • Work will be done "in the dry", as feasible

TABLE 9.
SUMMARY OF PROPOSED WORKS AND SITE-SPECIFIC MITIGATION

Name	Fish Habitat	Existing	Proposed	Net Environmental Effects	Site Specific Mitigation
Crossing E:Tributary of Innisfil Creek (CUL_01_09)	• Seasonal Flow • Indirect Fish Habitat • Coldwater fishery downstream of the study area	Corrugated Steel Pipe Diameter: 500 mm Culvert Length: 12.4 m	• Replace existing culvert to match the new ditch alignment • New culvert will be a twin structure, length 17.7 m	• The new structure will enclose 2.7m^2 of indirect fish habitat	• All works to be conducted within the coldwater timing window (July 1- September 15). • Work will be done "in the dry"
Crossing F:Tributary of Innisfil Creek (CUL_01_12)	• Seasonal Flow • Seasonal Fish Habitat • Coldwater fishery downstream of the study area	Corrugated Steel Pipe Diameter 1200 mm Culvert Length: 14.2 m	• Replace existing culvert to match the new ditch alignment • New culvert length 25.0m	• The new structure will enclose 13m^2 of seasonal fish habitat	• All works to be conducted within the coldwater timing window (July 1- September 15). • Work will be done "in the dry", as feasible
Crossing G: Tributary of Innisfil Creek (CUL_01_13)	• Seasonal Flow • Indirect Fish Habitat • Coldwater fishery downstream of the study area	Corrugated Steel Pipe (with wooden retaining structure) Diameter: 800 mm Culvert Length: 10 m	• Replace existing culvert to match the new ditch alignment • New culvert length 15.4 m	• The new structure will enclose 4.3m^2 of indirect fish habitat • Alteration of ~110 linear metres of indirect fish habitat along the south ditch of 6th Line due to the Road widening	• All works to be conducted within the coldwater timing window (July 1- September 15). • Work will be done "in the dry", as feasible • Realigned channel should replicate functions with low impact development measures • Realigned channel should be relocated away from the road platform to the extent possible and new channel should incorporate natural channel design principles
Crossing H: Tributary of Banks Creek (CUL_01_15)	• Seasonal Flow • Seasonal Fish Habitat • Tolerant, Warmwater	Corrugated Steel Pipe Diameter: 400 mm Culvert Length: 10.6 m	• Replace existing culvert to match the new ditch alignment • New culvert will	• The new structure will enclose 3.7m^2 of seasonal fish habitat • Alteration of ~190 linear metres of roadside ditch/seasonal fish habitat along the north ditch of 6th Line due to	• All works to be conducted within the warmwater timing window (July 1- March 31). • Work will be done "in the dry", as feasible

TABLE 9.
SUMMARY OF PROPOSED WORKS AND SITE-SPECIFIC MITIGATION

Name	Fish Habitat	Existing	Proposed	Net Environmental Effects	Site Specific Mitigation
	Fishery		be a 600 mm concrete structure, length 19.9 m	the road widening	• Realigned channel should replicate surface/groundwater contributions • Realigned channel should be relocated away from the road platform to the extent possible and new channel should incorporate natural channel design principles
Entrance Culvert, north of 6th Line (CUL 02-49)	• Seasonal Flow • Seasonal Fish Habitat • Tolerant, Warmwater Fishery	Corrugated Steel Pipe Diameter: 400 mm Culvert Length: 7.5 m	• Replace the culvert	• No permanent effects if culvert remains the same length	• All works to be conducted within the warmwater timing window (July 1- March 31). • Work will be done "in the dry", as feasible
Crossing I: Tributary of Banks Creek (CUL_01_16)	• Seasonal Flow • Indirect Fish Habitat • Tolerant, Warmwater Fishery	Corrugated Steel Pipe Diameter: 600 mm Culvert Length: 13.6 mm	• Extend existing culvert to match the new ditch alignment • New culvert length 18.6m	• The new structure will enclose 4.0m^2 of indirect fish habitat	• All works to be conducted within the warmwater timing window (July 1- March 31). • Work will be done "in the dry", as feasible
Crossing J: Banks Creek (CUL_01_17)	• Seasonal Flow • Seasonal Fish Habitat • Tolerant, Warmwater Fishery	Corrugated Steel Pipe Diameter: 600 mm Culvert Length: 12.3 mm	• Replace with either: • 800 X 2400 open bottom structure (recommended); or • twin 800 X 1200 concrete pipes • New culvert lengths 20.3 m	• The new structures will enclose 4.8m^2 of seasonal fish habitat	• All works to be conducted within the warmwater timing window (July 1- March 31). • Work will be done "in the dry", as feasible

implemented in the design. Although the study area does not fall within the CVC/TRCA jurisdictions, these guidelines are effective in classification of watercourses and ensuring low impact design measures.

This watercourse is functioning as contributing fish habitat, therefore the realigned channel should replicate function, with low impact development measures incorporated (CVC, 2012). Overall benefit to this watercourse could also be achieved by realigning the channel at a distance from the road platform, thus minimizing roadside impacts such as oil, grime, and salt inputs into the system.

Crossing B

The existing CSP at crossing B, which functions as seasonal fish habitat measures 12.5 m in length with a diameter of 1800 mm. This structure is being replaced, and new length is 21.6m, to match the new ditch alignment. This will result in an enclosure of 16.4 m^2 of seasonal fish habitat. The additional culvert length is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.

The roadside ditch to east of the crossing, which functions as seasonal fish habitat to ~85 m east of the crossing along the north side of 6th Line will be altered by the proposed widening of the ROW based on the preliminary design. Channel realignment will therefore be necessary based on the widening. As this watercourse is functioning as a headwater feature, mitigation and enchantment measures outlined in the CVC/TRCA Headwater Feature Guidelines should be implemented in the design. This watercourse is functioning as seasonal fish habitat, therefore the realigned channel should replicate surface and groundwater flows, and natural channel design should be utilized in the design. Overall benefit to this watercourse could also be achieved by realigning the channel at a distance from the road platform, thus minimizing roadside impacts such as oil, grime, and salt inputs into the system.

Crossing C

Two culverts at crossing C exist; one is a CSP (CUL_01_06) which is conveying the flow of the watercourse. The second culvert, a concrete box structure (CUL_01_07), is elevated and is not functioning as a conveyer of flow (potential overflow culvert). The CSP, which functions as seasonal fish habitat measures 13 m in length with a diameter of 800 mm.

The CSP structure (CUL_01_06) will be removed if hydraulic analysis reveals that CUL_01_07 has adequate capacity to carry the flow of the watercourse. If this is not the case, the CSP will be replaced, and new length is to match the new ditch alignment of 26.0 m. This will result in an additional enclosure of 19.8m^2 of seasonal fish habitat. The additional culvert length is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.

Sideroad 5 culvert C-01 (north of 6th Line) which functions as seasonal fish habitat measures 15.5 m in length with a diameter of 1500 mm will be extended to the new ditch alignment (length is unknown at this time). Dimensions of the culvert extension are not known at this time; however, the culvert length will be sized appropriately, to minimize the enclosure of fish habitat. The additional culvert length is expected to be relatively small, thus is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.

The watercourse to the east of Sideroad 5 runs parallel to 6th Line along the north ditchline for approximately 45 m before it joins Crossing C. This watercourse may be altered by the proposed widening of the ROW based on the preliminary design. Channel realignment will likely be necessary based on the widening. As this watercourse is functioning as a headwater feature, mitigation and enhancement measures outlined in the CVC/TRCA Headwater Feature Guidelines should be implemented in the design. This watercourse is functioning as seasonal fish habitat, therefore the realigned channel is

required to replicate surface and groundwater flows, and natural channel design should be utilized in the design. Overall benefit to this watercourse could also be achieved by realigning the channel at a distance from the road platform, thus minimizing roadside impacts such as oil, grime, and salt inputs into the system.

Crossing D
The existing CSP at crossing D, which functions as seasonal fish habitat measures 17.8 m in length with a diameter of 1800 mm. This structure is being extended, and new length is to match the new ditch alignment of 21.3m. This will result in an additional enclosure of 6.3m^2 of seasonal fish habitat. The additional culvert length is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.

Crossing E
The existing CSP at crossing E, which functions as indirect fish habitat measures 12.4 m in length with a diameter of 500 mm. This structure is being replaced, and new length is to match the new ditch alignment of 17.7.This will result in an additional enclosure of 2.7m^2 of indirect fish habitat. The additional culvert length is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.

Crossing F
The existing CSP at crossing F, which functions as seasonal fish habitat measures 14.2 m in length with a diameter of 1200 mm. This structure is being replaced, and new length is to match the new ditch alignment of 25 m. This will result in an additional enclosure of 13m^2 of seasonal fish habitat. The additional culvert length is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.
Crossing G
The existing CSP at crossing G, which functions as indirect fish habitat measures 10 m in length with a diameter of 800 mm. This structure is being replaced to match the new ditch alignment of 15.4m. This will result in an additional enclosure of 4.3m^2 of indirect fish habitat. The additional culvert length is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.

To the south of 6th Line, the watercourse flows parallel along the south ditch for approximately 110 m before crossing to the north of 6th Line; therefore, the widening of the ROW will result in alteration of this channel, necessitating channel realignment. As this watercourse is functioning as a headwater feature, mitigation and enchantment measures outlined in the CVC/TRCA Headwater Feature Guidelines should be implemented in the design. This watercourse is functioning as contributing fish habitat, therefore the realigned channel should replicate function, with low impact development measures incorporated. Overall benefit to this watercourse could also be achieved by realigning the channel at a distance from the road platform, thus minimizing roadside impacts such as oil, grime, and salt inputs into the system.

Crossing H
The existing CSP at crossing H, which functions as seasonal fish habitat measures 10.6 m in length with a diameter of 400 mm. This structure is being replaced to match the new ditch alignment of 19.9m. This will result in an additional enclosure of 3.7m^2 of seasonal fish habitat. The additional culvert length is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.

The roadside ditch which functions as seasonal fish habitat extends ~190 m along the north side of 6th Line. This ditch will be altered by the proposed widening of the ROW based on the preliminary design. Channel realignment will therefore be necessary based on the widening. As this watercourse is

functioning as a headwater feature, mitigation and enchantment measures outlined in the CVC/TRCA Headwater Feature Guidelines should be implemented in the design. This watercourse is functioning as seasonal fish habitat, therefore the realigned channel should replicate surface and groundwater flows, and natural channel design should be utilized in the design. Overall benefit to this watercourse could also be achieved by realigning the channel at a distance from the road platform, thus minimizing roadside impacts such as oil, grime, and salt inputs into the system.

An entrance culvert (02-49) located along the north ditch, to the east of crossing H, will be replaced, and relocated along the new channel alignment 'serious harm' should not occur if the replacement culvert remains the same size as the original.

Crossing I

The existing CSP at crossing I, which functions as indirect fish habitat measures 13.6 m in length with a diameter of 600 mm. This structure is being replaced, and new length is to match the new ditch alignment of 21.0m. This will result in an additional enclosure of 4.4m^2 of indirect fish habitat. The additional culvert length is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.

Crossing J

The existing CSP at crossing J, which functions as seasonal fish habitat measures 12.3 m in length with a diameter of 600 mm. This structure is being replaced with twin 800 X 1200 concrete pipes. This will result in an additional enclosure of 4.8m^2 of seasonal fish habitat. The additional culvert length is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.

General Environmental Protection Measures

To reduce the potential for 'serious harm' to fish, the following environmental protection measures will be implemented:

- an in-water construction timing restriction should be implemented to protect spawning fish, incubating eggs and fry emergence. The fisheries timing windows will need to be confirmed with the MNRF or DFO (depending on permitting agency) at the detailed design stage;
- Crossings A - G (Egbert and Innisfil Creek Tributaries - coldwater), in-water work is permitted from July 1 to September 15 (to be confirmed by MNRF or DFO during detail design);
- Crossings H - J (Banks Creek Tributaries - warmwater), in-water work is permitted from July 1 to March 31 (to be confirmed by MNRF or DFO during detail design); construction should occur during the driest time of the year to permit work in the dry;
- work areas will be delineated with construction fencing to minimize the area of disturbance;
- appropriate sediment control structures will be installed prior to and maintained during construction to prevent entry of sediments into the watercourse;
- where cofferdams are to be employed, unwatering effluent will be treated prior to discharge to receiving watercourse;
- cofferdams will be constructed using pea gravel bags or equivalent to isolate the work area and maintain flow;
- fish isolated by construction activities will be captured and safely released to the watercourse. A Licence to Collect Fish for Scientific Purposes under the *Fish and Wildlife Conservation Act* (1997) is required from the MNRF to capture and transfer fish;

- no construction machinery or vehicles are permitted to cross the watercourse at any time during construction, unless authorized by the permitting agencies;
- good housekeeping practices related to materials storage/stockpiling, equipment fuelling/ maintenance, etc. will be implemented during construction; and
- disturbed riparian areas will be vegetated and/or covered with an erosion control blanket as quickly as possible to stabilize the banks and minimize the potential for erosion and sedimentation.

These environmental protection measures will greatly reduce the potential adverse effects to fish and fish habitat resulting from construction activities.

4.2.2 Temporary Change to Water Quality

The construction associated with the proposed works has the potential to alter water quality through on-site erosion of exposed materials and the subsequent impairment of downstream water quality with sediments and other contaminants.

Changes to water quality will be mitigated through construction occurring during the driest time of the year, isolation of the work areas behind cofferdams, the treatment of effluent from unwatering prior to its release back into the receiving watercourses, and the deployment and maintenance of erosion and sediment controls (silt fencing, flow checks, etc.) which will prevent sediments from reaching the watercourses from exposed soils upslope.

Refuelling and construction staging areas where contaminants are handled should be located off-site where possible, or well away from the waterbodies. Equipment refuelling should take place on impermeable pads or buried liners designed to allow full containment of spills.

Stormwater management practices are expected to be incorporated into the design of the widened road. Enhanced bio-swales and/or oil grit separators should be considered to treat water prior to it entering a watercourse. In addition, all exposed areas will be vegetated as quickly as possible once work is completed.

4.2.3 Changes in Water Temperature

The thermal regime of a receiving watercourse may be altered by storm water runoff or removal of riparian vegetation that shades the watercourse. In the summer, runoff can become superheated through contact with paved surfaces, which, when discharged to a receiving watercourse can result in thermal shock, thereby injuring or killing aquatic organisms. Coldwater or coolwater streams are usually considered more sensitive to changes in water temperature than warmwater streams.

It is expected that there will be no significant increase in temperature as a result of the proposed works; as appropriate storm water management strategies will be implemented. All the crossings are highly impacted by the proximity to 6th Line, agricultural activities and lack of stormwater facilities. The potential channel realignments, riparian plantings and the installation of stormwater management strategies have the potential to improve thermal conditions for the downstream fisheries.

There is a potential to alter the quantity & quality of groundwater to Innisfil Creek at Crossing D in the vicinity of Highway 400 and downstream. The 6th Line/Hwy 400 underpass is only marginally above the Innisfil Creek level (and presumed water table). As such, all future work on the Hwy 400 underpass would need to ensure groundwater quantity & quality are maintained. Changes to the quality and quantity of groundwater to Innisfil Creek caused by proposed roadwork should be investigated at the detail design stage.

4.2.4 Barriers to Fish Passage

Culverts will be modified or replaced using fish-friendly design to maintain/improve fish passage including countersinking, matching existing upstream and downstream elevations, backfilling with native substrates, etc. As a result, no barriers to fish passage will result from this project.

4.2.5 Restoration/Enhancement

The goal of the restoration/enhancement plan is to provide an overall benefit to the watercourse at these locations through restoration of natural channel form and geomorphic function (via widened structures and potential fluvial geomorphological works) as well as improvements to riparian habitat.

Specific enhancement opportunities were noted at crossings C and D (Tributary of Innisfil Creek - Wilson Drain), it was noted that livestock have free access to the watercourses, which is resulting in eroding banks, lack of natural riparian areas, and increased phosphorous inputs into the watercourse. If possible, consultation with neighbouring land owners could be undertaken to prevent livestock access to the area watercourses. If this is achieved, it would greatly improve fish habitat and water quality at 6th Line, and downstream.

At a minimum, the following should be employed as restoration/enhancement during the detail design phase of the project for the works at all crossings: banks and riparian areas will be planted with native grasses and shrubs; management guidelines should be followed for channel realignments based on the CVC/TRCA Headwater Management Guide (2014); and where possible, watercourses currently functioning as roadside ditches, should be realigned away from the road platform thus minimizing roadside impacts such as oil, grime, and salt inputs into the system. These restoration and enhancement works will increase the diversity of habitat in relation to what is present by increasing riparian cover, increasing habitat diversity and providing good floodplain connectivity.

4.3 Vegetation and Vegetation Communities

Improvements to 6th Line between County Road 27 to 20th Sideroad have the potential to result in impacts to vegetation and vegetation communities. Effects on vegetation related to these modifications could include:

- displacement of / disturbance to vegetation and vegetation communities; and,
- displacement of rare, threatened or endangered vegetation or significant vegetation communities.

Displacement and/or Disturbance to Vegetation Communities/Vegetation

Clearing of vegetation will be required to accommodate the proposed improvements to 6th Line between County Road 27 to 20th Sideroad. The improvements to 6th Line will result in the removal of approximately 15.9 ha of naturalized and/or planted areas. The largest area of impact will be to lands that have been anthropogenically influenced, including cultural vegetation communities, agricultural lands, hedgerows and manicured areas. A total of approximately 14.7 ha of anthropogenically influenced lands and cultural vegetation communities will be removed as a result of the proposed improvements. In addition, a total of approximately 0.26 ha and 0.94 ha of forest and wetland communities will be removed, respectively. **Table 10** provides a summary of the total area of vegetation communities that will be removed for the improvements to 6th Line.

Cultural Vegetation Communities

Improvements to 6th Line between County Road 27 and 20th Sideroad will result in the removal of approximately 8.88 ha of Dry-Moist Old Field Meadow. Overall, impacts resulting in the loss of vegetation within these cultural communities are considered to be minor. Cultural meadow communities typically persist in areas that are regularly disturbed, and as a result, generally contain a high proportion of invasive and non-native plant species that are tolerant of these conditions.

TABLE 10.
IMPACTS TO VEGETATION COMMUNITIES WITHIN THE STUDY AREA

Vegetation Community Type	Vegetation Community	Approximate Area (ha) to be Cleared
Cultural	Dry-Moist Old Field Meadow (CUM1-1a and b)	8.88
	Sub-total	**8.88**
Forest	Deciduous Forest (FOD)	0.03
	Dry-Fresh Poplar Deciduous Forest (FOD3-1)	0.004
	Dry-Fresh Sugar Maple Deciduous Forest (FOD5)	0.22
	Dry-Fresh White Cedar-Poplar Forest (FOM4-2)	0.01
	Sub-total	**0.264**
Wetland	Forb Mineral Meadow Marsh (MAM2-10)	0.01
	Cattail Mineral Shallow Marsh (MAS2-1a and b)	0.09
	White Cedar Mineral Coniferous Swamp (SWC1-1a and b)	0.58
	Deciduous Swamp (SWD)	0.05
	Green Ash Mineral Deciduous Swamp (SWD2-2a and b)	0.144
	Mineral Swamp Thicket (SWT2)	0.004
	Willow Mineral Swamp Thicket (SWT2-2a and b)	0.032
	Sub-total	**0.9406**
Human Influenced Lands	Agriculture	2.08
	Manicured	1.66
	Hedgerow (a to d)	2.08
	Sub-total	**5.82**
	Total Area	**15.9046**

It is expected that plant species displaced and/or disturbed within the cultural meadows due to the road improvements will re-colonize available lands adjacent to the new right-of-way post-construction. Disturbance activities often serve to promote the establishment and / or spread of certain plant species (including the disturbance tolerant species identified within the existing right-of-way).

Forest Communities

A total of four forest community types will be impacted as a result of the improvements to 6th Line. These communities include: Deciduous Forest (FOD), Dry-Fresh Poplar Deciduous Forest (FOD3-1), Dry-Fresh Sugar Maple Deciduous Forest (FOD5), and Dry-Fresh White Cedar –Poplar Mixed Forest (FOM4-2). The primary impact to the forest communities noted above will be to existing forest edges adjacent to the right-of-way on either side of 6th Line. Efforts have been made by the study team to restrict any widening activities adjacent to these natural areas, where possible. However, impacts to the forest communities will result in the removal of a narrow strip of the community adjacent to the existing 6th Line right-of-way creating a new forest edge. New forest edges are exposed to greater potential for non-native and invasive species infiltration further into the forest, and as such, forest edge management is recommended for the above noted forest communities.

Forest Edge Management is recommended where new forest edges are exposed, and forest edge management techniques should be implemented to mitigate the associated impacts to the Deciduous Forest (FOD) and Sugar Maple Deciduous Forest (FOD5) communities. As part of the Forest Edge Management, mitigation measures should include, but not be limited to the following.

- The limits of clearing, grubbing and grading shall be clearly marked in the field using construction fencing or equivalent in accordance with OPSS 801, Construction Specification for the Protection of Trees. Close cut clearing should be used in lieu of grubbing, where feasible.

- Planting of appropriate native trees, shrubs and ground flora shall be undertaken as soon as possible following vegetation removals. Plantings along the disturbed forest edges will provide a protective buffer. Newly exposed forest edges become exposed to a greater potential for aggressive and invasive species infiltration further into the forest interior causing greater impacts. Micro-habitat conditions are also altered due to a greater incident of light penetrating further into the forest resulting with decreases in soil moisture and increased windthrow. Plant species used within the buffer shall be somewhat similar to those in the adjacent habitat and be non-invasive in nature.
- Grading within areas where edges will be newly created shall be designed to meet existing grades a minimum of 3 m away from the tree drip-line.
- Compaction of soils on lands immediately adjacent to the newly exposed forest edge will be minimized to the extent possible. Construction activities can result in cut roots, and soil compaction due to re-grading and fill placement. Cut tree roots can reduce a tree's capacity to uptake and transfer water and nutrients, and soil compaction can result in a decrease in air spaces within the soil which can reduce the infiltration capacity of the soil, limits soil oxygen and limits root penetration. Decompaction efforts and methodology shall be site specific. Where decompaction is required, it shall extend to a minimum depth of approximately 25 cm.
- Drainage patterns adjacent to newly created edges shall be maintained to avoid changes in soil moisture, this is especially important around wetland areas and forest communities with substrates that maintain increased moisture capacity.

All of the forest communities within the study area are widespread throughout Ontario and the loss of a portion of these vegetation communities are not expected to have any negative impacts to the remaining portions of forest within the study area.

Wetland Communities
A total of seven (7) wetland community types will be impact as a result of the improvements to 6th Line. These communities include Forb-Mineral Meadow Marsh (MAM2-10), Cattail Mineral Shallow Marsh (MAS2-1), White Cedar Mineral Coniferous Swamp (SWC1-1), Deciduous Swamp (SWD), Green Ash Mineral Deciduous Swamp (SWD2-2), Mineral Thicket Swamp (SWT2), and Willow Mineral Swamp Thicket (SWT2-2).

Impacts to the swamp communities will result in the removal of a small portion of the communities adjacent to the existing 6th Line right-of-way creating a new community edge. Impacts to the Ash Deciduous Swamp (SWD2-2) and White Cedar Coniferous Swamp (SWC1-1) will result in the removal of a small portion of the Lover's Creek PSW Complex. Edge management techniques using suitable plant species should be employed to mitigate any negative impacts to these vegetation communities. During detail design, appropriate edge management measures will be developed. Overall, impacts resulting from the proposed improvements to 6th Line will not have a negative impact on the remaining portions of swamp communities throughout the study area.

In addition, impacts to the meadow marsh and shallow marsh communities will result in the removal of a small portion of the community adjacent to the 6th Line right-of-way. Meadow marsh and cattail shallow marsh are widespread and common in Ontario and the loss of a portion of these communities is not expected to have any negative impacts to the remaining portions of meadow marsh and cattail shallow marsh within the study area.

All of the wetland communities within the study area are widespread throughout Ontario and the loss of a portion of this vegetation community is not expected to have any negative impacts to the remaining portions of wetland communities within the study area.

Wetland Compensation

Compensation for the loss of wetland should be determined in consultation with the Town of Innisfil and LSRCA and NVCA staff. LSRCA has recommended that the wetland lost as a result of this project be compensated for at a 3:1 ratio as per the LSRCA Ecological Offsetting Strategy. Therefore, the loss of 0.94 ha of wetland should result in the creation of 2.82 ha of wetland. The negotiation of a wetland compensation ratio based on LSRCA policy, and other details related to this task should be finalized at the detail design stage.

Human Influenced Lands
As noted in **Table 10**, a total of approximately 5.82 ha of human influence lands will be removed including approximately 2.08 ha of agricultural lands, 1.66 ha of manicured lands and 2.08 ha of hedgerows. The overall significance of the impact to these lands is considered low.

Displacement of rare, threatened or endangered vegetation of significant vegetation
All of the vegetation communities identified within the study area are considered to be widespread and common in Ontario and secure globally. As a result, there will be no impacts on rare, threatened or endangered vegetation communities.

As noted above, one species at risk was identified within the study area during LGL's botanical investigation. Based on the preliminary design grading limits this specimen will need to be removed as a result of the proposed improvements to 6th Line.

As noted above, a total of 11 plant species considered rare in Simcoe County and by LSRCA were identified in the study area. **Table 3** presents a list of these species. It is recommended that the regionally and locally significant plant species be retained, to the extent possible. If impacts are unavoidable, it is recommended that regionally and locally significant plant species, including individual shrub and trees that measure less than 10 cm diameter at breast height (DBH), be transplanted into suitable habitat conditions. Where possible, these plants should be transplanted into the newly created edges of those impacted communities, but outside the limit of disturbance.

4.4 Tree Impacts

The proposed improvements to 6th Line between County Road 27 and 20th Sideroad have the potential to result in impacts to the trees within the study area. Potential impacts to trees may include removal, physical injury, severing of roots, and soil compaction.

As noted in **Section 2.4**, the majority of trees within the study area are mature and in good condition with the exception of ash trees which are in decline likely as a result of the Emerald Ash Borer. It is likely that impacts to trees will occur to all of the tree polygons identified on **Figures 2A to 2D.** A detailed tree survey should be undertaken during detail design to determine impacts to trees within the study area and to identify tree-specific mitigation measures.

Trees Protection Measures

The following recommendations are provided to ensure impacts to all retained trees are minimized. Designation of a Tree Protection Zone (TPZ) is imperative for the protection of trees (roots, trunks, branches) adjacent to construction works. The TPZ will restrict construction related machinery and activities from damaging trees identified for protection. This protection zone is the minimum distance from the tree trunk required for protection, and it varies depending on tree size and species. At a minimum the tree protection zone should be 1 metre beyond the dripline of the tree.
The following recommendations are for those trees that will be preserved.

Protection recommendations:

- Tree protection barriers should be constructed in accordance with the Town of Innisfil specifications;
- Any excavations within the minimum TPZ must be completed by hand or low pressure hydro vac excavation under the direction of a Certified Arborist/Forester;
- Tree protection hoarding/barrier must be installed prior to the commencement of any construction activities;
- Heavy machinery should not to be operated within the TPZ (including overhead swinging of machine arms);
- Construction materials, equipment, soil, construction waste or debris are not to be stored within the TPZ or dripline of the trees identified for protection;
- There should be no movement or parking of vehicles, placement of equipment or pedestrian traffic within the TPZ;
- Low pressure hydro-vac excavation technology is recommended to expose roots where encroachment within the minimum TPZ is required;
- Prune any exposed roots with a diameter of less than 5 cm to promote regeneration and prevent infection. All roots greater than 5 cm in diameter should not be removed;
- Any tree removals, pruning or root cutting required is to be conducted by a Certified Arborist/Forester;
- Apply a slow release deep root low nitrogen fertilizer to promote increased vigor;
- No signs or objects should be displayed or affixed to any trees;
- Disposal of any liquids shall not occur within the TPZ;
- Should any additional, incidental or accidental tree injuries occur during construction, a Certified Arborist/Forester should be consulted to determine whether additional mitigation measures should be employed; and,
- Tree clearing shall not be conducted during the *Migratory Bird Convention Act* (MBCA) breeding bird, which includes April 1 to August 31 with several exceptions.

These efforts will help to ensure that impacts to trees are minimal and that the condition and character of these trees will not change, either in the short-term or long-term period.

Tree Compensation

Compensation for the removal of trees should be determined in consultation with the Town of Innisfil, NVCA and LSRCA staff. LSRCA has recommended that the offset for loss of woodland should replace at the greatest extent, either through a 3:1 tree replacement or by area at a ratio of 2:1 to the satisfaction of the LSRCA. Also as per LSRCA guidance, consideration should be given to preserving trees of 50 cm dbh or greater, as feasible.

Suitable planting locations for the replacement trees are along the roadway as a streetscape feature (where they currently do not exist), within naturalized areas of the tributaries, and within compensation areas identified by the Town of Innisfil and LSRCA. The offsetting should increase natural area on public lands, either on-site or within the same subwatershed and include appropriately sized trees. These locations will be determined in consultation with LSRCA and the Town of Innisfil during detail design.

4.5 Wildlife and Wildlife Habitat

Modification and widening of 6th Line between County Road 27 to 20th Sideroad, within the Town of Innisfil have the potential to result in the displacement of and disturbance to wildlife and wildlife habitat.

Effects on wildlife related to these modifications may include:

- displacement of wildlife and wildlife habitat;
- barrier effects on wildlife passage;
- wildlife/vehicle conflicts;
- disturbance to wildlife from noise, light and visual intrusion;
- potential impacts to migratory birds; and,
- displacement of rare, threatened or endangered wildlife and significant wildlife habitat.

4.5.1 Displacement of Wildlife and Wildlife Habitat

Modification and widening of 6th Line will take place within and beyond the existing right-of-way. Much of the right-of-way and lands immediately adjacent consist of disturbed low quality wildlife habitat, with higher quality habitats closely associated with Lover's Creek Swamp PSW, watercourse crossings (and associated riparian areas) such as crossings D, E, G, B, H and I (see **Figures 2A to 2D**), and several forested (deciduous, mixed and coniferous types) habitats. Agricultural lands, particularly those which are less managed (i.e. fallow lands) were found to provide wildlife habitat, particular for open-country bird species.

Only minimal infringement to the edge of the above-mentioned natural heritage features will occur as a result of road modification and widening of 6th Line. Modification and widening of 6th Line within and beyond the right-of-way is not expected to have any significant impact on wildlife and/or wildlife habitat. Displacement of species at risk habitat is anticipated; however, these impacts are expected to be minor (see **Section 4.5.6**).

An analysis of vegetation removal per vegetation (wildlife habitat) community is presented in **Section 4.3** (above).

4.5.2 Barrier Effects on Wildlife Passage

No new permanent migratory barriers to wildlife will be created as a result of road modifications and widening. The existing barrier posed by the current 6th Line right-of-way will be greater due to proposed widening. Given the disturbed nature of the lands found within the study area, the modifications are not expected to have a significant impact on wildlife passage. However, where natural areas are found abutting, and in particular, on opposite sides of 6th Line (e.g. Lover's Creek Swamp PSW, watercourses and forested areas) a more significant barrier effect on wildlife movement across 6th Line can be anticipated. Opportunities for facilitation of wildlife passage (target species likely small mammals and herpetofauna) should be explored at detail design at the culvert replacement locations.

4.5.3 Wildlife/Vehicle Conflicts

The proposed road modifications and widening will increase the width of the travelled surface resulting in an increased risk of mortality for wildlife that elects to cross the road. The existing 6th Line right-of-way poses a potential barrier to wildlife movement. While the increase in width of road increases exposure of wildlife to vehicle conflicts, the potential increase in wildlife mortality above existing conditions is considered minor. However, where natural areas are found abutting, and in particular, on opposite sides of 6th Line (e.g. Lover's Creek Swamp PSW, watercourses and forested areas) an increase in

wildlife/vehicle conflicts may be expected. Construction duration and disturbance in the vicinity of culverts and bridges should be minimized to the extent possible to reduce the potential for increase in road mortality caused by wildlife avoidance of these structures.

The MNRF has identified a deer core/shelter (stratum 1) wintering area at the south end of the Lover's Creek PSW. As such, an analysis of deer movement across the roadway in the vicinity of the deer yard should be completed at the detail design stage. If studies reveal significant deer movement in this area, mitigation measures will need to be incorporated.

4.5.4 Disturbance to Wildlife from Noise, Light and Visual Intrusion

Noise, light and visual intrusion may alter wildlife activities and patterns. In human-influenced settings, such as the study area, wildlife has become acclimatized to anthropogenic conditions and only those fauna that are tolerant of human activities remain. Minor edge effect to natural areas (e.g. Lover's Creek Swamp PSW, watercourses and forested areas) may occur as road widening will result in an increase in noise, light, and visual intrusion. Given that wildlife are acclimatized to the presence of the existing 6th Line right-of-way in the study area, the tolerance of the wildlife assemblage to human activities and the limited zone of influence of the proposed widening, disturbance to wildlife from noise, light and visual intrusion will have no significant adverse effects.

4.5.5 Potential Impacts to Migratory Birds

As identified above (**Section 2.5.3**), numerous bird species listed under the *Migratory Birds Convention Act* (MBCA) are located within the study area. The MBCA prohibits the killing, capturing, injuring, taking or disturbing of migratory birds (including eggs) or the damaging, destroying, removing or disturbing of nests. While migratory insectivorous and non-game birds are protected year-round, migratory game birds are only protected from March 10 to September 1. The study area lands fall within Environment Canada's Nesting Zone C2 (Nesting Period: end of March – end of August). Consequently, to comply with the requirements of the MBCA, it is recommended that disturbance, clearing or disruption of vegetation where birds may be nesting should be completed outside the window of April 1 to August 31 to avoid the breeding bird season for the majority of the bird species protected under the act. In the event that these activities must be undertaken from April 1 to August 31, a nest screening survey will be conducted by a qualified avian biologist. If an active nest is located, a mitigation plan shall be developed and provided to Environment Canada – Ontario Region for review prior to implementation. As noted above, a single Cliff Swallow nest was found under the south side of the Highway 400 bridge structure. The Cliff Swallow is protected under the MBCA.

4.5.6 Displacement of Rare, Threatened or Endangered Wildlife or Significant Wildlife Habitat

The study area has been screened for potential wildlife species at risk, and a total of nine (9) species at risk have been identified based on field work and secondary source data. As noted above (see **Section 2.5.3**) five (5) species either listed or regulated under the Ontario *Endangered Species Act, 2007* (ESA) and/or the federal *Species at Risk Act* were identified within the study area during 2015 surveys. Based on a review our secondary source data and consultation with MNRF Midhurst District, four (4) additional species at risk have been identified as having the potential to be found in the vicinity of the study area. Based on a request from MNRF, information on ESA regulated species has been omitted from this report but has been made available to MNRF under separate cover.

Western Chorus Frog

As noted above, the Great Lakes–St. Lawrence population of Western Chorus Frog (the sub-population identified) is listed as 'Threatened' under the federal *Species at Risk Act* (SARA) and is also afforded some protection by the Provincial Policy Statement (PPS) under the *Planning Act*. However, this species is not regulated under the ESA, and lands within the study area are not federally owned, a criterion that

would trigger a federal permit under the SARA. The minimal encroachment into lands adjacent to the existing 6th Line right-of-way will also result in only minimal impacts to habitats which may support Western Chorus Frog.

4.6 Designated Natural Areas

As noted in **Section 2.6**, no ANSIs or ESAs are located within 120 m of the study area. However, the Lover's Creek Provincially Significant Wetland Complex is located on the north and south side of 6th Line between 10th Sideroad and Yonge Street (**See Figure 2C**).

The widening of 6th Line will remove a narrow strip of wetland communities along the existing edge of the Lover's Creek Wetland Complex. Edge management is recommended at the PSW, where new edges are exposed. Edge management techniques should be implemented to mitigate associated impacts to the wetland communities. As noted in **Section 4.3**, impacts to the PSW complex will result in the removal of a narrow strip of the wetland communities adjacent to the exiting 6th Line right-of-way. Overall, the removal of a narrow strip of the wetland communities adjacent to the existing right-of-way is unlikely to negatively impact the function of the remaining portions of the PSW complex.

4.7 Potential Permit Requirements

4.7.1 Fisheries Act

As a result of recent changes to the *Fisheries Act*, the DFO has introduced a self-assessment process for proponents to determine if 'serious harm' to fish or fish habitat is expected as a result of activities from the project. With the new process, proponents use the DFO screening criteria to determine if a review of the project by DFO is required. This review will be carried out during detail design once the specific requirements for culvert replacement and modifications and channel realignments are confirmed.

4.7.2 Endangered Species Act

An Information Gathering Form will be submitted to the MNRF during detail design to determine permit requirements under the Ontario *Endangered Species Act*. If required, the necessary permit(s) will be secured during detail design.

4.7.3 LSRCA Ontario Regulation 179/06 and NVCA Ontario Regulation 172/06

Based on a review of LSRCA and NVCA mapping, portions of the study area are subject to Ontario Regulations 179/06 (LSRCA) and 172/06 (NVCA) Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses. **Figures 2A to 2D** present the limits of the LSRCA Regulated Area within the study limits. The regulation limit for the NVCA was not available for GIS mapping. During detail design, a permit from the LSRCA and NVCA will be required for work within these regulated areas.

5.0 MONITORING

To ensure that erosion and sediment controls are installed prior to and maintained during construction, an Erosion and Sediment Control (ESC) Plan will be prepared. The ESC Plan will provide details regarding the inspection, maintenance (e.g., need for repair), and documentation procedures during all stages of construction. An environmental inspector will monitor the site during construction to ensure that construction fencing, tree protection barriers and erosion and sedimentation control measures are installed correctly and are functional. Additional monitoring requirements may be identified during detail design through the permitting process.

6TH LINE FROM 20TH SIDEROAD TO ST. JOHN'S ROAD

6.0 EXISTING CONDITIONS

The following discussion outlines the existing environmental conditions within the study area and identifies natural heritage areas and/or features of environmental sensitivity and/or significance.

6.1 Physiography and Soils

The majority of the study area is located within the Peterborough drumlin field physiographic region, with the exception of the lands adjacent to Lake Simcoe, which are part of the Simcoe lowlands (Chapman and Putnam 1984). The Peterborough drumlin field covers an area extending east to Hastings County, west to Simcoe County, as well as drumlins south of the Oak Ridges Moraine in Northumberland County. The study area is located within an area of drumlins and drumlin uplands rising from sand plains (Chapman and Putnam 1984). The lands adjacent to Lake Simcoe are part of the Simcoe lowlands, and more specifically, the lowland surrounding the lake is referred to as the Lake Simcoe basin. This basin is connected to the Nottawasaga basin by flat-floored valleys and is comprised of a narrow boulder dominated terrace bordered by a low bluff cut (Chapman and Putnam 1984).

The study area is comprised of Guerin loam (stony phase) and Bondhead sandy loam (stony phase), with a smaller area at the easterly limit of the study area, which is comprised of Alliston sandy loam (Hoffman, Wicklund, and Richards 1962). These soils are described further in the following subsections.

6.1.1 Guerin loam

Guerin soils are associated with the Bondhead and Vasey soils in the County of Simcoe. Topography in areas with this soil type are typically gently sloping. The Guerin soils have imperfect drainage, and due to the topography, are less susceptible to erosion. The soils within the study area are part of 5,100 acres of a stony phase, due to a large amount of stones in the surface soils (Hoffman, Wicklund, and Richards 1962). The majority of the study corridor is classified as Guerin loam (stony phase) soils.

6.1.2 Bondhead sandy loam

Bondhead soils are found in the southwestern part of the County of Simcoe. These soils are found in areas with smooth, moderately sloping topography. The soils in this area are part of the stony phase, and contain stones and boulders throughout the surface soils. Drainage in this soil series is good and these soils are prone to erosion, particularly in areas without vegetation cover (Hoffman, Wicklund, and Richards 1962). Soils at the westerly limit of the study area, and in the vicinity of the rail crossing are classified as Bondhead sandy loam (stony phase) soils.

6.1.3 Alliston sandy loam

Alliston soils are associated with Tioga soils and are often found in the sandy outwash plain. Alliston soils are found in areas with smooth topography, and have imperfect drainage (Hoffman, Wicklund, and Richards 1962). The easterly limit of the study area contains Alliston sandy loam soils.

6.2 Aquatic Habitats and Communities

The study area is located within the Innisfil Creeks watershed under the jurisdiction of Lake Simcoe Region Conservation Authority (LSRCA), and managed under the jurisdiction of the Ministry of Natural Resources and Forestry (MNRF) Midhurst District Office.

One main watercourse is located within the study area. Cedar Creek crosses 6th Line approximately 420 m west of St. John's Road.

Background Data
LGL conducted a secondary source review to identify the fish community within the watershed. The secondary source review included species at risk screening though aquatic species at risk mapping (DFO/MNRF/LSRCA 2015), the Natural Heritage Information Centre (NHIC) database (MNRF 2012), correspondence with the MNRF Midhurst District Office (November 13, 2014), correspondence with the LSRCA regarding fish sensitivity and fisheries collection records in the study area watercourses (March 27, 2015), in addition to a review of the Fisheries Management Plan for the Innisfil Creeks Subwatershed (LSRCA 2012). An Environmental Impact Study for development in the area has recently been completed by Azimuth Environmental Consulting (2013) and provided some useful natural heritage data for 6th Line, west of St. John's Road. This study was reviewed for available fish and fish habitat information. A summary of the fish communities present within the watercourses in the vicinity of the study area are presented in **Table 11**.

Field Investigations
An LGL fisheries specialist visited Study Area A of the 6th Line study area on Friday, October 24, 2014 and Thursday May 7, 2015 to observe and document existing aquatic habitat conditions for a two season assessment. The weather conditions during the fall site visit was sunny and 11°C, with west winds less than 15 km/h. The weather conditions for the spring visit was 25°C with East winds <10km/h..

Physical habitat features were surveyed in sufficient detail to enable mapping and identification of key habitat types. The physical habitat attributes assessed included: (a) instream cover, (b) bank stability, (c) substrate characteristics, (d) stream dimensions, (e) barriers, (f) stream morphology, (g) terrain characteristics, (h) stream canopy cover, (i) stream gradient, (j) aquatic vegetation, (k) ground water seepage areas, and (l) general comments. Fish collection records based on secondary source review and LGL field investigations, as presented in **Table 11**. **Figure 3** presents the location of the crossings identified within the study area. An aquatic habitat summary is presented below which describes existing conditions observed during field investigations. Representative photographs of the crossings were also taken during investigations and are provided in **Appendix A**.

6.2.1 Cedar Creek

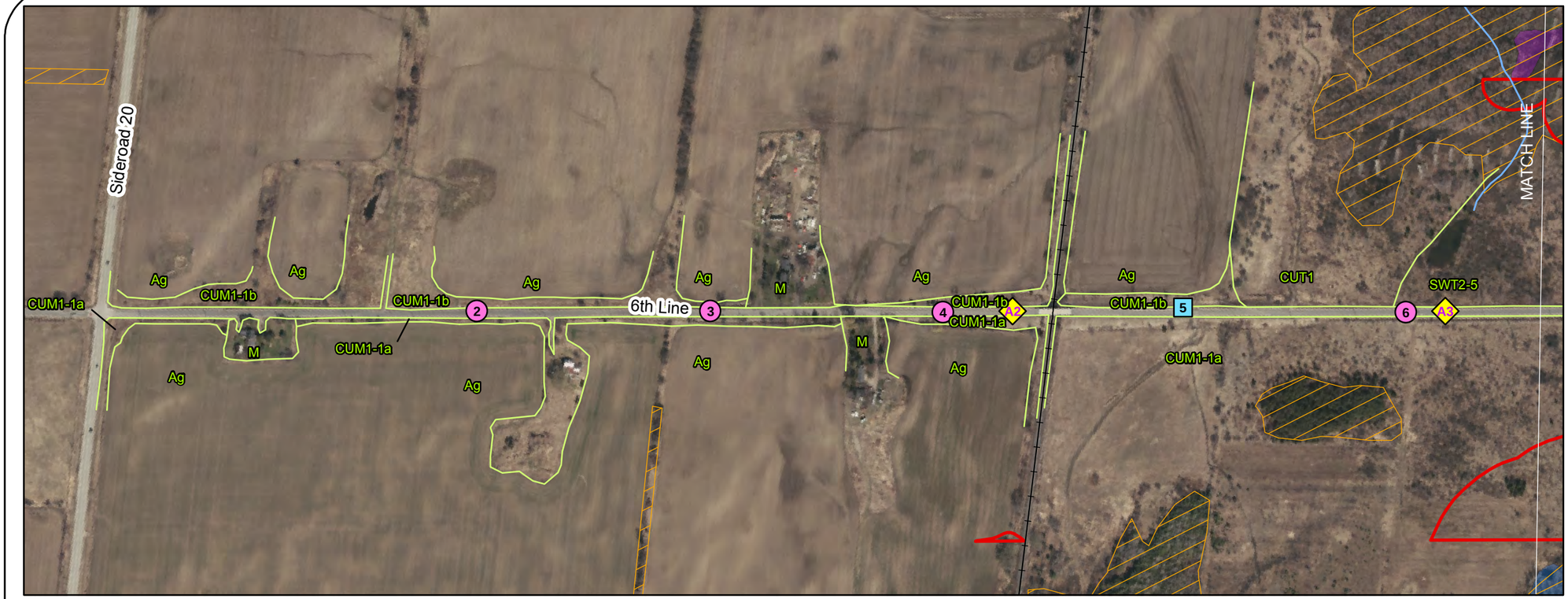
This watercourse within the study area appears to be predominantly fed by surface runoff from the adjacent agricultural lands. Based on the two season field investigation, the wetted watercourse appears to originate approximately 1.2 km west of St. John's Road. At this location, a corrugated steel pipe (CSP) culvert (approximately 60 cm diameter) crosses 6th Line from north to south. The location of this culvert is presented in **Figure 3** as Culvert #1 (CUL_01_21). The ditch and area to the north of this location was dry during the October and May site visits. To the south, there is a small isolated pool with submerged and emergent aquatic vegetation. The ditch drains to the east along the south side of 6th Line. Downstream of Culvert 1, contributing flow to the watercourse appears to originate from the woodlot to the south. Several sources of flow were observed entering the ditch. The ditch is lined with cattails and was flowing during the spring site visit, but was not flowing at the time of the fall site visit.

The ditch continues to the east adjacent to a cultural thicket, where another north-south culvert conveys flows into the ditch/channel. The location of this culvert is presented in **Figure 3** as Culvert #2 (CUL_01_22). The north side of this culvert was dry during the October 2014 and flowing during the May site visit. This ditch functions as an overflow for a small pond located to the north of 6th Line approximately 600 m west of St. John's Road (As of the May site visit, the north side of 6th Line was under construction. The pond was removed, and flow leaving the site was disrupted by a rock check flow dam. From this crossing downstream (to the east), along the south side of the 6th Line, the ditch was flowing during the spring visit and was standing during the fall site visit. Approximately 430 m to the west of St. John's Road, a third centreline culvert exists (CUL_01_23) which was dry to the north of 6th Line during both site visits; however the culvert itself should constitute fish habitat. At this location, the

TABLE 11.
HISTORICAL FISH COLLECTION RECORDS WITHIN THE VICINITY OF THE STUDY AREA

Scientific Name	Common Name	Cedar Creek	COSEWIC	SARA	MNR	Provincial
Semotilus atromaculatus	Creek Chub	z,v	-	-	-	S5
Rhinichthys atratulus	Blacknose Dace	x,y,z	-	-	-	SNR
Luxilus cornutus	Common Shiner	z	-	-	-	S5
Pimephales promelas	Fathead Minnow	z	-	-	-	S5
Pimephales notatus	Bluntnose Minnow	x,y,z	-	-	-	S5
Notropis atherinoides	Emerald Shiner	z	-	-	-	S5
Notropis heterodon	Blackchin Shiner	z	-	-	-	S4
Notropis volucellus	Mimic Shiner	z	-	-	-	S5
Notropis hudsonius	Spottail Shiner	z	-	-	-	S5
Esox lucius	Northern Pike	z	-	-	-	S5
Fundulus diaphanus	Banded Killifish	z	-	-	-	S5
Culaea inconstans	Brook Stickleback	x,y,z	-	-	-	S5
Ambloplites rupestris	Rock Bass	z	-	-	-	S5
Micropterus salmoides	Largemouth Bass	z	-	-	-	S5
Lepomis gibbosus	Pumpkinseed	z	-	-	-	S5
Etheostoma exile	Iowa Darter	z	-	-	-	S5

Note: x = Fish Collection Data, personal correspondence (MNRF 2014)
y = LSRCA Fish Community Data Summary, Site Code: CEDAR-A and Stream Code INC1 (2008)
z= Report- Alcona South Secondary Plan (Sleeping Lion) Scoped Environmental Impact Study Sampling Year 2005 (Azimuth Environmental Consulting 2013).
v= LGL Sampling (May 2015)



LEGEND

- Culvert
- Sideroad Culvert
- Railway (County of Simcoe)
- Watercourse Crossing
- Permanent Watercourse
- Seasonal Watercourse
- Water Flow Direction Arrow
- Provincially Significant Wetland (Little Cedar Point (IN3)) (County of Simcoe)
- Unevaluated Wetland (County of Simcoe)
- Wooded Area (County of Simcoe)
- LSRCA Regulation Limit
- Vegetation Community Boundary

Vegetation Communities

CUM1-1 (a-b)	Dry-Moist Old Field Meadow Type
CUT1	Mineral Cultural Thicket Ecosite
CUW	Cultural Woodland
FOD8-1	Fresh-Moist Poplar Deciduous Forest Type
SWD2	Ash Mineral Deciduous Swamp Ecosite
SWD6-2	Silver Maple Organic Deciduous Swamp Type
SWT2-5	Red-osier Mineral Thicket Swamp Type
Ag	Agricultural
M	Manicured

- Anuran Survey Station
- Breeding Bird Point Count Station (Cadman et al., 2007)
- Breeding Bird Point Count Station (MNRF, 2011)

N

100 50 0 100

Meters

Data Source: LGL Limited Field Survey 2014, County of Simcoe, Lake Simcoe Region Conservation Authority and Ministry of Natural Resources and Forestry.

NATURAL HERITAGE EXISTING CONDITIONS
6th Line
20 Sideroad to
St. John's Road

LGL LIMITED
environmental research associates

Project:	TA8487B	Figure:	3
Date:	February 2016	Prepared By:	KDR
Scale:	1 : 5000	Checked By:	KSB

watercourse flows to the southeast, out of the study area, before joining Lake Simcoe approximately 500 m to the southeast. The watercourse at the east end of the study area measures approximately 1.5 m in width and 10 cm depth. The channel consists of mostly fine substrates (silt, muck, detritus), and water was standing at the time of the October 2014 site visit. During the spring visit, the creek was flowing and depths averaged 30-40 cm. YOY creek chub were captured within the watercourse. Along the south ditch, much of the instream and riparian cover is provided by cattails.

No critical habitat features were observed during either site visit. Based on the site visits, and a review of background sources to date, Cedar Creek should be classified as direct fish habitat from 600 m west of St. John's Road to the east. Seasonal habitat exists further to the west, to approximately 1.2 km west of St. John's Road. Due to the proximity of Lake Simcoe, data provided from MNRF/LSRCA and sampling conducted by Azimuth Consulting in 2005, and LGL in 2015 the fish community in this watercourse can be classified as a mix of warm/coolwater lake and stream dwelling species. A full list of species captured is presented in **Table 11**.

6.2.2 Species at Risk

Based upon a review of the MNRF Natural Heritage Information Centre database, species at risk data provided by MNRF, and the LSCRA/Department of Fisheries and Oceans Species at Risk mapping 2015, there are no aquatic species at risk recorded within the study area.

6.3 Vegetation and Vegetation Communities

The geographical extent, composition, structure and function of the vegetation communities were identified through air photo interpretation and a field investigation. Air photos were interpreted to determine the limits and characteristics of the vegetation communities in the study area. A field investigation of the vegetation communities along 6th Line between Sideroad 20 and Saint John's Road was conducted on October 27, 2014 within the right-of-way, to the extent possible. The field investigation was carried out to ground truth the boundaries of the vegetation communities and to conduct a botanical survey.

The vegetation communities were classified according to the *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (Lee *et al*. 1998). A plant list and a description of the general structure of vegetation were obtained during the field investigations. Plant species status was reviewed for Ontario (Oldham 2009), and Simcoe County (Riley 1989). Vascular plant nomenclature follows Newmaster *et al*. (1998) with a few exceptions that have been updated to Newmaster *et al.* (2005).

6.3.1 Vegetation Communities

The study area consists of a mixture of cultural, forest and wetland vegetation communities, including portions of vegetation communities that are already in a disturbed state as a result of the land uses. Evidence of disturbance includes a high proportion of non-native plant species that are well adapted to persist in areas that are regularly disturbed including species that are adapted to high light conditions, limited soil moisture, and species that are tolerant of salt spray.

The natural/semi-natural features within the study area are restricted to the south side of 6th Line and consist of deciduous forest and deciduous swamp. These communities are of higher quality and support a higher diversity of native plant species.

Seven Ecological Land Classification (ELC) vegetation community types were identified within the study limits during LGL's botanical survey. The community types include: Dry-Moist Old Field Meadow

(CUM1-1a and b), Mineral Cultural Thicket (CUT1), Mineral Cultural Woodland (CUW1), Fresh-Moist Poplar Deciduous Forest (FOD8-1), Ash Mineral Deciduous Swamp (SWD2), Silver Maple Organic Deciduous Swamp (SWD6-2), and Red-osier Mineral Thicket Swamp (SWT2-5). All of the vegetation communities identified within the study area are considered widespread and common in Ontario and are secure globally. These communities are delineated in **Figure 3** and are described in **Table 12.**

There are several areas that are not identified by an ELC classification such as areas of manicured grass (M) which include mown lawns, gardens and planted trees.

6.3.2 Flora

A total of 136 plant species have been recorded within the study area. Five of these plants could only be identified to genus and are not included in the following calculations. Of the 131 plants identified to species, seventy-eight (60%) plant species identified are native to Ontario and fifty-three (40%) plant species are considered introduced and non-native to Ontario. A list of vascular plants is presented in **Appendix B.** Definitions of the acronyms and species ranks used in **Appendix B** are described in **Appendix C**.

6.3.3 Species at Risk

No plant species that are regulated under the Ontario *Endangered Species Act* or the Canada *Species at Risk Act* were encountered during LGL's botanical investigation within the subject area (those plant species regulated as Endangered, Threatened, or Special Concern). A description of provincial species ranks is provided in **Appendix C**.

Five plant species that are rare in Simcoe County were identified within the study area. **Table 13** presents the list of those rare species and in which vegetation community each species was identified. A description of Simcoe plant species rarity is presented in **Appendix B**.

6.4 Tree Resources

Methodology

Field investigations were conducted on May 19, 2015 within the study area. A tree inventory was completed for the study area and included trees measuring 10 cm diameter at breast height (DBH) and greater within the proposed grading limits, where applicable. Trees with canopies overhanging the proposed grading limits were assessed in case grading limits are further refined during detail design. The following was completed for each tree:

- Species identification; including screening for species regulated under the *Endangered Species Act*, 2007;
- Measurements; diameter at breast height (DBH), and estimation of canopy dripline;
- Location; trees were given a unique numerical identifier and their locations recorded using a TopCon GRS1 GPS unit. Tree numbers consist of 1-163;
- Health Assessment; assessed as poor, fair, or good based on qualities such as trunk integrity, crown structure, vigour, and dieback. Physical irregularities were also noted for each tree.

Results

A total of 163 trees were inventoried and assessed during the field investigation. **Table 14** provides a summary of tree species identified within the study area. Trees range in size from 10 to ~131 cm DBH

TABLE 12.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
TERRESTRIAL – CULTURAL			
CUM	Cultural Meadow		
CUM1-1 (a and b)	Dry-Moist Old Field Meadow	**Emergent Trees/Shrubs:** includes eastern white cedar (*Thuja occidentalis*), white elm (*Ulmus americana*), staghorn sumac (*Rhus hirta*), common buckthorn (*Rhamnus cathartica*). **Grover cover:** includes meadow horsetail (*Equisetum pratense*), white sweet-clover (*Melilotus alba*), Canada goldenrod (*Solidago canadensis*), Kentucky bluegrass (*Poa pratensis* ssp. *pratensis*), and New England aster (*Symphyotrichum novae-angliae*).	• Cultural communities (CU). • Tree cover and shrub cover < 25 % (M). • This community can occur on a wide range of soil moisture regimes (Dry-Moist) (-1).
CUT	Cultural Thicket		
CUT1	Mineral Cultural Thicket	**Canopy:** includes eastern red cedar (*Juniperus virginiana*), white willow (*Salix alba*), choke cherry (*Prunus virginiana* var. *virginiana*), trembling aspen (*Populus tremuloides*). **Understory:** includes eastern white cedar, common buckthorn, common apple (*Malus pumila*), and white willow. **Ground Cover:** includes tall white aster (*Aster lanceolatus* ssp. *lanceolatus*), Canada goldenrod, awnless brome (*Bromus inermis* ssp. *inermis*), reed canary grass (*Phalaris arundianacea*),	• Cultural communities (CU). • Tree cover <25 %; shrub cover >25% (T). • Mineral Soil (1).
CUW	Cultural Woodland		
CUW1	Mineral Cultural Woodland	**Canopy:** includes trembling aspen, white willow, and red ash (*Fraxinus pennslyvanica*). **Understory:** includes trembling aspen, red-osier dogwood (*Cornus sericea* ssp. *sericea*), high bush cranberry (*Viburnum opulus* var. *americanum*), and common buckthorn. **Ground cover:** includes reed canary grass, red raspberry (*Rubus idaeus* ssp. *idaeus*), and blue-joint grass (*Calamagrostis canadensis*).	• Cultural communities (CU). • 25 % < tree cover < 35 % (W). • Mineral Soil (1).

TABLE 12.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
TERRESTRIAL – NATURAL/SEMI-NATURAL			
FOD	Deciduous Forest		
FOD8-1	Fresh-Moist Poplar Deciduous Forest	**Canopy:** includes trembling aspen, balsam poplar (*Populus balsamifera* ssp. *balsamifera*), eastern white cedar, black cherry (*Prunus serotina*), and white spruce (*Picea glauca*). **Understory:** includes ironwood (*Ostrya virginiana*), alternate-leaved dogwood (*Cornus alternifolia*), common buckthorn, trembling aspen, and high bush cranberry. **Ground cover**: includes herb-robert (*Geranium robertianum*), sedges (*Carex* spp.), American wild mint (*Mentha arvensis*), and common dandelion (*Taraxacum officinale*), and butter-and-eggs (*Linaria vulgaris*).	• Tree cover >60 % (FO). • Deciduous trees >75 % of canopy cover (D). • Typically represents a young forest (8). • Poplar species are dominant (-1).
WETLAND			
SWD	Deciduous Swamp		
SWD2	Ash Mineral Deciduous Swamp	**Canopy:** includes red ash, balsam poplar, and eastern white cedar. **Understory:** includes round-leaved dogwood (*Cornus rugosa*), red ash, balsam poplar, nannyberry (*Viburnum lentago*), and high bush cranberry. **Ground cover**: includes sedges, herb-robert, thimble-berry (*Rubus occidentalis*), white snakeroot (*Ageratina altissima* var. *altissima*), and spotted crane's-bill (*Geranium maculatum*).	• Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Deciduous tree cover >75% of canopy cover (D). • Ash species dominant (2).
SWD6-2	Silver Maple Organic Deciduous Swamp	**Canopy**: includes silver maple (*Acer saccharinum*), balsam poplar, and red ash. **Understory:** includes silver maple, common buckthorn, high bush cranberry, red ash, and riverbank grape (*Vitis riparia*). **Ground cover:** includes marsh horsetail (*Equisetum palustre*), sensitive fern (*Onoclea sensibilis*), spotted touch-me-not (*Impatiens capensis*), sedges, and wild sarsaparilla *(Aralia nudicaulis*).	• Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Deciduous tree cover >75% of canopy cover (D). • Organic soil (6). • Silver maple dominant (-2).

TABLE 12.
SUMMARY OF ECOLOGICAL LAND CLASSIFICATION VEGETATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
SWT	Swamp Thicket		
SWT2-5	Red-osier Mineral Thicket Swamp	**Canopy:** includes red-osier dogwood and white willow. **Ground cover:** includes Canada goldenrod, purple-stemmed aster (*Aster puniceus* var. *puniceus*), and broad-leaved cattail (*Typha latifolia*).	• Tree cover <25% and hydrophytic shrub >25% (SWT). • Mineral soil (2). • Red-osier dogwood dominant (-5).
OTHER*	Manicured		
M	Manicured grasses and planted shrubs and/or trees	Areas where large expanses of grass/shrubs/trees are maintained and/or planted. **Includes**: Norway spruce (*Picea abies*), eastern white cedar, Norway maple (*Acer plattanoides*), silver maple, and sugar maple (*Acer saccharum* ssp. *saccharum*).	

* Not identified as an ELC community by Lee, H., W. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurray. 1998. *Ecological Land Classification for Southern Ontario: First Approximation and Its Application*. Natural Heritage Information Centre.

TABLE 13.
SUMMARY OF REGIONALLY RARE PLANT SPECIES IDENTIFIED WITHIN THE STUDY AREA

Scientific Name	Common Name	SRank	Simcoe	LSRCA	CUM1-1a	CUM1-1b	CUT1	SWD2	SWD6-2
Equisetum palustre	marsh horsetail	S5		W			X	X	X
Equisetum pratense	meadow horsetail	S5	R-2	W	X	X			
Juglans nigra	black walnut	S4	R-1 Nat	W		X			
Geranium maculatum	spotted crane's-bill	S5	R-2	W				X	
Sorghastrum nutans	Indian grass	S4		W		X			

TABLE 14.
SUMMARY OF TREE SPECIES IDENTIFIED WITHIN THE STUDY AREA

Scientific Name	Common Name	Total Number of Trees
Acer negundo	Manitoba maple	9
Acer saccharinum	silver maple	1
Acer saccharum ssp. *saccharum*	sugar maple	1
Betula pendula	European birch	1
Fraxinus pennsylvanica	red ash	73
Juniperus virginiana	eastern red cedar	18
Malus sp.	apple	11
Picea abies	Norway spruce	3
Picea pungens	blue spruce	3
Pinus strobus	white pine	3
Pinus sylvestris	Scots pine	4
Populus balsamifera	balsam poplar	3
Populus tremuloides	trembling aspen	4
Pyrus sp.	pear	2
Salix X *sepulcralis*	willow hybrid	2
Thuja occidentalis	eastern white cedar	18
Ulmus americana	white elm	7

and are generally considered to be in good to fair condition. Epicormic branching and varying degrees of crown dieback were prevalent throughout the study area which is often an indication of stress in trees found in urban settings. In addition, ash trees throughout the study area are showing decline. Evidence of decline in the ash trees includes a high proportion of dieback, chlorosis of the leaves and the growth of epicormic shoots. In addition, a number of the ash trees are displaying the typical 'D-shape' exit hole which is an indicator of Emerald Ash Borer. The full tree inventory table can be seen in **Appendix E**. **Figure 2A to 2D** presents the area that was inventoried and the results of the tree inventory.

6.5 Wildlife and Wildlife Habitat

Field investigations were conducted with the purpose of documenting wildlife and wildlife habitat and to characterize the nature, extent and significance of wildlife usage within the study area. Wildlife investigations were focused within and adjacent to the existing 6th Line right-of-way, from 20th Sideroad to St. John's Road, within the Town of Innisfil. Direct observations, calls and tracks were used to record wildlife present within the study area. A summary of survey date(s), tasks and weather is presented in **Table 15**.

TABLE 15.
SUMMARY OF DATE OF INVENTORY, TASK, WEATHER AND PERSONNEL

Date of Inventory	Task	Weather	Personnel Involved
October 23, 2014	General wildlife survey	Partial cloud cover, 8C, calm	David Smith (LGL)
April 20, 2015	Anuran survey	Overcast, 15C, calm	David Smith (LGL)
May 18, 2015	Anuran survey	Overcast, 25C, calm	David Smith (LGL)
June 3, 2015	Breeding Bird survey and incidental wildlife survey	Clear, 8C, calm.	David Smith (LGL)
June 15, 2015	Breeding Bird survey and incidental wildlife survey	Overcast, 16C, calm	David Smith (LGL)
June 18, 2015	Breeding bird survey, incidental wildlife surveys and anuran survey	Clear, 11C, calm.	David Smith (LGL)
June 22, 2015	Breeding bird survey and incidental wildlife survey	Partial cloud cover, 19C, calm	David Smith (LGL)
June 23, 2015	Breeding bird survey and incidental wildlife survey	Partial cloud cover, 15C, calm	David Smith (LGL)
June 25, 2015	Breeding bird survey and incidental wildlife survey	Partial cloud cover, 15C, calm	David Smith (LGL)

6.5.1 Wildlife Habitat

Wildlife and wildlife habitat was found to be distributed across the entire study area; however, given the predominantly cleared landscape practices (agriculture and residential area) and disturbed nature of the study area, natural heritage features were generally restricted. A single watercourse crossing, coniferous and deciduous swamp, meadow, thicket and forested habitat provide the majority of natural heritage features within the study area.

Little Cedar Point Provincially Significant Wetland (PSW) is located on the south side of 6th Line west of St. John's Road. This natural area provides important habitat for wildlife species typically associated

with wetland/swamp, aquatic, riparian zone and forest/forest edge habitat types. The PSW maintains connectivity with a number of natural areas to the south.

Cedar Creek runs parallel to and crosses 6th Line west of St. John's Road within the study area. The watercourse and associated riparian habitats are considered highly disturbed and support limited natural heritage features.
A small pond, presumed to be ephemeral in nature and measuring approximately 3 m x 3 m is located immediately north of 6th Line, approximately 620 m west of St. John's Road. The pond was found to provide amphibian breeding habitat; however, degradation of this feature was noted throughout the survey period as a result of land clearing from encroaching development.

Since natural areas within the study area are limited and given the cleared landscape practices associated with surrounding agriculture and residential development, natural areas likely provide locally significant wildlife habitat. However, outside of these natural areas, the disturbed landscape supports limited natural heritage features, resulting in the presence of low to moderately diverse assemblage of wildlife species which are generally considered urban or tolerant of anthropogenic features and disturbance.

6.5.2 Fauna

Based on field observations, 43 species of wildlife could be verified in the study area and the majority of these recordings came from identification (through calls and sightings) of bird species with more modest numbers of herpetofauna and mammal species identified. A summary of wildlife species documented in the study area during field investigations is presented in **Table 16**.

6.4.2.1 Anuran Survey
Methodologies outlined in the Marsh Monitoring Program Protocol (2000) were applied to confirm presence/absence of anuran species, document potential breeding habitat/areas, and confirm the nature, extent and significance of amphibian usage. Stations were strategically placed where amphibian breeding habitat was suspected, based on air-photo interpretation and a review of the study area (see **Figure 4**). Field investigations within the study area were conducted on three separate nights during the spring and summer of 2015, ran from one half hour after sunset and ended prior to midnight and were conducted during appropriate weather conditions (see **Table 15**). Investigations were undertaken during periods of peak anuran breeding activity and vocalization.

Fauna
Anuran breeding evidence was documented for six species during 2015 surveys. Vocalizing male American Toad (*Anaxyrus americanus*), Gray Treefrog (*Hyla versicolor*), Spring Peeper (*Pseudacris crucifer*), Western Chorus Frog (*Pseudacris triseriata*), Wood Frog (*Lithobates sylvaticus*) and Green Frog (*Rana clamitans*) were noted within the study area or in the immediate vicinity. A summary of anuran species and their respective call level codes is presented in **Table 17**.

Mammal Species
Four mammal species were identified during field investigations in the study area. Northern racoon (*Procyon lotor*) tracks were commonly identified along the roadside, while eastern gray squirrel (*Sciurus carolinensis*) and eastern cottontail (*Sylvilagus floridanus*) were observed within wooded and residential areas. A road-killed White-tailed deer (*Odocoileus virginianus*) was also observed. The mammal species documented represent an assemblage that readily utilizes human influenced landscapes.

Herpetofauna Species
Six herpetofauna species were observed in the study area during field investigations. The majority of these species were identified during anuran call surveys conducted over three separate surveys (see Section 6.4 for dates). Several American Toad, Wood Frog and Spring Peeper were also observed crossing 6th Line during amphibian surveys.

TABLE 16.
WILDLIFE SPECIES DOCUMENTED IN THE STUDY AREA BY LGL (2015)

Wildlife	Scientific Name	Common Name	SARA	ESA	Legal Status	Other
Herpetofauna	*Bufo americanus*	American Toad				
	Hyla versicolor	Gray Treefrog			FWCA (P)	
	Pseudacris crucifer	Spring Peeper				
	Pseudacris triseriata	Western Chorus Frog	THR	-		
	Rana sylvatica	Wood Frog				
	Lithobates clamitans	Green Frog				
Birds	*Accipiter cooperii*	Cooper's Hawk			FWCA(P)	SWH/INT
	Charadrius vociferus	Killdeer			MBCA	
	Zenaida macroura	Mourning Dove			MBCA	
	Coccyzus erythropthalmus	Black-billed Cuckoo			MBCA	
	Empidonax traillii	Willow Flycatcher			MBCA	
	Myiarchus crinitus	Great-crested Flycatcher			MBCA	
	Tyrannus tyrannus	Eastern Kingbird			MBCA	
	Vireo olivaceus	Red-eyed Vireo			MBCA	INT
	Cyanocitta cristata	Blue Jay			FWCA (P)	
	Corvus brachyrhynchos	American Crow			MBCA	
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
	Poecile atricapillus	Black-capped Chickadee			MBCA	
	Troglodytes aedon	House Wren			MBCA	
	Turdus migratorius	American Robin			MBCA	
	Dumetella carolinensis	Gray Catbird			MBCA	
	Sturnus vulgaris	European Starling				
	Bombycilla garrulus	Cedar Waxwing			MBCA	
	Dendroica petechia	Yellow Warbler			MBCA	
	Seiurus aurocapilla	Ovenbird			MBCA	SWH/INT
	Geothlypis trichas	Common Yellowthroat			MBCA	
(continued)	*Spizella passerina*	Chipping Sparrow			MBCA	

TABLE 16.
WILDLIFE SPECIES DOCUMENTED IN THE STUDY AREA BY LGL (2015)

Wildlife	Scientific Name	Common Name	SARA	ESA	Legal Status	Other
	Spizella pusilla	Field Sparrow			MBCA	
	Passerculus sanwichensis	Savannah Sparrow			MBCA	SWH
	Melospica melodia	Song Sparrow			MBCA	
	Spizella pallida	Clay-coloured Sparrow			MBCA	
	Cardinalis cardinalis	Northern Cardinal			MBCA	
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Agelaius phoeniceus	Red-winged Blackbird				
	Quiscalus quiscula	Common Grackle				
	Carduelis tristis	American Goldfinch			MBCA	
	Passer domesticus	House Sparrow				
Mammals	*Sciurus carolinensis*	Eastern Gray Squirrel			FWCA(G)	
	Sylvilagus floridanus	Eastern Cottontail			FWCA(G)	
	Procyon lotor	Northern Raccoon			FWCA(F)	
	Odocoileus virginianus	White-tailed Deer			FWCA(G)	

COSEWIC - Committee on the Status of Endangered Wildlife in Canada:
- END - Endangered
- THR – Threatened
- SC - Special Concern

ESA - *Ontario Endangered Species Act*, 2007
- END – Endangered
- THR – Threatened
- SC - Special Concern

Other:
- SWH - SWH-TG Area Sensitive Species
- INT - Interior Species

For definitions of species ranks, refer to **Appendix G**.

Legal Status:
- MBCA - *Migratory Birds Convention Act*
- ESA - E*ndangered Species Act*
- SARA - *Species at Risk Act*
- FWCA - *Fish and Wildlife Conservation Act*
- (P) Protected Species (G) Game species (F) Furbearing mammals

TABLE 17.
AMPHIBIAN SURVEY OF STUDY AREA AND ADJACENT LANDS BY LGL LIMITED (2015)

Station	Scientific Name	Common Name	SARA	ESA	Local	Legal Status	Call Level Code
1	*Pseudacris crucifer*	Spring Peeper					3
2	*Bufo americanus*	American Toad					2
3	*Bufo americanus*	American Toad					1
	Hyla versicolor	Gray Treefrog				FWCA(P)	3
	Pseudacris crucifer	Spring Peeper					1
	Lithobates clamitans	Green Frog					1
	Pseudacris triseriata	Western Chorus Frog	THR	-			2
4	*Hyla versicolor*	Gray Treefrog				FWCA(P)	3
	Pseudacris crucifer	Spring Peeper					3
	Rana sylvatica	Wood Frog					2
5	*Hyla versicolor*	Gray Treefrog				FWCA(P)	3
	Pseudacris crucifer	Spring Peeper					3
	Rana sylvatica	Wood Frog					2
	Pseudacris triseriata	Western Chorus Frog	THR	-			2
6	*Bufo americanus*	American Toad					2
	Hyla versicolor	Gray Treefrog				FWCA(P)	2
	Pseudacris crucifer	Spring Peeper					3
	Pseudacris triseriata	Western Chorus Frog	THR	-			2

* - No anuran species/individuals documented
Call Level Codes – Abundance Count (according to Bird Studies Canada):
Call Level One (1) – Individual males can be counted accurately.
Call Level Two (2) - Frogs can be generally counted but calls overlap thus no exact number can be obtained.
Call Level Three (3) - Calls continuous and overlapping, no reasonable estimate of numbers.

6.4.2.2 Breeding Bird Survey

Breeding bird surveys were conducted on a number of dates during the 2015 breeding bird season to document breeding bird evidence (BBE) and to characterize the nature, extent and significance of breeding bird usage of the habitats within the study area (see **Table 15**). Breeding bird survey methodology varied depending on the habitat type present. Where potentially suitable habitat for Bobolink (*Dolichonyx oryzivorus*) and/or Eastern Meadowlark (*Sturnella magna*) was identified, surveys were undertaken in accordance with MNRF survey protocol for Bobolink (MNRF 2011). In all other habitat types, survey methodology and breeding bird behaviours used as evidence of breeding success were categorized according to the Breeding Bird Atlas five-year surveys organized by Bird Studies Canada (Cadman et al., 2007). Locations of breeding bird point count stations are shown on **Figure 3**.

Fauna

The study area contained a low to moderate number of breeding bird species representing several habitat types. Breeding evidence was obtained for 31 species of birds. Breeding evidence was confirmed in seven species and suspected in 13. An additional 11 species were identified as having the potential to breed within the study area. Confirmed breeding by bird species was generally documented based on adults carrying food for young, including species such as Song Sparrow (*Melospica melodia*), American

Robin (*Turdus migratorius*), Yellow Warbler (*Setophaga petechia*), American Goldfinch (*Carduelis tristis*), European Starling (*Sturnus vulgaris*), American Crow (*Corvus brachyrhynchos*) and Eastern Kingbird (*Tyrannus tyrannus*). These same species which were confirmed as breeding were also commonly encountered species across the study area. Species which were most commonly encountered across the study area were generally species associated with open-country/agricultural or highly disturbed habitat types. There are also multiple species that are considered area-sensitive and/or interior species according to the Significant Wildlife Habitat Technical Guide (MNRF 2000) as indicated in **Table 16**.

A summary of the breeding birds documented in the study area during field investigations is presented in **Appendix E**.

6.5.3 Species at Risk

Twenty-six recorded species of bird are protected under the MBCA and two bird species are protected under the FWCA. Several species that are considered area-sensitive and/or interior species according to the Significant Wildlife Habitat Technical Guide (MNRF 2000) were identified within the study area (see **Table 16**).

Of the 43 wildlife species recorded within the study area, three are regulated under the ESA and/or the SARA.

Each of the eight species identified above, their respective legal status, biological requirements, habitat suitability of the study area, likelihood of presence within the study area and survey results (if completed) are discussed below and summarized in **Table 18**. As per MNRF direction, the details for these species has been omitted from this report but has been provided under separate cover to MNRF.

Western Chorus Frog

Western Chorus Frog was identified during amphibian surveys and was heard at Anuran Call Station #3 and #5 (see **Figure 3**). The Western Chorus Frog inhabits open to semi-open areas around wooded areas but can also be found in meadows, marshes, agricultural fields and urban areas. The Great Lakes–St. Lawrence population of Western Chorus Frog (the sub-population identified) is listed as 'Threatened' under the federal *Species at Risk Act* and is also afforded some protection by the Provincial Policy Statement under the *Planning Act*. These acts offer protection to individuals and their habitat. Habitat considered suitable to support this species was identified across much of the study area.

6.6 Designated Natural Areas

Designated natural areas include areas identified for protection by the Ontario Ministry of Natural Resources (OMNR), Lake Simcoe Region Conservation Authority (LSRCA), County of Simcoe, and the Town of Innisfil. A review of the Natural Heritage Information Centre (2014) indicates there are no Areas of Natural and Scientific Interest (ANSIs) or Environmentally Sensitive Areas (ESAs) located within 120 m of the study area. The Little Cedar Point Provincially Significant Wetland (PSW) is located on the south side of 6th Line west of Saint John's Sideroad. The Little Cedar Point PSW is comprised of three individual wetlands and two wetland types including swamp and marsh. A review of the Town of Innisfil Official Plan (2011) identifies the Little Cedar Point as 'significant woodland.'

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TABLE 18.
WILDLIFE SPECIES AT RISK SUMMARY

Scientific Name	Common Name	Location (s)	ESA	SARA	Last Observed Date	Preferred Habitat*	Potential Habitat in Study Area
Pseudacris triseriata	Chorus Frog	Anuran Survey Station(s): 3, 4, and 6	-	THR	2015	Around wooded areas but can also be found in meadows, marshes, agricultural fields and urban areas	Habitats suitable to support this species are present within the study area and included communities such as meadow, thicket and agricultural fields.
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 18.
WILDLIFE SPECIES AT RISK SUMMARY

Scientific Name	Common Name	Location (s)	ESA	SARA	Last Observed Date	Preferred Habitat*	Potential Habitat in Study Area
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 18.
WILDLIFE SPECIES AT RISK SUMMARY

Scientific Name	Common Name	Location (s)	ESA	SARA	Last Observed Date	Preferred Habitat*	Potential Habitat in Study Area
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

*Preferred habitat is based on a review of secondary sources; however, these species may be found in other habitats.
For definitions of the acronyms used in this table, refer to **Appendix C**.

7.0 PROJECT DESCRIPTION

Currently 6th Line is a two-lane road with a rural cross-section and a posted speed of 80 km/hour. The preliminary design for this section of 6th Line includes widening from the existing two lanes to a four lane road with an urban cross-section (urban major collector road). The study area includes the planned Sleeping Lion Development, which will require servicing to be provided to accommodate the new development. A multi-use trail is proposed in some locations along the widened roadway.

The study team has minimized impacts to the Provincially Significant Wetland, by modifying the road cross section, shifting the road centreline, and reducing the grading impact of the road reconstruction, where feasible, to avoid any widening into the wetland. A review of the preliminary design drawings has been completed to determine the potential environmental impacts and to recommend appropriate environmental protection and mitigation measures. The results of this assessment have been summarized in **Section 8.0**.

8.0 IMPACT ASSESSMENT AND ENVIRONMENTAL PROTECTION

8.1 Soil Disturbance and Potential for Erosion

Soil disturbance within the 6th Line study area will be limited to the previously disturbed areas, with some exceptions, where grading will be required in natural areas. Impacts resulting from any excavating or cut and fill operations will be temporary in nature. Erosion and sedimentation mitigation measures will be implemented prior to and during the construction phase.
A Sediment and Erosion Control Plan will be prepared during detail design. These control measures will include:

- limiting the geographical extent and duration that soils are exposed to the elements;
- implementing standard erosion and sedimentation control measures in accordance with Ontario Provincial Standard Specification (OPSS) 805 Construction Specification for Temporary Erosion and Sediment Control Measures. These standard measures include: silt fence placed along the margins of areas of soil disturbance; applying conventional seed and mulch and/or erosion control blanket in areas of soil disturbance to provide adequate slope protection and long term slope stabilization; and,
- managing surface water outside of work areas to prevent water from coming in contact with exposed soils.

Monitoring of these erosion and sedimentation control measures during and after construction will be implemented to ensure their effectiveness. These environmental measures will greatly reduce/minimize adverse environmental impacts.

8.2 Aquatic Habitats and Communities

Cedar Creek flows east along the south ditch of 6th Line and supports direct fish habitat downstream of Crossing 2 and seasonal direct fish habitat downstream of Crossing 1. According to the preliminary design, the grading limits are being extended to the north and south of 6th Line, and therefore will be encroaching into Cedar Creek. In addition, one entrance culvert which provides direct fish habitat at Cedar Creek to the South of 6th Line, labelled as (CUL_02-74) in the HDR Culvert Inspection Report is also being affected. Works and impacts are currently based on preliminary design and have the potential for refinement or change during detail design.

Figure 3 presents the locations of all culverts. Because the watercourse within the grading limits, and at the crossing locations provide fish habitat, the proposed widening works have the potential to result in 'serious harm' to fish habitat due to the following effects:

- temporary disruption of site-specific habitat;
- changes to water quality and quantity;
- changes in water temperature; and
- barriers to fish passage.

As a result of recent changes to the *Fisheries Act*, DFO has introduced a self-assessment process for proponents to determine if 'serious harm' to fish or fish habitat is expected as a result of activities from the project. Previously, all screenings under the *Fisheries Act* in the LSRCA jurisdiction were undertaken by the Conservation Authority in accordance with an agreement with DFO. With the new process, proponents use DFO screening criteria to determine if a review of the project by DFO is required.

The preliminary design works proposed in the vicinity of Cedar Creek do not meet the self-assessment criteria, due to the requirement for extending culverts and channel realignment as a result of the widening of 6th Line. DFO review will be required, and 'serious harm' to fish may occur. A 'Request for Review' should be submitted to DFO at detail design to determine if an authorization under the *Fisheries Act* is required. If required, the completed Application Form for Paragraph 35(2)(b) *Fisheries Act* Authorization (Normal Circumstances) will be submitted to DFO for review. This submission will be made during detail design. Further details regarding works at the crossing locations including net environmental effects and site specific mitigation proposed can be found below and summarized in **Table 19**.

8.2.1 Temporary Disruption or Permanent Loss of Site-Specific Habitat

The culvert replacements/removals and potential channel realignments have the potential to result in temporary or permanent disruption of the localized fish habitat. In order to minimize the potential for 'serious harm', the new structure/culvert lengths will be as short as possible and all works will be performed in-the-dry by constructing during the driest time of the year or by using temporary flow bypass systems and cofferdams to isolate the work areas. The need for channel realignments in locations where fish habitat is present within roadside ditches is currently based on preliminary design, and may be avoided through refinement during detail design. Where watercourse realignments are required, natural channel design options will be proposed. Where proposed realignment may impact adjacent natural heritage features (i.e. wetlands, woodlands, etc.) an evaluation will be completed to determine appropriate mitigation and design to minimize impacts, to the satisfaction of the LSRCA.

Timing windows were determined based on the secondary source review, and field investigations for fish communities at 6th Line, and downstream of the study area. The coolwater timing window (July 1 to September 15) will need to be confirmed by MNRF during detail design.

The existing CSP at Crossing 1 (CUL_01_21), which functions as seasonal fish habitat measures 15.4 m in length with a diameter of 600 mm. This structure is being extended to match the new ditch alignment of 34.3 m. This will result in an additional enclosure of 11.3m^2 of seasonal fish habitat. The additional culvert length is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.

The existing CSP at Crossing 2 (CUL_01_22), which functions as direct fish habitat measures 14.8 m in length with a diameter of 400 mm. This structure is being replaced and will extend to the new ditch alignment of 33.6m. This will result in an additional enclosure of 7.5m^2 of direct fish habitat. The

TABLE 19.
SUMMARY OF PROPOSED WORKS AND SITE-SPECIFIC MITIGATION

Name	Fish Habitat	Existing	Proposed	Net Environmental Effects	Site Specific Mitigation
Crossing 1: Cedar Creek (CUL_01_21)	• Seasonal Flow • Seasonal Fish Habitat • Warm/Coolwater Fishery	Corrugated Steel Pipe Diameter: 600mm Culvert Length: 15.4 m	• Culvert extension to match the new ditch alignment • New culvert length 34.3 m	• The new structure will enclose an additional 11.3m^2 of seasonal fish habitat	• All works to be conducted within the coolwater timing window (July 1- September 15). • Work will be done "in the dry", as feasible
Crossing 2: Cedar Creek (CUL_01_22)	• Permanant Flow • Direct Fish Habitat • Warm/Coolwater Fishery	Corrugated Steel Pipe Diameter: 400m Culvert Length: 14.8 m	• Culvert replacement to the new ditch alignment • New culvert length 33.6 m	• The new structure will enclose an additional 7.5m^2 of direct fish habitat	• All works to be conducted within the coolwater timing window (July 1- September 15). • Work will be done "in the dry", as feasible
Entrance Culvert (CUL 02-74)	• Permanant Flow • Direct Fish Habitat • Warm/Coolwater Fishery	Corrugated Steel Pipe Diameter: 1200mm Culvert Length: ~10 m	• Culvert removal	• The removal of this structure will open up approximately 12 m^2 of direct fish habitat	• All works to be conducted within the coolwater timing window (July 1- September 15). • Work will be done "in the dry", as feasible
Crossing 3: Cedar Creek (CUL_01_23)	• Permanant Flow • Direct Fish Habitat • Warm/Coolwater Fishery	Corrugated Steel Pipe Diameter: 800 mm Culvert Length: 14.2 m	• 19.4 m culvert extension to the new ditch alignment • Extended culvert will measure 33.6m	• The new structure will enclose and additional 15.5m^2 of direct fish habitat	• All works to be conducted within the coolwater timing window (July 1- September 15). • Work will be done "in the dry", as feasible
Cedar Creek	• Direct Fish Habitat from where channel enters study area to 600 m west of St. Johns Road • Seasonal Fish	Functioning as a roadside ditch to the south of 6th Line.	• Realignment of channel due to the widened grading limits.	• Alteration of 180 linear metres of direct fish habitat • Alteration of 600 linear m of seasonal fish habitat (to be confirmed during detail design) • Channel realignment will be an overall benefit to the watercourse: Channel can be relocated away from	• All works to be conducted within the coolwater timing window (July 1- September 15). • Work will be done "in the dry", as feasible • Realigned channel should be relocated away from the road

TABLE 19.
SUMMARY OF PROPOSED WORKS AND SITE-SPECIFIC MITIGATION

Name	Fish Habitat	Existing	Proposed	Net Environmental Effects	Site Specific Mitigation
	habitat from 600 m west of St. Johns Road to 1.2 km west of St. Johns Road (To be confirmed during detail design) • Warm/Coolwater Fishery			the road platform, natural channel design can be implemented, entrance culvert is to be removed	platform to the extent possible and new channel should incorporate natural channel design principles

additional culvert length is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.

The existing CSP at Crossing 3(CUL_01_23), which functions as direct fish habitat measures 14.2 m in length with a diameter of 800 mm. This structure is being extended to the new ditch alignment of 33.6m. This will result in an additional enclosure of 15.5m^2 of direct fish habitat. The additional culvert length is not considered to be significant. As such it can likely be mitigated with the implementation of the environmental protection measures and stream improvements presented below.

The existing entrance CSP (CUL_02-74) located to the east of Culvert 2 measures ~10 m in length with a diameter of 1200 mm. This structure is being removed, as this ditch/channel will require realignment due to the widened grading limits. The removal of this structure will result in a gain of open channel of approximately 12 m^2 of direct fish habitat

According to the preliminary design, the grading limits are being extended to the south of 6th Line to accommodate the road widening. As a result, a realignment of Cedar Creek will be required. The widening of 6th Line is expected to affect approximately 180 linear meters of direct fish habitat and 600 linear meters of seasonal fish habitat. Please note: Additional field investigations will be required during detail design to document spring conditions and confirm the extent of fish habitat to the west of Crossing 2.

The realigned channel will be an overall benefit to the watercourse if the channel is designed using natural channel design by a fluvial geomorphologist and the channel is relocated a greater distance away from the widened road platform to avoid impacts from road pollution. The realigned channel should replicate surface/groundwater contributions.
To reduce the potential for 'serious harm' to fish, the following environmental protection measures will be implemented:

- an in-water construction timing restriction should be implemented to protect spawning fish, incubating eggs and fry emergence. The fisheries timing windows will need to be confirmed with the MNRF or DFO (depending on permitting agency) at the detailed design stage;;
- Cedar Creek (warmwater/coolwater), in-water work is permitted from July 1 to September 15 (to be confirmed by MNRF or DFO during detail design); construction should occur during the driest time of the year to permit work in the dry;
- work areas will be delineated with construction fencing to minimize the area of disturbance;
- appropriate sediment control structures will be installed prior to and maintained during construction to prevent entry of sediments into the watercourse;
- where cofferdams are to be employed, unwatering effluent will be treated prior to discharge to receiving watercourse;
- cofferdams will be constructed using pea gravel bags or equivalent to isolate the work area and maintain flow;
- fish isolated by construction activities will be captured and safely released to the watercourse. A Licence to Collect Fish for Scientific Purposes under the *Fish and Wildlife Conservation Act* (1997) is required from the MNRF to capture and transfer fish;
- no construction machinery or vehicles are permitted to cross the watercourse at any time during construction unless authorized by the permitting agencies;

- good housekeeping practices related to materials storage/stockpiling, equipment fuelling/ maintenance, etc. will be implemented during construction; and
- disturbed riparian areas will be vegetated and/or covered with an erosion control blanket as quickly as possible to stabilize the banks and minimize the potential for erosion and sedimentation.

These environmental protection measures will greatly reduce the potential adverse effects to fish and fish habitat resulting from construction activities.

8.2.2 Temporary Change to Water Quality

The construction associated with the proposed works has the potential to alter water quality through on-site erosion of exposed materials and the subsequent impairment of downstream water quality with sediments and other contaminants.

Changes to water quality will be mitigated through construction occurring during the driest time of the year, isolation of the work areas behind cofferdams, the treatment of effluent from unwatering prior to its release back into the receiving watercourses, and the deployment and maintenance of erosion and sediment controls (silt fencing, flow checks, etc.) which will prevent sediments from reaching the watercourses from exposed soils upslope.

Refuelling and construction staging areas where contaminants are handled should be located off-site where possible, or well away from the waterbodies. Equipment refuelling should take place on impermeable pads or buried liners designed to allow full containment of spills.

Stormwater management practices are expected to be incorporated into the design of the widened road. Enhanced bio-retention swales and/or oil grit separators are recommended to treat water prior to it entering the watercourse. In addition, all exposed areas will be vegetated as quickly as possible once work is completed.

8.2.3 Changes in Water Temperature

The thermal regime of a receiving watercourse may be altered by storm water runoff or removal of riparian vegetation that shades the watercourse. In the summer, runoff can become superheated through contact with paved surfaces, which, when discharged to a receiving watercourse can result in thermal shock, thereby injuring or killing aquatic organisms. Coldwater or coolwater streams are usually considered more sensitive to changes in water temperature than warmwater streams.

It is expected that there will be no significant increase in temperature as a result of the proposed works; as appropriate storm water management strategies will be implemented. Thermal conditions in Cedar Creek may improve following construction. Cedar Creek is currently highly impacted by the proximity to 6th Line, agricultural activities and no stormwater facilities exist. The channel realignment, riparian plantings and the installation of stormwater management strategies have the potential to improve thermal conditions for the downstream fishery.

8.2.4 Barriers to Fish Passage

Culverts will be modified or replaced using fish-friendly design to maintain/improve fish passage including countersinking, matching existing upstream and downstream elevations, backfilling with native substrates, etc. As a result, no barriers to fish passage will result from this project.

8.2.5 Restoration/Enhancement

Proposed works at Cedar Creek are expected to result in 'serious harm' to fish due to the proposed channel realignment. The goal of the restoration/enhancement plan is to provide an overall benefit to the

watercourse at these locations through restoration of natural channel form and geomorphic function as well as riparian habitat.

The realigned channel is expected to be an overall benefit to the watercourse if the channel is designed using natural channel design by a fluvial geomorphologist and the channel is relocated a greater distance away from the widened road platform to avoid impacts from road pollution. In addition, enhancement of riparian vegetation will be undertaken and will increase the diversity of habitat in relation to what is currently present (roadside ditch) by increasing riparian cover, increase habitat diversity and provide good floodplain connectivity. Banks and riparian areas will be planted with native grasses and shrubs to provide increased shading and allochthonous inputs to the watercourse.

8.3 Vegetation and Vegetation Communities

Improvements to 6th Line between 20th Sideroad to St. John's Road has have the potential to result in impacts to vegetation and vegetation communities. Effects on vegetation related to these modifications could include:

- displacement of / disturbance to vegetation and vegetation communities; and,
- displacement of rare, threatened or endangered vegetation or significant vegetation communities.

Displacement and/or Disturbance to Vegetation Communities/Vegetation

Clearing of vegetation will be required to accommodate the proposed improvements to 6th Line between 20th Sideroad and St. John's Road. The improvements to 6th Line will result in the removal of approximately 6.08 ha of naturalized and/or planted areas. The largest area of impact will be to lands that have been anthropogenically influenced, including cultural vegetation communities, agricultural and manicured areas. A total of approximately 5.44 ha of anthropogenically influenced lands and cultural vegetation communities will be removed as a result of the proposed improvements. In addition, a total of approximately 0.03 ha and 0.61 ha of forest and wetland communities will be removed, respectively. **Table 20** provides a summary of the total area of vegetation communities that will be removed for the improvements to 6th Line.

TABLE 20.
IMPACTS TO VEGETATION COMMUNITIES WITHIN THE STUDY AREA

Vegetation Community Type	Vegetation Community	Approximate Area (ha) to be Impacted
Cultural	Dry-Moist Old Field Meadow (CUM1-1a and b)	4.24
	Mineral Cultural Thicket (CUT1)	0.54
	Mineral Cultural Woodland (CUW1)	0.09
	Sub-total	**4.86**
Forest	Fresh-Moist Poplar Deciduous Forest (FOD8-1)	0.03
	Sub-total	**0.03**
Wetland	Ash Mineral Deciduous Swamp (SWD2)	0.03
	Silver Maple Organic Deciduous Swamp (SWD6-2)	0.12
	Red Osier Mineral Thicket Swamp (SWT2-5)	0.46
	Sub-total	**0.61**
Human Influenced Lands	Agriculture	0.45
	Manicured	0.13
	Sub-total	**0.58**
	Total Area	**6.08**

Cultural Vegetation Communities
A total of three cultural community types will be impacted as a result of the proposed improvements to 6th Line. These include: Dry-Moist-Old Field Meadow (CUM1-1), Mineral Cultural Thicket (CUT1), and Mineral Cultural Woodland (CUW1). As noted in **Table 20**, the largest impact will occur to the cultural meadow communities with a total removal of approximately 4.24 ha. In addition, a total of approximately 0.54 ha and 0.09 ha of cultural thicket and cultural woodland will be removed, respectively.

Overall, impacts resulting in the loss of vegetation within these cultural communities are considered to be minor. Cultural vegetation communities typically persist in areas that are regularly disturbed, and as a result, generally contain a high proportion of invasive and non-native plant species that are tolerant of these conditions.

It is expected that plant species displaced and / or disturbed within the cultural communities due to the 6th Line improvements will re-colonize available lands adjacent to the new right-of-way post-construction. Disturbance activities often serve to promote the establishment and / or spread of certain plant species (including the disturbance tolerant species identified within the existing right-of-way).

Forest Communities
A total of approximately 0.03 ha of Fresh-Moist Poplar Deciduous Forest (FOD8-1) will be removed as a result of the proposed improvements to 6th Line. Impacts to the deciduous forest community will include the removal of a small portion of the community adjacent to the existing right-of-way creating a new forest edge. The proposed improvements to 6th Line will encroach into the deciduous forest community at variable distances, but the maximum distance the proposed improvements will encroach into the woodlot is approximately 4 metres. New forest edges are exposed to greater potential for non-native and invasive species infiltration further into the forest, and as such, forest edge management is recommended. Recommended forest edge management measures are outlined in **Section 4.3**.

Wetland Communities
A total of three wetland community types will be impacted as a result of the proposed improvements to 6th Line. These communities include: Ash Mineral Deciduous Swamp (SWD2), Silver Maple Organic Deciduous Swamp (SWD6-2), and Red Osier Mineral Thicket Swamp (SWT2-5).

Impacts to the Ash Mineral Deciduous Swamp and Silver Maple Organic Deciduous Swamp will involve the removal of a narrow strip of the community adjacent to the roadway within the boundary of the Little Cedar Point Provincially Significant Wetland Complex. Edge management is recommended for the SWD2 and SWD6-2 community, where a new edge will be exposed, and will be implemented to mitigate the associated impacts to these communities. The edge management measures will be further developed during detail design.

The deciduous swamp communities within the study area are widespread throughout Ontario and the loss of a portion of this vegetation community is not expected to have any negative impacts to the remaining portions of wetland communities within the study area.

Impacts to the Red Osier Mineral Thicket Swamp will involve the removal of approximately 0.46 ha of the community, located on the north side of 6th Line, west of the PSW (refer to **Figure 4**). Red osier thicket swamps are widespread and common in Ontario and as such, impacts to this community are considered to be minor.

Wetland Compensation

Compensation for the loss of wetland should be determined in consultation with the Town of Innisfil and LSRCA and NVCA staff. LSRCA has recommended that the wetland lost as a result of this project be compensated for at a 3:1 ratio as per the LSRCA Ecological Offsetting Strategy. Therefore, the loss of 0.62 ha of wetland should result in the creation of 1.86 ha of wetland. The negotiation of a wetland compensation ratio based on LSRCA policy, and other details related to this task should be finalized at the detail design stage.

Human Influenced Lands
As noted in **Table 20**, a total of approximately 0.45 ha of agriculture and 0.13 ha of manicured lands will be removed as a result of the proposed improvements to the 6th Line. The overall significance of the impact to these lands is considered low.

Displacement of Rare, Threatened or Endangered Vegetation and Vegetation Communities

All of the vegetation communities identified within the study area are considered to be widespread and common in Ontario and secure globally. No plant species that are regulated under the Ontario *Endangered Species Act, 2007* or the Canada *Species at Risk Act* were observed during LGL's botanical investigation. In addition, no plant species that are provincially ranked as "critically imperilled" to "vulnerable" (S1 to S3) were observed within the study area. As a result, there will be no impacts on rare, threatened or endangered vegetation and vegetation communities.

As noted in **Section 6.3.3**, a total five (5) plant species considered rare in Simcoe County and by LSRCA were identified in the study area. **Table 13** presents a list of these species. It is recommended that the regionally and locally significant plant species be retained, to the extent possible. If impacts are unavoidable, it is recommended that regionally and locally significant plant species, including individual shrub and trees that measure less than 10 cm DBH, be transplanted into suitable habitat conditions. Where possible, these plants should be transplanted into the newly created edges of those impacted communities, but outside the limit of disturbance.

8.4 Tree Impacts

An assessment of the potential number of trees to be impacted by the road improvements to 6th Line was undertaken. This assessment was based on the preliminary design grading limits. Change of grade and construction activity within 1.5 m of a tree will severely impact the integrity and root structure of the tree and the survival of the tree post-construction. Consequently, trees located within the grading limit and within 1.5 m of the grading limits (trunk) have been identified for removal. Refinements to the number of trees to be removed will be required with any changes to the proposed grading limits during detail design.

Trees to be Removed

A total of 114 trees will be removed to accommodate the road widening and improvements along 6th Line. Trees marked for removal range in size from approximately 10 cm to 131 cm DBH. Of the trees to be removed, 7 trees are in poor condition. The remaining are considered to be in good to fair condition. The trees of good to fair condition consist of 13 species which are described by tree ID in **Appendix E**. Efforts should be made during the detail design study to identify opportunities to make design refinements to minimize tree removals, where appropriate. Any changes made to the design that affect the grading limits will require refinements to the tree impact assessment (e.g., number of trees to be removed/protected).

Trees to be Retained

Based on the assessment using the preliminary grading limits, trees have been identified for protection. **Appendix E** includes a table that indicates which trees will be retained.

Tree Protection Measures

The following recommendations are provided to ensure impacts to all retained trees are minimized. Designation of a Tree Protection Zone (TPZ) is imperative for the protection of trees (roots, trunks, branches) adjacent to construction works. The TPZ will restrict construction related machinery and activities from damaging trees identified for protection. This protection zone is the minimum distance from the tree trunk required for protection, and it varies depending on tree size. At a minimum the tree protection zone should be 1 metre beyond the dripline of the tree.

The following recommendations are for those trees that will be preserved.

Protection recommendations:

- Tree protection barriers should be constructed in accordance with the Town of Innisfil specifications;
- Any excavations within the minimum TPZ must be completed by hand or low pressure hydro vac excavation under the direction of a Certified Arborist/Forester.
- Tree protection hoarding/barrier must be installed prior to the commencement of any construction activities;
- Heavy machinery should not to be operated within the TPZ (including overhead swinging of machine arms);
- Construction materials, equipment, soil, construction waste or debris are not to be stored within the TPZ or dripline of the trees identified for protection;
- There should be no movement or parking of vehicles, placement of equipment or pedestrian traffic within the TPZ;
- Low pressure hydro-vac excavation technology is recommended to expose roots where encroachment within the minimum TPZ is required;
- Prune any exposed roots with a diameter of less than 5 cm to promote regeneration and prevent infection. All roots greater than 5 cm in diameter should not be removed;
- Any tree removals, pruning or root cutting required is to be conducted by a Certified Arborist/Forester;
- Apply a slow release deep root low nitrogen fertilizer to promote increased vigor;
- No signs or objects should be displayed or affixed to any trees;
- Disposal of any liquids shall not occur within the TPZ;
- Should any additional, incidental or accidental tree injuries occur during construction, a Certified Arborist/Forester should be consulted to determine whether additional mitigation measures should be employed; and,
- Tree clearing shall not be conducted during the *Migratory Bird Convention Act* (MBCA) breeding season.

These efforts will help to ensure that impacts to retained trees are minimal and that the condition and character of these trees will not change, either in the short-term or long-term period.

Tree Compensation

Compensation for the removal of trees should be determined in consultation with the Town of Innisfil, NVCA and LSRCA staff. LSRCA has recommended that the offset for loss of woodland should replace at the greatest extent, either through a 3:1 tree replacement or by area at a ratio of 2:1 to the satisfaction of the LSRCA. Also as per LSRCA guidance, consideration should be given to preserving trees of 50 cm dbh or greater, as feasible.

Suitable planting locations for the replacement trees are along the roadway as a streetscape feature (where they currently do not exist), within naturalized areas of the tributaries, and within compensation areas identified by the Town of Innisfil and LSRCA. The offsetting should increase natural area on public lands, either on-site or within the same subwatershed and include appropriately sized trees. These locations will be determined in consultation with LSRCA and the Town of Innisfil during detail design.

8.5 Wildlife and Wildlife Habitat

Modification and widening of 6th Line from 20th Sideroad to St. John's Road, within the Town of Innisfil has the potential to result in the displacement of and disturbance to wildlife and wildlife habitat.

Effects on wildlife related to these modifications may include:

- displacement of wildlife and wildlife habitat;
- barrier effects on wildlife passage;
- wildlife/vehicle conflicts;
- disturbance to wildlife from noise, light and visual intrusion;
- potential impacts to migratory birds; and,
- displacement of rare, threatened or endangered wildlife and significant wildlife habitat.

8.5.1 Displacement of Wildlife and Wildlife Habitat

Modification and widening of 6th Line will take place within and beyond the existing right-of-way. Much of the right-of-way and lands immediately adjacent consist of disturbed low quality wildlife habitat, with higher quality habitats closely associated with Little Cedar Point PSW and open-country (cultural meadow and thicket) and swamp habitat types. Agricultural lands, particularly those which are less managed (i.e. fallow lands) were found to provide wildlife habitat, particular for open-country bird species.

Only minimal infringement to the edge of the above-mentioned natural heritage features will occur as a result of road modification and widening of 6th Line. Modification and widening of 6th Line within and beyond the right-of-way is not expected to have any significant impact on wildlife and/or wildlife habitat. Displacement of species at risk habitat is anticipated; however, these impacts are expected to be minor (see **Section 8.5.6**).

An analysis of vegetation removal per vegetation (wildlife habitat) community is presented in **Section 8.3** (above).

8.5.2 Barrier Effects on Wildlife Passage

No new permanent migratory barriers to wildlife will be created as a result of road modifications and widening. The existing barrier posed by the current 6th Line right-of-way will be greater due to proposed widening. Given the disturbed nature of the lands found within the study area, the modifications are not expected to have a significant impact on wildlife passage. However, where natural areas are found abutting, and in particular, on opposite sides of 6th Line (e.g. Little Cedar Point PSW and open-country habitats) a more significant barrier effect on wildlife movement across 6th Line can be anticipated. Opportunities for facilitation of wildlife passage (target species likely small mammals and herpetofauna) should be explored at detail design at the culvert replacement locations.

8.5.3 Wildlife/Vehicle Conflicts

The proposed road modifications and widening will increase the width of the travelled surface resulting in an increased risk of mortality for wildlife that elects to cross the roads. The existing 6th Line right-of-way poses a potential barrier to wildlife movement. While the increase in width of road increases exposure of wildlife to vehicle conflicts, the potential increase in wildlife mortality above existing conditions is considered minor. However, where natural areas are found abutting (e.g. Little Cedar Point PSW) and in particular, on opposite sides of 6th Line (e.g. open-country habitats east of rail tracks) an increase in wildlife/vehicle conflicts may be expected. Construction duration and disturbance in the vicinity of culverts and bridges should be minimized to the extent possible to reduce the potential for increase in road mortality caused by wildlife avoidance of these structures.

8.5.4 Disturbance to Wildlife from Noise, Light and Visual Intrusion

Noise, light and visual intrusion may alter wildlife activities and patterns. In human-influenced settings, such as the study area, wildlife has become acclimatized to anthropogenic conditions and only those fauna that are tolerant of human activities remain. Minor edge effect to natural areas (e.g. Little Cedar Point PSW and forested and open-country habitats) may occur as road widening will result in an increase in noise, light, and visual intrusion. Given that wildlife are acclimatized to the presence of the existing 6th Line right-of-way in the study area, the tolerance of the wildlife assemblage to human activities and the limited zone of influence of the proposed widening, disturbance to wildlife from noise, light and visual intrusion will have no significant adverse effects.

8.5.5 Potential Impacts to Migratory Birds

As identified above (**Section 6.5.3**), numerous bird species listed under the *Migratory Birds Convention Act* (MBCA) are located within the study area. The MBCA prohibits the killing, capturing, injuring, taking or disturbing of migratory birds (including eggs) or the damaging, destroying, removing or disturbing of nests. While migratory insectivorous and non-game birds are protected year-round, migratory game birds are only protected from March 10 to September 1. The study area lands fall within Environment Canada's Nesting Zone C2 (Nesting Period: end of March – end of August). Consequently, to comply with the requirements of the MBCA, it is recommended that disturbance, clearing or disruption of vegetation where birds may be nesting should be completed outside the window of April 1 to August 31 to avoid the breeding bird season for the majority of the bird species protected under the act. In the event that these activities must be undertaken from April 1 to August 31, a nest screening survey will be conducted by a qualified avian biologist. If an active nest is located, a mitigation plan shall be developed and provided to Environment Canada – Ontario Region for review prior to implementation.

8.5.6 Displacement of Rare, Threatened or Endangered Wildlife or Significant Wildlife Habitat

The study area has been screened for potential wildlife species at risk. As noted above (see **Section 7.5.3**) three species either listed or regulated under the Ontario *Endangered Species Act, 2007* (ESA) and/or the federal *Species at Risk Act* were identified within the study area during 2015 surveys. Based on a review

of secondary source data and consultation with MNRF Midhurst District, five additional species at risk have been identified as having the potential to be found in the vicinity of the study area. Based on a request from MNRF, information on ESA regulated species has been omitted from this report but has been made available to MNRF under separate cover.

Western Chorus Frog
As noted above, the Great Lakes–St. Lawrence population of Western Chorus Frog (the sub-population identified) is listed as 'Threatened' under the federal *Species at Risk Act* (SARA) and is also afforded some protection by the Provincial Policy Statement (PPS) under the *Planning Act*. However, this species is not regulated under the ESA, and lands within the study area are not federally owned, a criterion that would trigger a federal permit under the SARA. The minimal encroachment into lands adjacent to the existing 6th Line right-of-way will also result in only minimal impacts to habitats which may support Western Chorus Frog.

8.6 Designated Natural Areas

As noted in **Section 7.6**, no ANSIs or ESAs are located within 120 m of the study area. However, the Little Cedar Point Provincially Significant Wetland Complex is located on the south side of 6th Line east of St. John's Road. (**See Figure 3**).

The widening of 6th Line will remove a narrow strip of wetland communities along the existing edge of the Little Cedar Point Wetland Complex. The proposed improvements to 6th Line will encroach into the PSW Complex at variable distances, but the maximum distance the proposed improvements will encroach into the PSW Complex is approximately 5 metres. Edge management is recommended at the PSW, where new edges are exposed. Edge management techniques should be implemented to mitigate associated impacts to the wetland communities. As noted in **Section 8.3**, impacts to the PSW complex will result in the removal of a narrow strip of the wetland communities adjacent to the exiting 6th Line right-of-way. Overall, the removal of a narrow strip of the wetland communities adjacent to the existing right-of-way is unlikely to negatively impact the function of the remaining portions of the PSW complex.

8.7 Potential Permit Requirements

8.7.1 Fisheries Act

As a result of recent changes to the *Fisheries Act*, the DFO has introduced a self-assessment process for proponents to determine if 'serious harm' to fish or fish habitat is expected as a result of activities from the project. With the new process, proponents use the DFO screening criteria to determine if a review of the project by DFO is required. This review will be carried out during detail design once the specific requirements for culvert replacement and modifications and channel realignments are known.

8.7.2 Endangered Species Act

An Information Gathering Form will be submitted to the MNRF during detail design to determine permit requirements under the Ontario *Endangered Species Act*. If required, the necessary permit(s) will be secured during detail design.

8.7.3 LSRCA Regulation 179/06

Based on a review of LSRCA mapping, the Little Cedar Point Provincially Significant Wetland and Cedar Creek are located within the area subject to Ontario Regulation 179/06 LSRCA Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses. **Figure 3** presents the limits of the LSRCA Regulated Area within the study limits. During detail design, a permit from the LSRCA under O. Reg. 179/06 will be required for work within these areas.

9.0 MONITORING

To ensure that erosion and sediment controls are installed prior to and maintained during construction, an Erosion and Sediment Control (ESC) Plan will be prepared. The ESC Plan will provide details regarding the inspection, maintenance (e.g., need for repair), and documentation procedures during all stages of construction. An environmental inspector will monitor the site during construction to ensure that construction fencing, tree protection barriers and erosion and sedimentation control measures are installed correctly and are functional. Additional monitoring requirements may be identified during detail design through the permitting process.

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APPENDIX A

PHOTOGRAPHIC RECORD

PROJECT #TA8487
October 2014

PHOTO APPENDIX
6th Line EA

LGL LIMITED
environmental research associates

Looking west along the north side of 6th Line, approximately 1.2 kilometers west of St. Johns Road.

Looking east along the north side of 6th Line, approximately 1.2 kilometers west of St. Johns Road.

Looking east along the south side of 6th Line, approximately 1.2 kilometers west of St. Johns Road.

Looking west along the south side of 6th Line, approximately 1.2 kilometers west of St. Johns Road.

Looking north from 6th Line at the pond, approximately 600 m west of St. Johns Road.

Looking west along the south side of 6th Line, approximately 500 m west of St. Johns Road.

PROJECT #TA8487
October 2014/May 2015

PHOTO APPENDIX
6th Line EA

LGL LIMITED
environmental research associates

Looking east along the south side of 6th Line, approximately 430 m west of St. Johns Road.

Looking southeast from 6th Line, along where Cedar Creek exits the study area.

Looking east along the south side of 6th Line, approximately 1.2 kilometers west of St. Johns Road.

Looking west along the south side of 6th Line, approximately 500 m west of St. Johns Road.

Looking southeast from 6th Line, along where Cedar Creek exits the study area.

Looking west along the north side of 6th Line approximately 450 m west of St. Johns Road.

PROJECT #TA8487
May 2015

PHOTO APPENDIX
6th Line from County Road 27 to 20th Sideroad

LGL LIMITED
environmental research associates

Crossing A: Looking north (upstream) at a tributary of Egbert Creek.

Crossing A: Looking northwest (upstream) at a tributary of Egbert Creek.

Crossing A: Looking south (downstream) at a tributary of Egbert Creek.

Crossing B: Looking north (upstream) at Egbert Creek.

Crossing B: Looking east to the north of 6th Line along the adjoining ditch connecting to Egbert Creek.

Crossing B: Looking south (downstream) at Egbert Creek.

PROJECT #TA8487
May 2015

PHOTO APPENDIX
6th Line from County Road 27 to 20th Sideroad

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Crossing C: Looking northwest (upstream) from the northwest quadrant of 6th Line and Sideroad 5 of the northerly Tributary of Innisfil Creek (Wilson Drain).

Crossing C: Looking east (downstream) from the northeast quadrant of 6th Line and Sideroad 5 of the northerly Tributary of Innisfil Creek (Wilson Drain).

Crossing C: Looking south (upstream) from the southeast quadrant of 6th Line and Sideroad 5 of the southerly Tributary of Innisfil Creek.

Crossing C: Looking north (downstream) from the northeast quadrant of 6th Line and Sideroad 5 at the junction of the two tributaries of Innisfil Creek).

Crossing D: Looking north (upstream) from 6th Line at a Tributary of Innisfil Creek (Wilson Drain).

Crossing D: Looking south (downstream) from 6th Line at a Tributary of Innisfil Creek (Wilson Drain).

PROJECT #TA8487
May 2015

PHOTO APPENDIX
6th Line from County Road 27 to 20th Sideroad

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Looking upstream (west) along a tributary of Innisfil Creek from west of Highway 400 (Wilson Drain).

Looking south along the tributary crossing of Innisfil Creek from west of Highway 400 (Wilson Drain).

Looking downstream (east) along the tributary crossing of Innisfil Creek from west of Highway 400 (Wilson Drain). Note sheet flow conditions.

Looking north along the tributary outlet of Innisfil Creek from east (downtream) of Highway 400 (Wilson Drain). Note barrier to fish

Looking downstream (east) along a Tributary of Innisfil Creek (Wilson Drain) from east of Highway 400.

Crossing E: Looking north (upstream) from 6th Line at a Tributary of Innisfil Creek.

PROJECT #TA8487
May 2015

PHOTO APPENDIX
6th Line from County Road 27 to 20th Sideroad

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Crossing E: Looking south (downstream) from 6th Line at a Tributary of Innisfil Creek.

Crossing F: Looking north (upstream) from 6th Line at a Tributary of Innisfil Creek.

Crossing F: Looking north (upstream) from 6th Line at a Tributary of Innisfil Creek.

Crossing F: Looking south (downstream) from 6th Line at a Tributary of Innisfil Creek.

Crossing G: Looking south (upstream) from 6th Line at a Tributary of Innisfil Creek.

Crossing G: Looking north (downstream) from 6th Line at a Tributary of Innisfil Creek.

PROJECT #TA8487
May 2015

PHOTO APPENDIX
6th Line from County Road 27 to 20th Sideroad

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Crossing H: Looking east from north (upstream) of 6th Line at a Tributary of Banks Creek.

Crossing H: Looking west from north (upstream) of 6th Line at a Tributary of Banks Creek.

Crossing H: Looking west from south (downstream) of 6th Line at a Tributary of Banks Creek.

Crossing H: Looking south (downstream) of 6th Line at a Tributary of Banks Creek.

Crossing I: Looking north (upstream) from 6th Line at a Tributary of Innisfil Creek.

Crossing I: Looking south (downstream) from 6th Line at a Tributary of Innisfil Creek.

PROJECT #TA8487
May/July 2015

PHOTO APPENDIX
6th Line from County Road 27 to 20th Sideroad

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Crossing J: Looking south from south (upstream) of 6th Line at a Tributary of Banks Creek.

Crossing J: Looking west from north (downstream) of 6th Line at a Tributary of Banks Creek.

Crossing J: Looking north (downstream) of 6th Line at a Tributary of Banks Creek.

Crossing A: Looking west (upstream) from north of 6th Line at a Tributary of Egbert Creek.

Crossing A: Looking south (downstream) from 6th Line at a Tributary of Egbert Creek.

Crossing B: Looking north (upstream) from 6th Line at a Tributary of Egbert Creek.

PROJECT #TA8487
July 2015

PHOTO APPENDIX
6th Line from County Road 27 to 20th Sideroad

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Crossing B: Looking south (downstream) from 6th Line at a Tributary of Egbert Creek.

Crossing C: Looking northwest (upstream) from the northwest quadrant of 6th Line and Sideroad 5 of the northerly Tributary of Innisfil Creek (Wilson Drain).

Crossing C: Looking east (downstream) from the northeast quadrant of 6th Line and Sideroad 5 of the northerly Tributary of Innisfil Creek (Wilson Drain).

Crossing C: Looking south (upstream) from the southeast quadrant of 6th Line and Sideroad 5 of the southerly Tributary of Innisfil Creek.

Crossing C: Looking north (downstream) from the northeast quadrant of 6th Line and Sideroad 5 at the junction of the two tributaries of Innisfil Creek).

Crossing D: Looking north (upstream) from 6th Line at a Tributary of Innisfil Creek (Wilson Drain).

PROJECT #TA8487
July 2015

PHOTO APPENDIX
6th Line from County Road 27 to 20th Sideroad

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Crossing D: Looking south (downstream) from 6th Line at a Tributary of Innisfil Creek (Wilson Drain).

Looking upstream (west) along a tributary of Innisfil Creek from west of Highway 400 (Wilson Drain).

Looking downstream (east) along the tributary crossing of Innisfil Creek from west of Highway 400 (Wilson Drain).

Crossing E: Looking north (upstream) from 6th Line at a Tributary of Innisfil Creek.

Crossing E: Looking south (downstream) from 6th Line at a Tributary of Innisfil Creek.

Crossing F: Looking north (upstream) from 6th Line at a Tributary of Innisfil Creek.

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PHOTO APPENDIX
6th Line from County Road 27 to 20th Sideroad

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Crossing F: Looking south (downstream) from 6th Line at a Tributary of Innisfil Creek.

Crossing G: Looking south (upstream) from 6th Line at a Tributary of Innisfil Creek.

Crossing G: Looking north (downstream) from 6th Line at a Tributary of Innisfil Creek.

Crossing H: Looking east (upstream) from north of 6th Line at a Tributary of Banks Creek.

Crossing H: Looking south (downstream) from 6th Line at a Tributary of Banks Creek.

Crossing I: Looking west (upstream) from north of 6th Line at a Tributary of Banks Creek.

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July 2015

PHOTO APPENDIX
6th Line from County Road 27 to 20th Sideroad

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Crossing I: Looking south (downstream) from 6th Line at a Tributary of Banks Creek.

Crossing J: Looking south (upstream) from 6th Line at a Tributary of Banks Creek.

Crossing J: Looking north (downstream) from 6th Line at a Tributary of Banks Creek.

APPENDIX B

VASCULAR PLANT LIST
6TH LINE FROM COUNTY ROAD 27 TO 20TH SIDEROAD

Appendix B.
Vascular Plant List - 6th Line from County Road 27 to 20th Sideroad

	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Simcoe	LSRCA	CUM1-1a	CUM1-1b	CUT1	CUW1	FOD8-1	SWD2	SWD6-2	SWT2-5	Manicured
	EQUISETACEAE	**HORSETAIL FAMILY**															
	Equisetum palustre	marsh horsetail	G5	S5			X	w			X			X	X		
	Equisetum pratense	meadow horsetail	G5	S5			R-2	w	X	X							
	DENNSTAEDTIACEAE	**BRACKEN FERN FAMILY**															
	Pteridium aquilinum var. *latiusculum*	eastern bracken-fern	G5T	S5			X									X	
	THELYPTERIDACEAE	**MARSH FERN**															
	Thelypteris palustris var. *pubescens*	marsh fern	G5T?	S5			X									X	
	DRYOPTERIDACEAE	**WOOD FERN FAMILY**															
	Athyrium filix-femina var. *angustum*	northern lady fern	G5T5	S5			X							X			
	Dryopteris cristata	crested wood fern	G5	S5			X							X	X		
	Matteuccia struthiopteris var. *pensylvanica*	ostrich fern	G5	S5			X								X		
	Onoclea sensibilis	sensitive fern	G5	S5			X							X	X		
	PINACEAE	**PINE FAMILY**															
*	*Picea abies*	Norway spruce	G?	SE3				+									X
	Picea glauca	white spruce	G5	S5			X						X				
*	*Picea pungens*	Colorado spruce	G5	SE1													X
*	*Pinus nigra*	Austrian pine	G?	SE2				+		X							
	Pinus strobus	eastern white pine	G5	S5			X										X
	CUPRESSACEAE	**CEDAR FAMILY**															
	Juniperus virginiana	eastern red cedar	G5	S5					X	X	X						

Appendix B.
Vascular Plant List - 6th Line from County Road 27 to 20th Sideroad

	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Simcoe	LSRCA	CUM1-1a	CUM1-1b	CUT1	CUW1	FOD8-1	SWD2	SWD6-2	SWT2-5	Manicured
	Thuja occidentalis	eastern white cedar	G5	S5			X		X	X	X		X	X			X
	RANUNCULACEAE	**BUTTERCUP FAMILY**															
	Actaea pachypoda	white baneberry	G5	S5			X						X				
	Ranunculus abortivus	kidney-leaf buttercup	G5	S5			X							X	X		
	ULMACEAE	**ELM FAMILY**															
	Ulmus americana	white elm	G5?	S5			X		X								
	URTICACEAE	**NETTLE FAMILY**															
*	*Urtica dioica* ssp. *dioica*	European stinging nettle	G5T?	SE2										X			
	JUGLANDACEAE	**WALNUT FAMILY**															
	Juglans nigra	black walnut	G5	S4			R-1 Nat	w		X							
	BETULACEAE	**BIRCH FAMILY**															
	Ostrya virginiana	ironwood	G5	S5			X						X				
	CHENOPODIACEAE	**GOOSEFOOT FAMILY**															
*	*Chenopodium album* var. *album*	lamb's quarters	G5T5	SE5			X			X							
	CARYOPHYLLACEAE	**PINK FAMILY**															
*	*Saponaria officinalis*	bouncing-bet	G?	SE5			X	+			X						
*	*Silene vulgaris*	catchfly	G?	SE5			X	+	X	X							
	POLYGONACEAE	**SMARTWEED FAMILY**															
*	*Rumex crispus*	curly-leaf dock	G?	SE5			X	+		X	X						
	GUTTIFERAE	**ST. JOHN'S-WORT FAMILY**															
*	*Hypericum perforatum*	common St. John's-wort	G?	SE5			X	+	X	X	X						
	SALICACEAE	**WILLOW FAMILY**															

Appendix B.
Vascular Plant List - 6th Line from County Road 27 to 20th Sideroad

	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Simcoe	LSRCA	CUM1-1a	CUM1-1b	CUT1	CUW1	FOD8-1	SWD2	SWD6-2	SWT2-5	Manicured
	Populus balsamifera ssp. *balsamifera*	balsam poplar	G5T?	S5			X			X			X	X	X		
	Populus tremuloides	trembling aspen	G5	S5			X				X	X	X				
*	*Salix alba*	white willow	G5	SE4			X	+			X	X				X	
	Salix bebbiana	long-beaked willow	G5	S5			X		X	X		X					
	Salix discolor	pussy willow	G5	S5			X			X							
	Salix eriocephala	Missouri willow	G5	S5			X			X							
*	*Salix* X *sepulcralis*	hybrid willow	HYB	SE2				+									X
	GROSSULARIACEAE	**GOOSEBERRY FAMILY**															
	Ribes cynosbati	prickly gooseberry	G5	S5			X						X	X			
	CRASSULACEAE	**STONECROP FAMILY**															
*	*Hylotelephium telephium* ssp. *fabaria*	sedum purpureum	G?T?	SE2				+									X
	ROSACEAE	**ROSE FAMILY**															
	Fragaria virginiana ssp. *virginiana*	scarlet strawberry	G5T?	SU			X			X							
	Geum sp.	avens											X	X			
*	*Malus pumila*	common apple	G5	SE5			X	+			X						
	Malus sp.	apple							X								
*	*Potentilla recta*	rough-fruited cinquefoil	G?	SE5			X	+	X								
	Prunus serotina	black cherry	G5	S5			X						X				
	Prunus virginiana var. *virginiana*	choke cherry	G5T?	S5			X				X						
	Rubus allegheniensis	alleghany blackberry	G5	S5			X			X				X			
*	*Rubus idaeus* ssp. *idaeus*	red raspberry	G5T5	SE1						X		X					

Appendix B.
Vascular Plant List - 6th Line from County Road 27 to 20th Sideroad

	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Simcoe	LSRCA	CUM1-1a	CUM1-1b	CUT1	CUW1	FOD8-1	SWD2	SWD6-2	SWT2-5	Manicured
	Rubus occidentalis	thimble-berry	G5	S5			X		X			X	X	X			
	Rubus pubescens	dwarf raspberry	G5	S5			X								X		
	FABACEAE	**PEA FAMILY**															
*	*Lotus corniculatus*	bird's-foot trefoil	G?	SE5			X	+	X		X					X	
*	*Medicago lupulina*	black medick	G?	SE5			X	+			X						
*	*Medicago sativa* ssp. *sativa*	alfalfa	G?T?	SE5			X	+			X						
*	*Melilotus alba*	white sweet-clover	G?	SE5			X	+	X	X	X						
*	*Melilotus officinalis*	yellow sweet-clover	G?	SE5			X	+	X	X							
*	*Trifolium pretense*	red clover	G?	SE5			X	+	X	X							
*	*Vicia cracca*	tufted vetch	G?	SE5			X	+	X	X							
	LYTHRACEAE	**LOOSESTRIFE FAMILY**															
*	*Lythrum salicaria*	purple loosestrife	G5	SE5			X	+		X							
	ONAGRACEAE	**EVENING-PRIMROSE FAMILY**															
	Circaea lutetiana ssp. *canadensis*	yellowish enchanter's nightshade	G5T5	S5			X						X				
	Oenothera biennis	common evening-primrose	G5	S5			X		X	X							
	CORNACEAE	**DOGWOOD FAMILY**															
	Cornus alternifolia	alternate-leaved dogwood	G5	S5			X						X				
	Cornus amomum	silky dogwood	G5T?	S5			X				X						
	Cornus rugosa	round-leaved dogwood	G5	S5			X			X				X			
	Cornus sericea ssp. *sericea*	red-osier dogwood	G5	S5			X		X	X		X				X	
	CELASTRACEAE	**STAFF-TREE FAMILY**															
*	*Euonymus europaea*	spindle tree	G?	SE2						X							

Appendix B.
Vascular Plant List - 6th Line from County Road 27 to 20th Sideroad

	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Simcoe	LSRCA	CUM1-1a	CUM1-1b	CUT1	CUW1	FOD8-1	SWD2	SWD6-2	SWT2-5	Manicured
	RHAMNACEAE	**BUCKTHORN FAMILY**															
*	*Rhamnus cathartica*	common buckthorn	G?	SE5			X	+	X	X	X	X	X	X	X		
	VITACEAE	**GRAPE FAMILY**															
	Parthenocissus vitacea	inserted Virginia-creeper	G5	S5			X		X		X		X	X	X		
	Vitis riparia	riverbank grape	G5	S5			X		X	X	X	X	X		X		
	ACERACEAE	**MAPLE FAMILY**															
	Acer negundo	Manitoba maple	G5	S5			X	+	X								
*	*Acer platanoides*	Norway maple	G?	SE5			X	+									X
	Acer saccharinum	silver maple	G5	S5			X								X		X
	Acer saccharum var. *saccharum*	sugar maple	G5T?	S5			X						X				X
	ANACARDIACEAE	**SUMAC FAMILY**															
	Rhus hirta	staghorn sumac	G5	S5			X		X								X
	Toxicodendron radicans ssp. *negundo*	poison-ivy	G5T	S5			X						X	X	X		
	GERANIACEAE	**GERANIUM FAMILY**															
	Geranium maculatum	spotted crane's-bill	G5	S5			R-2	w						X			
*	*Geranium robertianum*	herb-robert	G5	SE5			X	+					X	X			
	BALSAMINACEAE	**TOUCH-ME-NOT FAMILY**															
	Impatiens capensis	spotted touch-me-not	G5	S5			X						X		X		
	ARALIACEAE	**GINSENG FAMILY**															
	Aralia nudicaulis	wild sarsaparilla	G5	S5			X								X		
	APIACEAE	**PARSLEY FAMILY**															
*	*Daucus carota*	wild carrot	G?	SE5			X	+	X	X	X						

Appendix B.
Vascular Plant List - 6th Line from County Road 27 to 20th Sideroad

	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Simcoe	LSRCA	CUM1-1a	CUM1-1b	CUT1	CUW1	FOD8-1	SWD2	SWD6-2	SWT2-5	Manicured
	Sium suave	hemlock water-parsnip	G5	S5			X								X		
	GENTIANACEAE	**GENTIAN FAMILY**															
*	*Centaurium erythraea*	erythraea-like centaury	G?	SE2			X				X						
	APOCYNACEAE	**DOGBANE FAMILY**															
	Apocynum androsaemifolium ssp. *androsaemifolium*	spreading dogbane	G5T?	S5			X				X						
	ASCLEPIADACEAE	**MILKWEED FAMILY**															
	Asclepias syriaca	common milkweed	G5	S5			X			X	X						
*	*Cynanchum nigrum*	black swallow-wort	G?	SE?			X	+		X	X		X				
	SOLANACEAE	**POTATO FAMILY**															
*	*Solanum dulcamara*	bitter nightshade	G?	SE5			X	+		X			X	X			
	BORAGINACEAE	**BORAGE FAMILY**															
*	*Echium vulgare*	blueweed	G?	SE5			X	+	X	X	X						
	LAMIACEAE	**MINT FAMILY**															
	Lycopus americanus	cut-leaved water-horehound	G5	S5			X							X	X		
	Mentha arvensis	American wild mint	G5T5	S5									X				
*	*Prunella vulgaris* ssp. *vulgaris*	common heal-all	G5T?	SE3			X	+			X						
	PLANTAGINACEAE	**PLANTAIN FAMILY**															
*	*Plantago lanceolata*	ribgrass	G5	SE5			X	+			X						
*	*Plantago major*	common plantain	G5	SE5			X	+	X	X	X						
	OLEACEAE	**OLIVE FAMILY**															
	Fraxinus pennsylvanica	red ash	G5	S5			X		X	X	X	X	X	X	X		X
*	*Syringa vulgaris*	common lilac	G?	SE5			X	+	X								

Appendix B.
Vascular Plant List - 6th Line from County Road 27 to 20th Sideroad

	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Simcoe	LSRCA	CUM1-1a	CUM1-1b	CUT1	CUW1	FOD8-1	SWD2	SWD6-2	SWT2-5	Manicured
	SCROPHULARIACEAE	**FIGWORT FAMILY**															
*	*Linaria vulgaris*	butter-and-eggs	G?	SE5			X	+	X		X		X				
*	*Verbascum thapsus*	common mullein	G?	SE5			X	+	X	X	X						
	CAPRIFOLIACEAE	**HONEYSUCKLE FAMILY**															
*	*Lonicera tatarica*	tartarian honeysuckle	G?	SE5			X	+					X				
	Viburnum lentago	nannyberry	G5	S5			X							X			
	Viburnum opulus var. *americanum*	high bush cranberry	G5T5	S5			X					X	X	X	X		
	DIPSACACEAE	**TEASEL FAMILY**															
*	*Dipsacus fullonum* ssp. *sylvestris*	wild teasel	G?T?	SE5			X		X	X	X						
	ASTERACEAE	**ASTER FAMILY**															
	Ageratina altissima var. *altissima*	white snakeroot	G5	S5			X							X			
	Ambrosia artemisiifolia	common ragweed	G5	S5			X	+		X							
*	*Arctium minus*	common burdock	G?T?	SE5			X	+	X								
	Aster lanceolatus ssp. *lanceolatus*	tall white aster	G5T?	S5			X			X	X					X	
	Aster lateriflorus var. *lateriflorus*	calico aster	G5T5	S5					X	X							
	Aster puniceus var. *puniceus*	purple-stemmed aster	G5T?	S5			X									X	
*	*Cichorium intybus*	chicory	G?	SE5			X	+	X		X						
*	*Cirsium arvense*	Canada thistle	G?	SE5			X	+	X	X	X						
*	*Cirsium vulgare*	bull thistle	G5	SE5			X	+		X	X						
	Erigeron annuus	daisy fleabane	G5	S5			X				X						
	Euthamia graminifolia	flat-topped bushy goldenrod	G5	S5						X	X	X				X	
*	*Inula helenium*	elecampane	G?	SE5			X	+	X		X					X	

Appendix B.
Vascular Plant List - 6th Line from County Road 27 to 20th Sideroad

	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Simcoe	LSRCA	CUM1-1a	CUM1-1b	CUT1	CUW1	FOD8-1	SWD2	SWD6-2	SWT2-5	Manicured
	Rudbeckia hirta	black-eyed Susan	G5	S5			X			X	X						
	Solidago canadensis	canada goldenrod	G5	S5			X		X	X	X	X				X	
	Solidago gigantean	giant goldenrod	G5	S5			X		X	X							
	Solidago nemoralis var. *nemoralis*	gray goldenrod	G5T?	S5			X				X						
	Symphyotrichum novae-angliae	New England aster	G5	S5			X		X	X	X					X	
*	*Tanacetum vulgare*	common tansy	G?	SE5			X	+		X							
*	*Taraxacum officinale*	common dandelion	G5	SE5			X	+		X			X				
*	*Tragopogon pratensis* ssp. *pratensis*	meadow goat's-beard	G?T?	SE5			X	+			X						
*	*Tussilago farfara*	coltsfoot	G?	SE5			X	+	X	X							
	ARACEAE	**ARUM FAMILY**															
	Arisaema triphyllum ssp. *triphyllum*	small jack-in-the-pulpit	G5T5	S5			X						X	X	X		
	JUNCACEAE	**RUSH FAMILY**															
	Juncus sp.	rush									X				X		
	CYPERACEAE	**SEDGE FAMILY**															
	Carex sp.	sedge							X	X			X	X	X		
	Carex stipata	awl-fruited sedge	G5	S5			X				X						
	Carex vulpinoidea	fox sedge	G5	S5			X				X						
	POACEAE	**GRASS FAMILY**															
*	*Bromus inermis* ssp. *inermis*	awnless brome	G4G5T?	SE5			X	+	X		X						
	Calamagrostis canadensis	blue-joint grass	G5	S5			X					X			X		
*	*Dactylis glomerata*	orchard grass	G?	SE5			X	+	X	X			X				

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Vascular Plant List - 6th Line from County Road 27 to 20th Sideroad

	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	Simcoe	LSRCA	CUM1-1a	CUM1-1b	CUT1	CUW1	FOD8-1	SWD2	SWD6-2	SWT2-5	Manicured
	Festuca rubra ssp. *rubra*	red fescue	G5T4	S5			X	+			X						
	Glyceria striata	fowl meadow grass	G5	S5			X							X	X		
	Phalaris arundinacea	reed canary grass	G5	S5			X	+	X		X	X					
*	*Phleum pretense*	timothy	G?	SE5			X	+	X	X	X						
	Phragmites australis	common reed	G5	S5			X	+		X							
	Poa compressa	Canada blue grass	G?	S5			X	+		X							
	Poa pratensis ssp. *pratensis*	Kentucky bluegrass	G5T	S5			X	+	X	X							
	Poa sp.	blue grass															X
	Sorghastrum nutans	Indian grass	G5	S4			X	w		X							
	TYPHACEAE	**CATTAIL FAMILY**															
	Typha angustifolia	narrow-leaved cattail	G5	S5			X			X							
	Typha latifolia	broad-leaved cattail	G5	S5			X		X	X					X	X	
	ORCHIDACEAE	**ORCHID FAMILY**															
*	*Epipactis helleborine*	common helleborine	G?	SE5			X	+					X	X			

* Non-native species
X present
Refer to **Appendix C** for species rank definitions.

Appendix B.
Vascular Plant List – 6th Line from 20th Sideroad to St. John's Road

	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	LSRCA	Simcoe	CUM1-1a	CUM1-1b	CUP3-2	FOD	FOD3-1	FOD5	FOM4-2	Hedgerow A	Hedgerow B	Hedgerow C	Hedgerow D	MAM2-10	Manicured	MAS2-1a	MAS2-1b	SWC1-1a	SWC1-1b	SWD	SWD2-2a	SWD2-2b	SWM1-1a	SWT2-2a	SWT2-2b	SWT2a
	EQUISETACEAE	**HORSETAIL FAMILY**																														
	Equisetum arvense	field horsetail	G5	S5				X											X							X						
	Equisetum fluviatile	water horsetail	G5	S5				X																				X				
	Equisetum pratense	meadow horsetail	G5	S5			w	R-2						X												X						
	DRYOPTERIDACEAE	**WOOD FERN FAMILY**																														
	Athyrium filix-femina var. *angustum*	northern lady fern	G5T5	S5				X						X																		
	Gymnocarpium dryopteris	oak fern	G5	S5				X						X	X										X	X						
	Onoclea sensibilis	sensitive fern	G5	S5				X	X													X				X		X	X			
	PINACEAE	**PINE FAMILY**																														
	Larix laricina	tamarack	G5	S5				X							X										X						X	X
*	*Picea abies*	Norway spruce	G?	SE3			+														X											
	Picea glauca	white spruce	G5	S5				X							X		X				X			X				X				X
*	*Picea pungens*	Colorado spruce	G5	SE1																	X		X									
*	*Pinus nigra*	Austrian pine	G?	SE2			+										X															
	Pinus strobus	eastern white pine	G5	S5				X			X			X							X					X						
*	*Pinus sylvestris*	scotch pine	G?	SE5			+	X								X			X													
	Tsuga canadensis	eastern hemlock	G5	S5				X				X													X	X						
	CUPRESSACEAE	**CEDAR FAMILY**																														
	Juniperus virginiana	eastern red cedar	G5	S5															X		X											
	Thuja occidentalis	eastern white cedar	G5	S5				X				X		X	X	X	X	X	X					X	X	X	X	X	X		X	
	ARISTOLOCHIACEAE	**DUCHMAN'S-PIPE FAMILY**																														
	Asarum canadense	wild ginger	G5	S5				X							X																	
	RANUNCULACEAE	**BUTTERCUP FAMILY**																														
	Actaea pachypoda	white baneberry	G5	S5				X						X	X																	
	Actaea rubra	red baneberry	G5	S5				X																		X						
	Anemone canadensis	Canada anemone	G5	S5				X	X						X											X				X		X
	Anemone quinquefolia var. *quinquefolia*	wood anemone	G5	S5				R-1							X																	
	Aquilegia canadensis	wild columbine	G5	S5				X						X																		
	Clematis virginiana	virgin's-bower	G5	S5				X				X																				
*	*Ranunculus acris*	tall buttercup	G5	SE5			+	X	X						X																	X
	BERBERIDACEAE	**BARBERRY FAMILY**																														
	Caulophyllum thalictroides	blue cohosh	G	S5								X		X																		

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	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	LSRCA	Simcoe	CUM1-1a	CUM1-1b	CUP3-2	FOD	FOD3-1	FOD5	FOM4-2	Hedgerow A	Hedgerow B	Hedgerow C	Hedgerow D	MAM2-10	Manicured	MAS2-1a	MAS2-1b	SWC1-1a	SWC1-1b	SWD	SWD2-2a	SWD2-2b	SWM1-1a	SWT2-2a	SWT2-2b	SWT2a
	Podophyllum peltatum	may-apple	G5	S5				X						X																		
	ULMACEAE	**ELM FAMILY**																														
	Ulmus americana	white elm	G5?	S5				X				X							X						X			X				
	URTICACEAE	**NETTLE FAMILY**																														
*	*Urtica dioica* ssp. *dioica*	European stinging nettle	G5T?	SE2																X										X		
	JUGLANDACEAE	**WALNUT FAMILY**																														
	Carya cordiformis	bitternut hickory	G5	S5				X						X																		
	Juglans nigra	black walnut	G5	S4			w	R-1 Nat				X				X		X														
	FAGACEAE	**BEECH FAMILY**																														
	Fagus grandifolia	American beech	G5	S5				X						X																		
	Quercus macrocarpa	bur oak	G5	S5				X						X																		
	Quercus rubra	red oak	G5	S5				X						X																		
	BETULACEAE	**BIRCH FAMILY**																														
	Alnus incana spp. *rugosa*	speckled alder	G5T5	S5				X																					X			X
	Betula papyrifera	white birch	G5	S5				X																X	X					X		
*	*Betula pendula*	European weeping birch	G?	SE4			+	X													X											
	Ostrya virginiana	ironwood	G5	S5				X						X																		
	CHENOPODIACEAE	**GOOSEFOOT FAMILY**																														
*	*Chenopodium album* var. *album*	lamb's quarters	G5T5	SE5				X	X	X																						
	CARYOPHYLLACEAE	**PINK FAMILY**																														
*	*Dianthus armeria*	deptford pink	G?	SE5			+	X												X							X					
*	*Silene vulgaris*	catchfly	G?	SE5			+	X	X	X							X															
	PAEONIACEAE	**PEONY FAMILY**																														
*	*Paenoia* sp.	peony		SE																	X											
	GUTTIFERAE	**ST. JOHN'S-WORT FAMILY**																														
*	*Hypericum perforatum*	common St. John's-wort	G?	SE5			+	X											X								X			X		
	TILIACEAE	**LINDEN FAMILY**																														
	Tilia americana	basswood	G5	S5				X					X		X	X	X	X	X								X					
	VIOLACEAE	**VIOLET FAMILY**																														
	Viola pubescens	downy yellow violet	G5	S5				X						X																		
	CUCURBITACEAE	**GOURD FAMILY**																														
	Echinocystis lobata	prickly cucumber	G5	S5				X							X												X					X
	SALICACEAE	**WILLOW FAMILY**																														

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	Populus balsamifera ssp. *balsamifera*	balsam poplar	G5T?	S5				X					X	X		X	X									X	X	X	X		X	X
	Populus grandidentata	large-tooth aspen	G5	S5				X																		X						
	Populus tremuloides	trembling aspen	G5	S5				X				X	X	X	X	X		X						X	X	X	X	X	X			
*	*Salix alba*	white willow	G5	SE4			+	X															X	X		X				X		X
	Salix bebbiana	long-beaked willow	G5	S5				X																							X	
	Salix eriocephala	Missouri willow	G5	S5				X																			X	X	X			
*	*Salix fragilis*	crack willow	G?	SE5				X																		X		X			X	
	Salix petiolaris	slender willow	G4	S5				X															X		X			X			X	
	Salix sp.	willow		?																X		X										
*	*Salix* X *sepulcralis*	hybrid willow	HYB	SE2			+									X					X											
	BRASSICACEAE	**MUSTARD FAMILY**																														
*	*Alliaria petiolata*	garlic mustard	G5	SE5			+	X					X																	X		
*	*Barbarea vulgaris*	yellow rocket	G?	SE5			+	X	X																							
	PRIMULACEAE	**PRIMROSE FAMILY**																														
	Lysimachia ciliata	fringed loosestrife	G5	S5				X																		X						
	Trientalis borealis ssp. *borealis*	star-flower	G5T?	S5				X						X																		
	GROSSULARIACEAE	**GOOSEBERRY FAMILY**																														
	Ribes cynosbati	prickly gooseberry	G5	S5				X					X																	X		
	Ribes hirtellum	smooth gooseberry	G5	S5			w	X				X															X					
	ROSACEAE	**ROSE FAMILY**																														
*	*Crataegus monogyna*	English hawthorn	G5	SE5			+	X											X													
	Crataegus sp.	hawthorn														X											X					
	Fragaria virginiana ssp. *virginiana*	scarlet strawberry	G5T?	SU				X					X	X												X						
	Geum aleppicum	yellow avens	G5	S5				X				X														X						
	Geum canadense	white avens	G5	S5				X						X																		
*	*Malus pumila*	common apple	G5	SE5			+	X		X						X	X															
	Malus sp.	apple							X																							
	Prunus serotina	black cherry	G5	S5				X					X																			
	Prunus virginiana var. *virginiana*	choke cherry	G5T?	S5				X	X				X	X											X		X			X		X
*	*Rubus idaeus* ssp. *idaeus*	red raspberry	G5T5	SE1									X			X														X		
	Rubus occidentalis	thimble-berry	G5	S5				X																								X
*	*Sorbus aucuparia*	European mountain-ash	G5	SE4			+	X								X			X													
	FABACEAE	**PEA FAMILY**																														
*	*Coronilla varia*	variable crown-vetch	G?	SE5				X					X																			

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*	*Lathyrus latifolius*	everlasting pea	G?	SE4			+	X		X							X															
*	*Lotus corniculatus*	bird's-foot trefoil	G?	SE5			+	X	X	X																X	X		X			
*	*Medicago lupulina*	black medick	G?	SE5			+	X	X	X																						
*	*Melilotus alba*	white sweet-clover	G?	SE5			+	X		X							X															
*	*Melilotus officinalis*	yellow sweet-clover	G?	SE5			+	X		X																						
*	*Robinia pseudo-acacia*	black locust	G5	SE5			+	X						X																		
*	*Trifolium pratense*	red clover	G?	SE5			+	X									X															
*	*Trifolium repens*	white clover	G?	SE5			+	X	X																							
*	*Vicia cracca*	tufted vetch	G?	SE5			+	X	X	X																						
	LYTHRACEAE	**LOOSESTRIFE FAMILY**																														
*	*Lythrum salicaria*	purple loosestrife	G5	SE5			+	X		X														X				X				
	ONAGRACEAE	**EVENING-PRIMROSE FAMILY**																														
	Oenothera biennis	common evening-primrose	G5	S5				X	X																							
	CORNACEAE	**DOGWOOD FAMILY**																														
	Cornus alternifolia	alternate-leaved dogwood	G5	S5				X				X		X	X			X														
	Cornus racemosa	red panicled dogwood	G5?	S5				R-2				X																				
	Cornus sericea ssp. *sericea*	red-osier dogwood	G5	S5				X	X							X			X			X				X	X		X			
	RHAMNACEAE	**BUCKTHORN FAMILY**																														
*	*Rhamnus cathartica*	common buckthorn	G?	SE5			+	X				X	X				X	X														
	VITACEAE	**GRAPE FAMILY**																														
	Parthenocissus vitacea	inserted Virginia-creeper	G5	S5				X	X				X	X	X	X		X	X				X				X					X
	Vitis riparia	riverbank grape	G5	S5				X	X	X				X				X	X													
	ACERACEAE	**MAPLE FAMILY**																														
	Acer negundo	manitoba maple	G5	S5			+	X	X	X									X								X					
	Acer nigrum	black maple	G5Q	S4?			w	X				X						X	X													
*	*Acer platanoides*	norway maple	G?	SE5			+	X											X		X											
	Acer saccharinum	silver maple	G5	S5				X									X				X											
	Acer saccharum var. *saccharum*	sugar maple	G5T?	S5				X				X	X	X			X	X										X	X			
	Acer X *freemanii*	freeman's maple																						X		X						
	ANACARDIACEAE	**SUMAC FAMILY**																														
	Rhus hirta	staghorn sumac	G5	S5				X	X	X				X			X	X	X													
	GERANIACEAE	**GERANIUM FAMILY**																														
*	*Geranium robertianum*	herb-robert	G5	SE5			+	X						X		X																

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	BALSAMINACEAE	**TOUCH-ME-NOT FAMILY**																														
	Impatiens capensis	spotted touch-me-not	G5	S5				X														X					X	X	X	X		X
	APIACEAE	**PARSLEY FAMILY**																														
*	*Aegopodium podagraria*	goutweed	G?	SE5			+	X													X											
*	*Daucus carota*	wild carrot	G?	SE5			+	X	X	X							X	X	X													
	Sium suave	hemlock water-parsnip	G5	S5				X																			X					
	APOCYNACEAE	**DOGBANE FAMILY**																														
	Apocynum androsaemifolium ssp. *androsaemifolium*	spreading dogbane	G5T?	S5				X						X																		
	ASCLEPIADACEAE	**MILKWEED FAMILY**																														
	Asclepias syriaca	common milkweed	G5	S5				X	X								X					X										
*	*Cynanchum rossicum*	swallow-wort	G?	SE5			+	X																								X
	SOLANACEAE	**POTATO FAMILY**																														
*	*Solanum dulcamara*	bitter nightshade	G?	SE5			+	X							X											X		X		X		X
	HYDROPHYLLACEAE	**WATER-LEAF FAMILY**																														
	Hydrophyllum virginianum	Virginia water-leaf	G5	S5				X				X		X																		
	BORAGINACEAE	**BORAGE FAMILY**																														
*	*Echium vulgare*	blueweed	G?	SE5			+	X	X																							
*	*Myosotis scorpioides*	mouse-ear scorpion-grass	G5	SE5																							X					
	VERBENACEAE	**VERVAIN FAMILY**																														
	Verbena hastata	blue vervain	G5	S5				X											X								X	X	X			
	LAMIACEAE	**MINT FAMILY**																														
	Lycopus uniflorus	northern water-horehound	G5	S5				X																				X				
	Mentha arvensis	American wild mint	G5T5	S5																		X				X		X				
	PLANTAGINACEAE	**PLANTAIN FAMILY**																														
*	*Plantago lanceolata*	ribgrass	G5	SE5			+	X							X																X	
	OLEACEAE	**OLIVE FAMILY**																														
	Fraxinus americana	white ash	G5	S5				X						X																		
	Fraxinus pennsylvanica	red ash	G5	S5				X				X		X	X	X	X	X						X		X	X	X	X			X
*	*Syringa vulgaris*	common lilac	G?	SE5			+	X													X											
	SCROPHULARIACEAE	**FIGWORT FAMILY**																														
*	*Linaria vulgaris*	butter-and-eggs	G?	SE5			+	X	X	X									X													
*	*Verbascum thapsus*	common mullein	G?	SE5			+	X	X																							
*	*Veronica anagallis-aquatica*	water speedwell	G5	SE5			+/w																					X				

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	RUBIACEAE	**MADDER FAMILY**																														
	Galium palustre	marsh bedstraw	G5	S5				X																						X		
	CAPRIFOLIACEAE	**HONEYSUCKLE FAMILY**																														
	Lonicera dioica	glaucous honeysuckle	G5	S5				X						X																		
*	*Lonicera tatarica*	tartarian honeysuckle	G?	SE5			+	X						X																		
	Sambucus nigra ssp. *canadensis*	common elderberry	G5	S5				X																				X				
*	*Viburnum opulus*	guelder rose	G5	SE4			+	X								X														X		
	Viburnum opulus var. *americanum*	high bush cranberry	G5T5	S5				X																				X				
	DIPSACACEAE	**TEASEL FAMILY**																														
*	*Dipsacus fullonum* ssp. *sylvestris*	wild teasel	G?T?	SE5				X	X													X										
	ASTERACEAE	**ASTER FAMILY**																														
*	*Achillea millefolium* var. *millefolium*	common yarrow	G5T?	SE?			+	X																			X		X			
	Ambrosia artemisiifolia	common ragweed	G5	S5			+	X	X	X							X											X				
*	*Arctium minus*	common burdock	G?T?	SE5			+	X	X	X								X														
	Aster lanceolatus ssp. *lanceolatus*	tall white aster	G5T?	S5				X											X		X	X									X	
	Aster puniceus var. *puniceus*	purple-stemmed aster	G5T?	S5				X																				X				
	Bidens frondosa	devil's beggar-ticks	G5	S5				X																						X		
*	*Cichorium intybus*	chicory	G?	SE5			+	X		X							X	X	X													
*	*Cirsium arvense*	Canada thistle	G?	SE5			+	X	X							X				X							X		X			
*	*Cirsium vulgare*	bull thistle	G5	SE5			+	X	X																					X		
	Erigeron philadelphicus var. *philadelphicus*	Philadelphia fleabane	G5T?	S5				X	X																							
	Eupatorium maculatum var. *maculatum*	spotted joe-pye-weed	G5T5	S5				X												X		X			X	X		X				
	Eupatorium perfoliatum	perfoliate thoroughwort	G5	S5				X												X		X				X	X	X	X		X	
	Euthamia graminifolia	flat-topped bushy goldenrod	G5	S5						X							X			X												
*	*Inula helenium*	elecampane	G?	SE5			+	X												X							X					
*	*Leucanthemum vulgare*	ox-eye daisy	G?	SE5			+	X	X							X															X	
	Solidago canadensis	canada goldenrod	G5	S5				X											X													
	Solidago canadensis var. *scabra*	tall goldenrod		S5				R-4	X	X			X				X	X	X			X	X		X	X	X		X		X	
*	*Sonchus arvensis* ssp. *arvensis*	field sow-thistle	G?T?	SE5				X		X			X				X	X	X							X	X				X	
	Symphyotrichum novae-angliae	New England aster	G5	S5				X					X																			
*	*Tanacetum vulgare*	common tansy	G?	SE5			+	X		X																						
*	*Taraxacum officinale*	common dandelion	G5	SE5			+	X	X						X			X														
*	*Tragopogon pratensis* ssp. *pratensis*	meadow goat's-beard	G?T?	SE5			+	X	X																							
*	*Tussilago farfara*	coltsfoot	G?	SE5			+	X	X					X												X		X			X	

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	Arisaema triphyllum ssp. *triphyllum*	small jack-in-the-pulpit	G5T5	S5				X				X			X																	
	JUNCACEAE	**RUSH FAMILY**																															
	Juncus canadensis	Canada rush	G5	S5			w	X																			X	X				
	Juncus effusus ssp. *solutus*	soft rush	G5T?	S5				X																		X	X	X	X			
	Juncus tenuis	path rush	G5	S5				X																			X					
	CYPERACEAE	**SEDGE FAMILY**																															
	Carex gracillima	graceful sedge	G5	S5				X				X																				
	Carex lacustris	lake-bank sedge	G5	S5				X																				X				
	Carex lupulina	hop sedge	G5	S5				X														X						X				
	Carex rosea	stellate sedge	G5	S5				X				X		X	X																	
	Carex scoparia	pointed broom sedge	G5	S5			w	X														X					X		X			
	Carex sp.	sedge												X																		
	Carex stipata	awl-fruited sedge	G5	S5				X												X								X				
	Carex viridula ssp. *viridula*	greenish sedge	G5?T?	S5			w	X																			X	X				
	Carex vulpinoidea	fox sedge	G5	S5				X																			X		X		X	
	Cladium mariscoides	water bog-rush	G5	S5			w	X																				X				
	Schoenoplectus tabernaemontani	American great bulrush	G?	S5				X												X		X					X	X	X			
	Scirpus atrovirens	dark-green bulrush	G5?	S5				X												X		X					X	X			X	
	Scirpus cyperinus	wool-grass	G5	S5				X																				X				
	POACEAE	**GRASS FAMILY**																														
*	*Bromus inermis* ssp. *inermis*	awnless brome	G4G5T?	SE5			+	X	X							X	X	X	X	X												
*	*Dactylis glomerata*	orchard grass	G?	SE5			+	X	X	X			X			X		X									X		X			
	Glyceria striata	fowl meadow grass	G5	S5				X																		X						
*	*Hordeum jubatum* ssp. *jubatum*	squirrel-tail grass	G5T?	SE5			+	X		X																						
	Panicum capillare	witch grass	G5	S5				X		X																						
	Phalaris arundinacea	reed canary grass	G5	S5			+	X								X		X		X		X	X	X	X	X	X	X		X	X	X
*	*Phleum pratense*	timothy	G?	SE5			+	X										X									X					
	Phragmites australis	common reed	G5	S5			+	X												X						X		X				
	Poa palustris	fowl meadow grass	G5	S5				X																			X	X				
	Poa pratensis ssp. *pratensis*	Kentucky bluegrass	G5T	S5			+	X	X										X								X		X			
*	*Setaria viridis*	green foxtail	G?	SE5			+	X		X																						
	TYPHACEAE	**CATTAIL FAMILY**																														
	Typha angustifolia	narrow-leaved cattail	G5	S5			+	X												X			X	X	X							
	Typha latifolia	broad-leaved cattail	G5	S5				X	X	X										X		X				X	X	X	X			

Appendix B.
Vascular Plant List – 6th Line from 20th Sideroad to St. John's Road

	Scientific Name	Common Name	GRank	SRank	MNR	COSEWIC	LSRCA	Simcoe	CUM1-1a	CUM1-1b	CUP3-2	FOD	FOD3-1	FOD5	FOM4-2	Hedgerow A	Hedgerow B	Hedgerow C	Hedgerow D	MAM2-10	Manicured	MAS2-1a	MAS2-1b	SWC1-1a	SWC1-1b	SWD	SWD2-2a	SWD2-2b	SWM1-1a	SWT2-2a	SWT2-2b	SWT2a
	LILIACEAE	**LILY FAMILY**																														
*	*Asparagus officinalis*	garden asparagus	G5?	SE5			+	X										X														
*	*Convallaria majalis*	lily-of-the-valley	G5	SE5			+	X										X														
*	*Hemerocallis fulva*	orange day-lily	G?	SE5			+	X													X											
	Maianthemum canadense	wild lily-of-the-valley	G5	S5				X				X		X	X																	
	Maianthemum racemosum ssp. *racemosum*	false Solomon's seal	G5T	S5				X							X																	
	Trillium grandiflorum	white trillium	G5	S5				X				X		X	X																	
	ORCHIDACEAE	**ORCHID FAMILY**																														
	Cypripedium pubescens var. *pubescens*	large yellow lady's slipper	G5T	S5				X							X																	

APPENDIX C

ACRONYMS AND DEFINITIONS USED IN SPECIES LISTS

Species Status

GRANK	**Global Rank**
Global ranks are assigned by a consensus of the network of Conservation Data Centres, scientific experts, and The Nature Conservatory to designate a rarity rank based on the range-wide status of a species, subspecies or variety. The most important factors considered in assigning global ranks are the total number of known, extant sites world-wide, and the degree to which they are potentially or actively threatened with destruction. Other criteria include the number of known populations considered to be securely protected, the size of the various populations, and the ability of the taxon to persist at its known sites. The taxonomic distinctness of each taxon has also been considered. Hybrids, introduced species, and taxonomically dubious species, subspecies and varieties have not been included.	
Short Form	**Definition**
G1	**Extremely rare;** usually 5 or fewer occurrences in the overall range or very few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.
G2	**Very rare;** usually between 5 and 20 occurrences in the overall range or with many individuals in fewer occurrences; or because of some factor(s) making it vulnerable to extinction.
G3	**Rare to uncommon**; usually between 20 and 100 occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.
G4	**Common**; usually more than 100 occurrences; usually not susceptible to immediate threats.
G5	**Very common**; demonstrably secure under present conditions.
GH	Historic, no records in the past 20 years.
GU	Status uncertain, often because of low search effort or cryptic nature of the species; more data needed.
GX	Globally extinct. No recent records despite specific searches.
?	Denotes inexact numeric rank (i.e. G4?).
G	A "G" (or "T") followed by a blank space means that the NHIC has not yet obtained the Global Rank from The Nature Conservancy.
G?	Unranked**,** or, if following a ranking, rank tentatively assigned (e.g. G3?).
Q	Denotes that the taxonomic status of the species, subspecies, or variety is questionable.
T	Denotes that the rank applies to a subspecies or variety.

SRANK	**Provincial Rank**
Provincial (or Sub-national) ranks are used by the Ontario Ministry of Natural Resources Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. These ranks are not legal designations. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Ontario. By comparing the global and provincial ranks, the status, rarity, and the urgency of conservation needs can be ascertained. The NHIC evaluates provincial ranks on a continual basis and produces updated lists at least annually.	
Short Form	**Definition**
S1	**Critically Imperiled** in Ontario because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation.
S2	**Imperiled** in Ontario because of rarity due to very restricted range, very few populations (often 20 or fewer occurrences) steep declines or other factors making it very vulnerable to extirpation.

SRANK	**Provincial Rank**
Provincial (or Sub-national) ranks are used by the Ontario Ministry of Natural Resources Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. These ranks are not legal designations. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Ontario. By comparing the global and provincial ranks, the status, rarity, and the urgency of conservation needs can be ascertained. The NHIC evaluates provincial ranks on a continual basis and produces updated lists at least annually.	
Short Form	**Definition**
S3	**Vulnerable** in Ontario due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4	**Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5	**Secure**—Common, widespread, and abundant in Ontario.
SX	**Presumed Extirpated** – Species or community is believed to be extirpated from Ontario.
SH	**Possibly Extirpated** – Species or community occurred historically in Ontario and there is some possibility that it may be rediscovered.
SNR	**Unranked**—Conservation status in Ontario not yet assessed
SU	**Unrankable**—Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
SNA	**Not Applicable** —A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S#	**Range Rank** —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

COSEWIC	**Committee on the Status of Endangered Wildlife in Canada**
The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species that are considered to be at risk in Canada.	
Status	**Definition**
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)	A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.

COSSARO/OMNR	Committee on the Status of Species at Risk in Ontario/Ontario Ministry of Natural Resources
The Committee on the Status of Species at Risk in Ontario (COSSARO)/Ontario Ministry of Natural Resources (OMNR) assesses the provincial status of wild species that are considered to be at risk in Ontario.	
Status	**Definition**
Extinct (EXT)	A species that no longer exists anywhere.
Extirpated (EXP)	A species that no longer exists in the wild in Ontario but still occurs elsewhere.
Endangered (Regulated) (END–R)	A species facing imminent extinction or extirpation in Ontario which has be regulated under Ontario's *Endangered Species Act*.
Endangered (END)	A species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's *Endangered Species Act*.
Threatened (THR)	A species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.
Special Concern (SC)	A species with characteristics that make it sensitive to human activities or natural events.
Not at Risk (NAR)	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)	A species for which there is insufficient information for a provincial status recommendation.

Species Status under Federal Legislation

MBCA	Migratory Birds Convention Act
The Canada *Migratory Birds Convention Act* provides for the protection of migratory birds in Canada and the United States. The provisions of this Act are implemented through the Migratory Bird Regulations. Bird species that are regulated under the *Migratory Birds Convention Act* are noted in the applicable species lists.	

SARA	Species at Risk Act
The Canada *Species at Risk Act* provides a framework for actions across Canada to ensure the survival of wildlife species and the protection of our natural heritage. It sets out how to decide which species are a priority for action and what to do to protect a species. It identifies ways governments, organizations and individuals can work together, and it establishes penalties for a failure to obey the law. Regulated species are listed in Schedules 1, 2 and 3 of the Act.	
Schedule 1 SARA (1)	Species that are currently covered under the Act.
Schedule 2 SARA (2)	Species that are endangered or threatened that have not been re-assessed by COSEWIC for inclusion on Schedule 1.
Schedule 3 SARA (3)	Species that are of special concern that have not yet been re-assessed by COSEWIC for inclusion on Schedule 1.

Species Status under Provincial Legislation

ESA	Endangered Species Act
The Ontario *Endangered Species Act* provides for the conservation, protection, restoration and propagation of species of fauna and flora of the Province of Ontario that are threatened with extinction. Regulated species are listed in Ontario Regulation 338.	

Schedule No.	Short Form	Status
Schedule 1 ESA (1)	EXT	The species of flora and fauna listed in Schedule 1 are declared to be threatened with extinction.
Schedule 2 ESA (2)	EXP	The species of flora and fauna listed in Schedule 2 are declared to be extirpated.
Schedule 3 ESA (3)	END	The species of flora and fauna listed in Schedule 3 are declared to be endangered.
Schedule 4 ESA (4)	THR	The species of flora and fauna listed in Schedule 4 are declared to be threatened.
Schedule 5 ESA (5)	SC	The species of flora and fauna listed in Schedule 5 are declared to be special concern.

FWCA	Fish and Wildlife Conservation Act
The Ontario *Fish and Wildlife Conservation Act* outlines the restrictions for hunting, trapping and fishing; handling of live wildlife; sale, purchase and transport of wildlife; and, licences that can be secured under the Act. Under Schedules 1 to 11 of the Act, wildlife are grouped for the purpose of regulating these species. These schedules are further defined below. Note: where there is a conflict between this Act and the Ontario *Endangered Species Act*, the provision with the most protection will prevail (s. 2 of the *Fish and Wildlife Conservation Act*).	

Schedule No.	Short Form	Status
Schedule 1	Furbearing – M	The species of fauna listed in Schedule 1 are declared to be furbearing mammals.
Schedule 2	Game – M	The species of fauna listed in Schedule 2 are declared to be game mammals.
Schedule 3	Game – B	The species of fauna listed in Schedule 3 are declared to be game birds.
Schedule 4	Game – R	The species of fauna listed in Schedule 4 are declared to be game reptiles.
Schedule 5	Game – A	The species of fauna listed in Schedule 5 are declared to be game amphibians.
Schedule 6	Specially Protected – M	The species of fauna listed in Schedule 6 are declared to be specially protected mammals.
Schedule 7	Specially Protected – R	The species of fauna listed in Schedule 7 are declared to be specially protected birds (raptors).
Schedule 8	Specially Protected – B	The species of fauna listed in Schedule 8 are declared to be specially protected birds (other than raptors).
Schedule 9	Specially Protected – R	The species of fauna listed in Schedule 9 are declared to be specially protected reptiles.
Schedule 10	Specially Protected – A	The species of fauna listed in Schedule 10 are declared to be specially protected amphibians.

FWCA	Fish and Wildlife Conservation Act

The Ontario *Fish and Wildlife Conservation Act* outlines the restrictions for hunting, trapping and fishing; handling of live wildlife; sale, purchase and transport of wildlife; and, licences that can be secured under the Act. Under Schedules 1 to 11 of the Act, wildlife are grouped for the purpose of regulating these species. These schedules are further defined below.

Note: where there is a conflict between this Act and the Ontario *Endangered Species Act*, the provision with the most protection will prevail (s. 2 of the *Fish and Wildlife Conservation Act*).

Schedule No.	Short Form	Status
Schedule 11	Specially Protected – I	The species of fauna listed in Schedule 11 are declared to be specially protected invertebrates.

Local Species Status

LSRCA and York	Local Species Status Definitions

Level of Conservation Concern in Lake Simcoe Region Conservation Authority (2003), and York (Varga *et al.* 2000; Riley 1999).

LSRCA		York	
w	Rare	Nat	Naturalized
P	S1 to S3	Int	Introduced
NE	nationally endangered	R	Rare
NC	national species of special concern	U	Uncommon

BSC	Bird Studies Canada

The Bird Studies Canada *Conservation Priorities for the Birds of Southern Ontario* (1999), based on work completed by Bird Studies Canada, the Canadian Wildlife Service and the MNR identifies bird species of high conservation priority. This list was prepared to assist municipalities in identifying significant natural heritage features, through using the information regarding the presence of birds of conservation priority in their municipality.

Birds of conservation priority have been noted (BSC) in the appropriate species lists.

SWH-TG	Significant Wildlife Habitat Technical Guide ()MNR 2000)

Area Sensitive species as defined in the Significant Wildlife Habitat Technical Guide.
Interior Species that primarily uses forest interior habitat.

APPENDIX D

BREEDING BIRD SPECIES IDENTIFIED
6TH LINE FROM COUNTY ROAD 27 TO 20TH SIDEROAD

APPENDIX D
BREEDING BIRD SPECIES DOCUMENTED IN STUDY AREA 'A' BY LGL (2015)
6TH LINE FROM COUNTY ROAD 27 TO 20TH SIDEROAD

Birds	Scientific Name	Common Name	SARA[1]	ESA[1]	Legal Status1	Other[1]	BBE	Station #[3]
	Cathartes aura	Turkey Vulture			FWCA(P)		H	28
	Charadrius vociferus	Killdeer			MBCA		T, A	6, 7, 9, 10, 11, 16, 18, 21, 26, 28, 29, 32, 38, 46
	Actitis macularius	Spotted Sandpiper			MBCA		T	6, 10, 13
	Bartramia longicauda	Upland Sandpiper			MBCA	SWH	H	2
	Larus delawarensis	Ring-billed Gull			MBCA		H	6, 40
	Columba livia	Rock Dove					T	6, 7, 10, 14, 16, 17, 19, 22, 28, 32
	Zenaida macroura	Mourning Dove			MBCA		T	4, 5, 8, 9, 10, 12, 21, 27, 34, 38, 40, 44, 46
	Melanerpes carolinus	Red-bellied Woodpecker			MBCA		S	36
	Picoides pubescens	Downy Woodpecker			MBCA		S	13, 24, 42
	Colaptes auratus	Northern Flicker			MBCA		T	10, 36, 41
	Dryocopus pileatus	Pileated Woodpecker			MBCA	SWH/INT	S	28, 31, 41
	Contopus virens	Eastern Wood Pewee	-	SC	MBCA		S	30, 35
	Empidonax traillii	Willow Flycatcher			MBCA		S	33
	Sayornis phoebe	Eastern Phoebe			MBCA		T	21, 22, 33
	Myiarchus crinitus	Great-crested Flycatcher			MBCA		T	18, 26, 27, 28, 40, 41, 42, 44
	Tyrannus tyrannus	Eastern Kingbird			MBCA		CF	28, 32, 34, 38, 40
	Vireo gilvus	Warbling Vireo			MBCA		T	17, 21, 22, 26, 27, 28, 43, 44
	Vireo olivaceus	Red-eyed Vireo			MBCA	INT	T	8, 18, 29, 36, 41, 44, 45
	Cyanocitta cristata	Blue Jay			FWCA (P)		T	10, 18, 19, 20, 33, 34, 36, 44, 45
	Corvus brachyrhynchos	American Crow			MBCA		CF	6, 7, 8, 9, 11, 12, 14, 26, 29, 34, 36, 38, 43, 44, 45
	Eremophila alpestris	Horned Lark			MBCA		T, A	2, 3, 6, 8, 9, 10, 11, 18, 20, 22, 47
	Tachycineta bicolor	Tree Swallow			MBCA		CF	12, 13, 18, 26, 28, 33

APPENDIX D
BREEDING BIRD SPECIES DOCUMENTED IN STUDY AREA 'A' BY LGL (2015)
6TH LINE FROM COUNTY ROAD 27 TO 20TH SIDEROAD

Birds	Scientific Name	Common Name	SARA[1]	ESA[1]	Legal Status1	Other[1]	BBE	Station #[3]
	Petrochelidon pyrrhonota	Cliff Swallow			MBCA		NY	15
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]
	Poecile atricapillus	Black-capped Chickadee			MBCA		T	13, 22, 26, 32, 34, 39, 41, 42, 43, 45
	Troglodytes aedon	House Wren			MBCA		T, A	8, 24, 25, 26, 27, 29, 44, 48
	Cathartes fuscescens	Veery			MBCA	SWH/INT	T	26, 31, 42
	Turdus migratorius	American Robin			MBCA		CF	2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 17, 21, 25, 26, 29, 30, 33, 37, 39, 40, 45, 46, 47, 48, 49
	Dumetella carolinensis	Gray Catbird			MBCA		T	14, 26
	Toxostoma rufum	Brown Thrasher			MBCA		T	6, 7, 21, 22, 23, 25, 41, 47
	Sturnus vulgaris	European Starling					T	2, 3, 5, 7, 11, 12, 14, 15, 17, 22, 26, 28, 29, 34, 37, 39, 41
	Bombycilla garrulus	Cedar Waxwing			MBCA		T	12, 13, 14, 18, 22, 26, 33, 41, 43, 45, 46
	Dendroica petechia	Yellow Warbler			MBCA		T, A	4, 12, 13, 14, 26, 27, 33, 46
	Dendroica virens	Black-throated Green Warbler			MBCA	SWH	S	29
	Mniotilta varia	Black and White Warbler			MBCA	SWH/INT	S	17
	Seiurus aurocapilla	Ovenbird			MBCA	SWH/INT	T	30, 31, 43, 44
	Geothlypis trichas	Common Yellowthroat			MBCA		T, A	16, 21, 26, 27, 29, 30, 41, 43, 44
	Spizella passerina	Chipping Sparrow			MBCA		T, A	13, 14, 15, 18, 21, 33, 34, 38, 41, 46
	Spizella pusilla	Field Sparrow			MBCA		S	16
	Passerculus	Savannah Sparrow			MBCA	SWH	CF	1, 2, 3, 5, 6, 7, 10, 12, 13, 15,

APPENDIX D
BREEDING BIRD SPECIES DOCUMENTED IN STUDY AREA 'A' BY LGL (2015)
6TH LINE FROM COUNTY ROAD 27 TO 20TH SIDEROAD

Birds	Scientific Name	Common Name	SARA[1]	ESA[1]	Legal Status1	Other[1]	BBE	Station #[3]
	sanwichensis							16, 17, 18, 19, 26, 28, 29, 34, 38, 39, 40, 41, 45, 46, 47
	Melospica melodia	Song Sparrow			MBCA		CF	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 19, 17, 18, 20, 22, 23, 24, 26, 28, 29, 33, 36, 37, 38, 39, 40, 43, 44, 45, 46, 47, 48, 49
	Melospiza georgiana	Swamp Sparrow			MBCA		S	44
	Zonotrichia albicollis	White-throated Sparrow			MBCA		S	42, 44
	Cardinalis cardinalis	Northern Cardinal			MBCA		T, A	18, 21, 26, 44, 45, 49
	Passerina cyanea	Indigo Bunting			MBCA		T	4, 18, 24, 26, 33, 40
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Agelaius phoeniceus	Red-winged Blackbird					CF	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 32, 33, 34, 35, 36, 39, 40, 41, 43, 45, 46, 47, 49
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Quiscalus quiscula	Common Grackle					T	6, 8, 12, 14, 18, 23, 27, 32, 33, 37, 44
	Icterus galbula	Baltimore Oriole			MBCA		T	17, 41
	Carduelis tristis	American Goldfinch			MBCA		T, A	5, 7, 9, 12, 14, 16, 17, 18, 21, 24, 26, 27, 28, 32, 33, 34, 37, 38, 39, 40, 41, 43, 45, 46, 47, 48
	Passer domesticus	House Sparrow					H	12

[1]For definitions of species ranks, refer to **Appendix C**.
[2]BBE - Breeding Bird Evidence (according to Bird Studies Canada):

Possible Breeding:
H - Species observed in its breeding season in suitable nesting habitat.
S - Singing male present in its breeding season in suitable nesting habitat.

Probable Breeding:
T - Permanent territory presumed through registration of territorial song on at least two days, a week or so apart, at the same place.
A - Agitated behaviour or anxiety calls of an adult.

Confirmed Breeding:
NU - Used nest or egg shell found (occupied or laid within the period of study).
FY - Recently fledged young or downy young, including young incapable of sustained flight.
CF - Adult carrying food for young.
NE - Nest containing eggs.
NY - Nest with young seen or heard.

[3]Bredding Bird Point Count Station.

APPENDIX E

TREE INVENTORY TABLE - 6TH LINE FROM 20TH SIDEROAD TO ST. JOHN'S ROAD

Project: TA8487

Client: HDR Date: May 19, 2015

Collectors: LMC, SLL Area: Sixth Line

TAG#	Species Scientific Name	Species Common Name	DBH (cm)	CONDITION																Managemet			COMMENTS
				TI	CS	CV	Radial Dripline (m)	Co-dominant stem	Included Bark	Lean, Dir.	Fungus	Insects	Cavity	Rot	Wound	Frost Crack	Epicormic	EAB	Canker	CDB (%)	Remove	Protect	ESA/SARA	
1	Fraxinus pennsylvanica	red ash	11.0	g	g	g	3															X		
2	Ulmus americana	white elm	21.0	g	g	g	4															X		
3	Fraxinus pennsylvanica	red ash	13.0	g	f	f	3															X		vitripa dominant in canopy
4	Fraxinus pennsylvanica	red ash	6,13,14	f	f	f	4								x							X		
5	Fraxinus pennsylvanica	red ash	15,16	f	f	f	3	x	x								x					X		
6	Pinus sylvestris	Scots pine	12,14	g	f	f	3													30	X			
7	Thuja occidentalis	eastern white cedar	~18,12	g	g	g	4															X		
8	Acer negundo	Manitoba maple	24,26,22,15	p	p	g	5							x	x					30		X		vitripa dominant in canopy
9	Pinus sylvestris	Scots pine	19.0	g	f	f	3													30	X			
10	Pinus sylvestris	Scots pine	19.0	g	f	f	3													30	X			
11	Pinus sylvestris	Scots pine	16.0	g	f	f	3									x				10	X			topped
12	Acer negundo	Manitoba maple	11,12,8,13	f	f	f	4										x				X			
18	Acer negundo	Manitoba maple	15,9,5	p	p	p	3										x			35	X			vitripa and cynross dominant in canopy
19	Fraxinus pennsylvanica	red ash	12,8,14,7	g	f	f	3														X			
20	Fraxinus pennsylvanica	red ash	14,8	f	p	p	3														X			
21	Juniperus virginiana	eastern red cedar	25.0	g	g	g	4														X			galls
22	Juniperus virginiana	eastern red cedar	16.0	g	g	g	1														X			galls
23	Juniperus virginiana	Eastern red cedar	15,12,8	g	g	g	3														X			
24	Fraxinus pennsylvanica	red ash	34.0	f	f	f	4													30	X			

25	Fraxinus pennsylvanica	red ash	27.0	f	f	f	3												30	X			
26	Fraxinus pennsylvanica	red ash	18,6	f	f	f	3												30	X			
27	Juniperus virginiana	Eastern red cedar	20.0	g	f	f	3													X			
28	Juniperus virginiana	Eastern red cedar	19.0	g	g	g	3													X			
29	Juniperus virginiana	Eastern red cedar	14,7,5	g	g	g	3													X			
30	Juniperus virginiana	Eastern red cedar	17.0	g	g	g	3													X			
31	Juniperus virginiana	Eastern red cedar	14.0	g	g	g	3													X			
38	Fraxinus pennsylvanica	red ash	~50	f	f	f	6										x			20	X			broken branches in canopy
39	Ulmus americana	White elm	18,32,13,19	g	g	g	6													5	X			
40	Malus sp.	apple	23,18,12	g	g	g	3													10	X			
41	Malus sp.	apple	18.0	g	g	g	3														X			
42	Malus sp.	apple	14,8	g	g	g	3														X			
43	Juniperus virginiana	Eastern red cedar	22.0	g	g	f	4													5	X			vitripa dominant in canopy
44	Fraxinus pennsylvanica	red ash	13.0	g	g	g	3														X			18
45	Malus sp.	apple	11,12,13	g	g	g	4														X			
46	Malus sp.	apple	18,17	g	g	g	3														X			
47	Malus sp.	apple	15,18,12	g	g	g	4										x				X			
48	Ulmus americana	White elm	20.0	p	p	p	3										x				X			
49	Ulmus americana	White elm	18.0	p	p	p	3														X			
56	Acer negundo	Manitoba maple	12.0	g	g	g	3														X			
57	Populus tremuloides	trembling aspen	17.0	g	g	g	3													5	X			vitripa dominant in canopy
67	Thuja occidentalis	Eastern white cedar	33.0	g	g	g	4														X			
68	Thuja occidentalis	Eastern white cedar	19,14,9,9	g	f	f	3														X			
69	Acer saccharinum	silver maple	13,9,12,8,7	g	g	g	5														X			
76	Pyrus sp.	pear	24.0	f	f	f	3													40	X			vitripa dominant in canopy
77	Juniperus virginiana	Eastern red cedar	22.0	f	f	f	4	x	x											30	X			
78	Ulmus americana	White elm	29.0	g	g	g	4											x			X			
79	Juniperus virginiana	Eastern red cedar	14.0	g	f	f	3														X			
80	Fraxinus pennsylvanica	red ash	35.0	g	g	g	6														X			
81	Fraxinus pennsylvanica	red ash	14,12	g	g	g	5													5	X			

82	Fraxinus pennsylvanica	red ash	24.0	g	g	g	5													5	X			galls
83	Fraxinus pennsylvanica	red ash	28,33	g	f	f	5													30	X			
84	Fraxinus pennsylvanica	red ash	12.0	g	g	g	3														X			
85	Fraxinus pennsylvanica	red ash	24.0	g	g	g	4														X			
86	Fraxinus pennsylvanica	red ash	11,5	g	g	g	3	x	x												X			
87	Fraxinus pennsylvanica	red ash	11,12	g	g	g	4	x	x											5	X			
88	Fraxinus pennsylvanica	red ash	15,4	g	g	g	3														X			
89	Fraxinus pennsylvanica	red ash	20.0	f	f	f	4													40	X			
90	Fraxinus pennsylvanica	red ash	12.0	g	g	g	3														X			
91	Fraxinus pennsylvanica	red ash	25,14	g	f	f	3													40	X			
92	Fraxinus pennsylvanica	red ash	15,11,18	f	f	f	3													30	X			
93	Fraxinus pennsylvanica	red ash	31.0	g	g	g	4														X			
94	Fraxinus pennsylvanica	red ash	11.0	g	g	g	2													10	X			
95	Fraxinus pennsylvanica	red ash	22.0	p	p	f	3													40	X			broken branches
96	Fraxinus pennsylvanica	red ash	15.0	g	g	g	3														X			
97	Fraxinus pennsylvanica	red ash	18.0	g	g	g	4														X			
98	Fraxinus pennsylvanica	red ash	22.0	g	f	f	4													20	X			broken branches
99	Fraxinus pennsylvanica	red ash	30.0	g	g	g	5														X			
100	Fraxinus pennsylvanica	red ash	29.0	g	g	g	4	x	x												X			
101	Fraxinus pennsylvanica	red ash	15.0	f	f	f	3													20	X			
102	Fraxinus pennsylvanica	red ash	18.0	f	f	f	4														X			
103	Fraxinus pennsylvanica	red ash	21.0	f	f	f	4														X			
104	Fraxinus pennsylvanica	red ash	22.0	f	f	f	4														X			
105	Thuja occidentalis	Eastern white cedar	26,19,13	g	g	g	6													5	X			
106	Fraxinus pennsylvanica	red ash	16,11	f	p	p	3													60	X			
107	Fraxinus pennsylvanica	red ash	10,12	f	p	p	2													60	X			
108	Fraxinus pennsylvanica	red ash	11.0	g	g	g	1														X			
109	Thuja occidentalis	Eastern white cedar	10.0	g	g	g	1														X			
110	Fraxinus pennsylvanica	red ash	23,22,19	g	f	g	5													10	X			
111	Fraxinus pennsylvanica	red ash	26.0	g	g	g	4														X			

112	Fraxinus pennsylvanica	red ash	10,9,7,5	f	p	p	4													60	X			
113	Fraxinus pennsylvanica	red ash	27,30,22	f	p	p	5	x	x											60	X			
114	Salix x sepulcralis	willow hybrid	~131	g	f	f	2	x	x												X			pruning wounds
115	Pinus strobus	white pine	12.0	g	g	g	1														X			
116	Pinus strobus	white pine	15.0	g	g	g	1														X			
117	Fraxinus pennsylvanica	red ash	33,23	g	g	g	4														X			
118	Fraxinus pennsylvanica	red ash	15.0	g	g	g	3														X			
119	Fraxinus pennsylvanica	red ash	20.0	g	g	g	4														X			
120	Fraxinus pennsylvanica	red ash	19.0	p	p	p	3													90	X			
121	Fraxinus pennsylvanica	red ash	24,15	g	f	f	4													40	X			
122	Fraxinus pennsylvanica	red ash	25.0	g	f	f	4														X			
123	Thuja occidentalis	Eastern white cedar	10.0	g	f	f	1														X			
124	Fraxinus pennsylvanica	red ash	18.0	g	g	g	3														X			
125	Fraxinus pennsylvanica	red ash	18.0	g	g	g	4														X			
126	Fraxinus pennsylvanica	red ash	14.0	g	g	g	3														X			
127	Fraxinus pennsylvanica	red ash	18.0	g	g	g	4														X			
128	Fraxinus pennsylvanica	red ash	13.0	g	g	g	3														X			
129	Fraxinus pennsylvanica	red ash	15.0	p	p	p	4			m,e										90	X			
130	Salix x sepulcralis	willow hybrid	45,25	g	g	g	6														X			
131	Acer negundo	Manitoba maple	10,12,14,9	g	g	g	5										x				X			
132	Fraxinus pennsylvanica	red ash	12.0	g	f	f	4													30	X			
133	Juniperus virginiana	Eastern red cedar	21.0	g	g	g	4														X			
134	Fraxinus pennsylvanica	red ash	10.0	g	f	f	3													40	X			
135	Fraxinus pennsylvanica	red ash	25.0	g	g	g	5														X			
136	Juniperus virginiana	Eastern red cedar	7,19,20	g	g	g	4								x						X			
137	Fraxinus pennsylvanica	red ash	24.0	g	g	g	4														X			
138	Fraxinus pennsylvanica	red ash	23.0	g	g	g	4													30	X			
139	Fraxinus pennsylvanica	red ash	12.0	g	f	f	3													30	X			
140	Fraxinus pennsylvanica	red ash	42.0	g	g	g	5														X			
144	Fraxinus pennsylvanica	red ash	15,18,19	g	f	f	5													30	X			

145	Acer negundo	Manitoba maple	22,18,12	f	f	f	6	x	x						x						X			
146	Populus balsamifera	balsam poplar	15,8,9	p	p	p	3		x					x	x						X			girdled by fence
147	Ulmus americana	White elm	18.0	g	g	g	4														X			
148	Juniperus virginiana	Eastern red cedar	12,14	g	g	g	3														X			galls
149	Juniperus virginiana	Eastern red cedar	18.0	g	g	g	3														X			galls
150	Ulmus americana	White elm	13.0	g	g	g	3										x				X			
151	Populus tremuloides	trembling aspen	18.0	g	g	g	4														X			
158	Populus tremuloides	trembling aspen	22.0	g	g	g	4														X			
159	Populus tremuloides	trembling aspen	10.0	g	g	g	1														X			
161	Thuja occidentalis	Eastern white cedar		g	g	g	1														X			cedar hedge
162	Populus balsamifera	balsam poplar	8,14,13	g	g	g	4														X			
163	Populus balsamifera	balsam poplar	12.0	g	g	g	3														X			

APPENDIX F

BREEDING BIRD SPECIES IDENTIFIED
6TH LINE FROM 20TH SIDEROAD TO ST. JOHN'S ROAD

APPENDIX F.
BREEDING BIRD SPECIES DOCUMENTED IN STUDY AREA 'B' BY LGL (2015)
6TH LINE FROM 20TH SIDEROAD TO ST. JOHN'S ROAD

Scientific Name	Common Name	SARA[1]	ESA[1]	Legal Status[1]	Other[1]	BBE[2]	Station #[3]
Accipiter cooperii	Cooper's Hawk			FWCA(P)	SWH/INT	H	11
Charadrius vociferus	Killdeer			MBCA		T	4, 6, 7, 10, 11, 12
Zenaida macroura	Mourning Dove			MBCA		T	10
Coccyzus erythropthalmus	Black-billed Cuckoo			MBCA		S	7
Empidonax traillii	Willow Flycatcher			MBCA		T	8
Myiarchus crinitus	Great-crested Flycatcher			MBCA		T	5, 10, 11, 12
Tyrannus tyrannus	Eastern Kingbird			MBCA		CF	5, 8
Vireo olivaceus	Red-eyed Vireo			MBCA	INT	S	11
Cyanocitta cristata	Blue Jay			FWCA (P)		T	1, 5, 10
Corvus brachyrhynchos	American Crow			MBCA		CF	5, 8, 10, 12
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		[redacted]	[redacted]
Poecile atricapillus	Black-capped Chickadee			MBCA		S	1
Troglodytes aedon	House Wren			MBCA		S	12
Turdus migratorius	American Robin			MBCA		CF	1, 4, 5, 8, 10, 12
Dumetella carolinensis	Gray Catbird			MBCA		T, A	5
Sturnus vulgaris	European Starling					CF	3, 4, 5, 9, 10
Bombycilla garrulus	Cedar Waxwing			MBCA		T	1, 12
Dendroica petechia	Yellow Warbler			MBCA		CF	1, 6, 7, 8, 11, 12
Seiurus aurocapilla	Ovenbird			MBCA	SWH/INT	S	12
Geothlypis trichas	Common Yellowthroat			MBCA		T, A	7, 8, 12
Spizella passerina	Chipping Sparrow			MBCA		H	10
Spizella pusilla	Field Sparrow			MBCA		S	8
Passerculus sanwichensis	Savannah Sparrow			MBCA	SWH	T, A	5, 8, 11
Melospica melodia	Song Sparrow			MBCA		CF	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12
Spizella pallida	Clay-coloured Sparrow			MBCA		S	5
Cardinalis cardinalis	Northern Cardinal			MBCA		H	12
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Agelaius phoeniceus	Red-winged Blackbird					T, A	3, 4, 5, 7, 11, 12
Quiscalus quiscula	Common Grackle					T	2, 4
Carduelis tristis	American Goldfinch			MBCA		CF	2, 3, 5, 6, 7, 11
Passer domesticus	House Sparrow					H	12

[1]For definitions of species ranks, refer to **Appendix C**.

[2]BBE - Breeding Bird Evidence (according to Bird Studies Canada):

Possible Breeding:
H - Species observed in its breeding season in suitable nesting habitat.
S - Singing male present in its breeding season in suitable nesting habitat.

Probable Breeding:
T - Permanent territory presumed through registration of territorial song on at least two days, a week or so apart, at the same place.
A - Agitated behaviour or anxiety calls of an adult.

Confirmed Breeding:
NU - Used nest or egg shell found (occupied or laid within the period of study).
FY - Recently fledged young or downy young, including young incapable of sustained flight.
CF - Adult carrying food for young.
NE - Nest containing eggs.
NY - Nest with young seen or heard.

[3]Breeding Bird Point Count Station.