

Chapter 3 – Existing and Future Conditions



407 TRANSITWAY - KENNEDY ROAD TO BROCK ROAD

MINISTRY OF TRANSPORTATION - CENTRAL REGION

3. EXISTING AND FUTURE CONDITIONS

This section describes the existing and future conditions (without the implementation of the 407 Transitway) found within the study area. The study area includes a one kilometer wide corridor centered on 407 ETR from east of Kennedy Road to east of Brock Road. The description of the existing and future conditions provided a baseline for the generation of alternatives, assessment of environmental impacts and the identification of environmental protection measures and monitoring plans. The identification of the environmental features (i.e. transportation infrastructure, natural, social and cultural environment) involved collection of primary and secondary source data including consultation with technical agencies. This was done in two steps, an inventory and analysis of existing conditions and an investigation as to how these conditions might change in the future. In general, the existing and future conditions can be categorized into the following topics and are presented in the associated sections:

- Natural Environment;
- Socio-Economic and Cultural Environment;
- Transportation; and,
- Utilities.

3.1. Natural Environment

3.1.1. Physiography and Soils

The study area is located within the Peel Plain and South Slope physiographic regions, which extend through the central portions of the Regions of York and Durham. The Peel Plain is a level to undulating tract of clay soils with imperfect drainage, through which the Rouge River and its tributaries have carved deep valleys. The South Slope is an interlobate moraine characterized by scattered drumlins pointing directly up-slope, with streams, including those of the Petticoat Creek and Duffins Creek watersheds, cutting sharply sloped valleys (Chapman and Putnam, 1984).

Soils surrounding 407 ETR in the study area are classified as: Peel clay and clay loam; Berrien sandy loam; Malton clay; Milliken loam; and, Woburn loam (Olding et al., 1956 and Hoffman and Richards, 1955).

Regional Geology

The surficial geology of the study area consists of three main distinct areas:

- shallow glacial lake sediments of sand, silt and clay in the western portion (Kennedy to McCowan Roads);
- transition to glacial deposits of fine-grained to sandy tills (east of McCowan Road to Brock Road); and,
- silt, sand and gravel glacial lake deposits in the lower elevations within the Duffins Creek valley (east of Brock Road).

In addition to the three main surficial geologic areas, watercourse valleys that cross the study area will contain recent stream deposits.

3.1.2. Contaminated Properties and Waste

Based on the existing land use information obtained to date, there are some properties within the study area which would require further environmental investigation to assess the potential presence of subsurface impacts. In general, properties currently or historically developed as service garages, gas stations, vehicles sales centres, auto body repair shops, manufacturing facilities, industrial properties and construction yards represent issues of potential environmental concern and contaminated materials may be encountered during construction activities.

3.1.3. Drainage

The present study focuses on the development of a drainage and SWM plan for the proposed Transitway that will minimize impacts on the existing watercourses and drainage patterns. A hydrologic and hydraulic analysis was undertaken for the proposed water crossings and mitigation measures are proposed where necessary. The proposed Transitway crosses a significant number of watercourses, some being major branches of creeks (such as Lower Rouge, Little Rouge, West Duffins Creek, Brougham Creek and others) and their tributaries, while others represent runoff conveyance systems such as ditches at highway ramps/interchanges or outlet channels from existing SWM ponds (especially within Rouge River Watershed in the City of Markham). Approximately 45 crossings have been identified within the study limits.

A hydrologic analysis using Visual OttHymo was conducted for the creek crossings and tributaries, whereas for the other runoff conveyance systems (ditches, SWM pond outlet channels) a separate analysis was carried out to ensure the proposed culverts were properly sized to convey the existing flows across the proposed Transitway. A HEC-RAS analysis was undertaken for the creek crossings using the existing HEC-RAS models from TRCA and updating them. In the instances where data was unavailable, new HEC-RAS models were created. Proposed culverts/bridges were sized such that they meet MTO standards. Subsequent to finalizing the hydraulic analysis of each creek crossing and tributary, floodplain mapping was generated/updated.

3.1.4. Groundwater

Shallow local groundwater flow within the study area is expected to reflect local topography and be toward surface water features. Deeper regional groundwater flow is expected to be to the south. Based on the surficial geology of the study area, significant areas of groundwater recharge are not expected within most of the study area. A relatively higher level of groundwater recharge is likely occurring associated with the relatively sandier portions of the glacial lake sediments in the vicinity of Kennedy Road and McCowan Road. Groundwater discharge in the study area is expected to be limited primarily to the lower elevation stream valley areas, with potentially a minor component within shallow stream features in the till deposits.

Aquifers within the western and central portions of the study area have been reported at between 20 m and 50 m below the ground surface and lie within sand and gravel deposits. Wells drilled within these areas show water levels above the aquifer indicating that the aquifer is under artesian pressure. In the vicinity of Brock Road to the east, the aquifer is shallower (approximately 10 m below ground surface).

No areas of significant groundwater discharge are expected within the study area. Any groundwater discharge will likely be associated with the watercourse valleys only.

Well records indicate that water wells have been used throughout the study area historically. However, with the urbanization of the City of Markham in the west, well use is not expected west of Donald Cousens Parkway. East of this area, water well use is expected and will likely be associated with residences and/or agriculture. According to mapping from the Regional Municipalities of York and Durham, wellhead protection areas and municipal wells are absent from the study area. According to MOECC's Source Water Protection Map, there are no Source Water Protection Areas/Intake Protection Zones within the study area.

3.1.5. Fish and Aquatic Habitat

Background information was collected from several sources including the MNRF and TRCA. The study area spans three separate watersheds: Rouge River, Petticoat Creek and Duffins Creek. All three watersheds are managed under the jurisdiction of MNRF Aurora District and TRCA.

A search of the NHIC database, DFO, and TRCA aquatic species at risk mapping (2014) was completed and revealed one Aquatic Species at Risk: Redside Dace (*Clinostomus elongatus*) as occurring within the study area. This species is regulated as 'Endangered' under the Ontario ESA.

In accordance with the *MTO Environmental Guide for Fish and Fish Habitat* (2009) (Fish Guide), a project notification and MNRF information request letter was sent to the MNRF Aurora District Office on August 5, 2014, requesting information regarding the thermal regime, habitat information, available data, fisheries management considerations, sensitivity and in-water timing windows for construction. A response was received from the Aurora District Office on May 11, 2015. Field investigations were conducted on April 28-29, May 1, August 25-26 and September 1-2, 2015 to identify and document fish habitat along the study area. The fisheries investigation was carried out in accordance with the MTO Fisheries Protocol (2013).

Based on results of the field investigations, a request was submitted to MNRF on September 17, 2015 to reconsider some of the watercourse sensitivities. A response was received on October 7, 2015 with the MNRF response to requested changes in sensitivity. Detailed information regarding Redside Dace habitat was requested from MNRF on August 25, 2015 and February 9, 2016. A response was received from Adam Challice on March 11, 2016 outlining the detailed Redside Dace habitat (recovery or contributing) by watercourse. **Table 3.1** presents the updated watercourse sensitivity.

Existing Aquatic Habitat Conditions

Aquatic habitat for each of the watercourse crossings within the study area were documented in detail after field investigations were completed. A summary of the existing fish and fish habitat conditions based on secondary source data and field investigation is presented in **Table 3.1** and illustrated in **Figures 3.1 to 3.3**. All watercourses within the study area flow in a north to south direction, except for the three tributaries of the Rouge River. Below is a general description of the watersheds and watercourses which occur within the 407 Transitway study area. Also included is a brief classification of sensitivity based on the watercourse features.

Rouge River Watershed

There are 11 crossings of Rouge River watershed watercourses occurring within the study area: three watercourses in Central Main Rouge River subwatershed; two within the Lower Main Rouge River subwatershed; and six within the Lower Little Rouge River subwatershed. According to the review of the Draft

Rouge River Fisheries Management Plan (MNR and TRCA 2010) and correspondence with the MNRF (2015), tributaries of the Rouge River that occur within the study area support warmwater, coolwater and coldwater fish communities. However, according to field work completed by LGL Limited in 2003 for the Highway 7 Transitway, many of the Rouge River tributaries, including the main branch, have been classified as coldwater or coolwater (LGL Limited 2005). The main branch of the Rouge River is known to support migratory salmonid runs, however the extent of natural reproduction is currently not known (MNR and TRCA 2010).

The Draft Rouge River Fisheries Management Plan (MNR and TRCA 2010), Aquatic Species at Risk Mapping (DFO 2014), and, personal correspondence with the MNRF indicate that Redside Dace habitat (recovery or contributing) occurs within several tributaries, including the main branch of the Rouge River within the study area. Below, there are descriptions of each of the watercourses that are being affected by the 407 Transitway corridor and proposed station locations.

One aquatic Species at Risk, Redside Dace (*Clinostomus elongatus*) occurs in the Rouge River Watershed within the study area. This species is regulated as 'Endangered' under the Ontario *ESA, 2007*. Redside Dace habitat (direct or contributing) occurs within several tributaries, including the Main branch of the Rouge River within the study area (DFO/OMNR/TRCA 2014).

Petticoat Creek Watershed

Petticoat Creek crosses the Transitway corridor west of York-Durham Line, and according to the Petticoat Creek Watershed Action Plan (TRCA and Rouge Park 2012), this watercourse has "low sensitivity". The watershed report states that much of the flow within the tributaries of this watershed is provided by surface flow, therefore these tributaries are likely intermittent/ephemeral and may support an indirect or seasonal warmwater fish community (TRCA and Rouge Park 2012). No aquatic Species at Risk are known to occur within the Petticoat Creek watershed (DFO/OMNR/TRCA 2014).

Duffins Creek Watershed

There are 18 watercourses in the Duffins Creek watershed that occur within the Transitway corridor; five watercourses within the West Duffins Creek subwatershed, five watercourses within the Whitevale Creek subwatershed, two watercourses within the Ganatsekiagon Creek subwatershed, three watercourses within the Urfe Creek subwatershed and three watercourses within the Brougham Creek subwatershed. According to the Duffins Creek Watershed Plan (TRCA 2002) and correspondence with the MNRF, these watercourses support predominately coolwater fish communities and are managed for Redside Dace, darter species and Rainbow Trout (*Oncorhynchus mykiss*). The coldwater watercourses within Duffins Creek watershed that occurs within the study area are managed for Brook Trout and Atlantic Salmon (TRCA 2002).

The Aquatic Species at Risk Mapping and correspondence with the MNRF indicate that Redside Dace habitat (Occupied or Contributing) occurs in several tributaries of Duffins Creek within the transitway corridor. Redside Dace-regulated watercourses include channel reaches downstream of the study area in Ganatsekiagon Creek, Urfe Creek and in the vicinity of the east end of the study area in the East Duffins Creek subwatershed (Brougham Creek) (DFO 2014). MNRF classified these watercourses as coldwater fish habitat and high sensitivity.

TABLE 3.1: EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

WATERCOURSE	UTM COORDINATES (ZONE 17T)	FLOW	THERMAL REGIME	SUBSTRATE TYPE	VEGETATION	SUPPORTS A FISHERY	FISH SPECIES PRESENT	MNRF IDENTIFIED HABITAT SENSITIVITY (AS PER FISHERIES PROTOCOL)
ROUGE RIVER WATERSHED								
R1: Tributary of the Rouge River	17T 637112 m E 4857012 m N	Intermittent	Warmwater	Rip rap, silt	Cattails, red osier dogwood, shrub willow, Reed Canary Grass	Indirect	Rainbow Trout, Redside Dace, Brown Bullhead, Rock Bass, Pumpkinseed, Smallmouth Bass, Largemouth Bass, Yellow Perch, Rainbow Darter, Cyprinidae Spp. (MNRF 2015)	Moderate
R2: Tributary of the Rouge River	17T 637411 m E 4856991 m N	Ephemeral	Warmwater	Silt, detritus	<i>Phragmites</i> , cattails, jewelweed, watercress	Indirect	Rainbow Trout, Redside Dace, Brown Bullhead, Rock Bass, Pumpkinseed, Smallmouth Bass, Largemouth Bass, Yellow Perch, Rainbow Darter, Cyprinidae Spp. (MNRF 2015)	Moderate
R3: Tributary of the Rouge River	17T 637515 m E 4857050 m N	Permanent	Warmwater	Silt, gravel, cobble, detritus	Cattails, <i>Phragmites</i> , overhanging grasses, jewelweed and shrub willow (riparian)	Direct	Rainbow Trout, Redside Dace, Brown Bullhead, Rock Bass, Pumpkinseed, Smallmouth Bass, Largemouth Bass, Yellow Perch, Rainbow Darter, Cyprinidae spp. (MNRF 2015) Brook Stickleback (LGL 2015)	Moderate
R4: Rouge River	17T 640546 m E 4858353 m N	Permanent	Coolwater	Cobble, silt, gravel, sand, boulder	Cattail, grasses, <i>Phragmites</i> along fringe. Mixed forest riparian.	Direct	Rainbow Trout, Redside Dace, Brown Bullhead, Rock Bass, Pumpkinseed, Smallmouth Bass, Largemouth Bass, Yellow Perch, Cyprinidae spp. (MNRF 2015) Common Carp (LGL 2015)	High
R5: Tributary of the Rouge River	17T 642139 m E 4858871 m N	Permanent	Coolwater	Silt, detritus	<i>Phragmites</i> , cattails, algae, shrub willow.	Direct	Coho Salmon, Chinook Salmon, Rainbow Trout, Brown Trout, Goldfish, Redside Dace, Smallmouth Bass, Yellow Perch, Rainbow Darter, Cyprinidae spp. (MNRF 2015)	Moderate
R6: Tributary of Little Rouge Creek	17T 642502 m E 4859023 m N	Permanent	Coolwater	Silt, gravel, detritus, rip rap	Cattails, <i>Phragmites</i> , jewelweed, crack willow, instream grasses	Direct	Rainbow Trout, Brown Trout, Rock Bass, Pumpkinseed, Smallmouth Bass, Largemouth Bass, Cyprinidae spp. (MNRF 2015) Northern Redbelly Dace, Creek Chub (LGL 2015)	Moderate
R7: Tributary of Little Rouge Creek	17T 643109 m E 4859368 m N	Permanent	Coldwater	Silt, detritus, cobble	Cattails, <i>Phragmites</i> , instream grasses, red osier dogwood, algae	Direct	Rainbow Trout, Brown Trout, Rock Bass, Pumpkinseed, Smallmouth Bass, Largemouth Bass, Cyprinidae spp. (MNRF 2015) Northern Redbelly Dace, Creek Chub (LGL 2015)	Moderate
R7a: Tributary of Little Rouge Creek	17T 643257 m E 4859331 m N	Ephemeral	Coldwater	Silt, detritus, cobble	Cattails, <i>Phragmites</i> , instream grasses, red osier dogwood, algae	Direct	Rainbow Trout, Brown Trout, Rock Bass, Pumpkinseed, Smallmouth Bass, Largemouth Bass, Cyprinidae Spp. (MNRF 2015) Cyprinidae Spp. (LGL 2015)	Moderate
R8: Tributary of Little Rouge Creek	17T 643840 m E 4859656 m N	Permanent	Coolwater	Silt, detritus	Cattails, <i>Phragmites</i> , Canada waterweed instream/ overhanging grasses (reed canary grass), crack willow riparian	Direct	No fisheries information available (MNRF 2015) No fish observed or captured (LGL 2015)	Moderate
R9: Tributary of Little Rouge Creek	17T 644309 m E 4859602 m N	Intermittent	Coolwater	Silt, detritus	Cattails, <i>Phragmites</i> , algae instream/ overhanging grasses, dog strangling vine, goldenrod, asters, bur-marigold.	Indirect	No fisheries information available (MNRF 2015). No fish observed or captured (LGL 2015)	Low
R10: Little Rouge Creek	17T 644561 m E 4859934 m N	Permanent	Coldwater	Cobble, gravel, sand, silt, Boulder	Cattails, overhanging grasses instream/mixed forest along east bank and wetland veg along west side (Joe-Pye-weed, angelica, elecampane)	Direct	Rainbow trout, Atlantic Salmon, Brown Trout, Rock Bass, Smallmouth Bass, Largemouth Bass, Yellow Perch, Cyprinidae spp. (MNRF 2015) White Sucker (LGL 2015)	High
R11: Tributary of Little Rouge Creek	17T 644770 m E 4859924 m N	Ephemeral	Warmwater	Upland soils	Terrestrial vegetation (cultural meadow species)	None	None	None

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WATERCOURSE	UTM COORDINATES (ZONE 17T)	FLOW	THERMAL REGIME	SUBSTRATE TYPE	VEGETATION	SUPPORTS A FISHERY	FISH SPECIES PRESENT	MNRF IDENTIFIED HABITAT SENSITIVITY (AS PER FISHERIES PROTOCOL)
PETTICOAT CREEK WATERSHED								
P1: Petticoat Creek	17T 645216 m E 4860351 m N	Ephemeral	Warmwater	Silt, detritus	Cattails, <i>Phragmites</i> , reed canary grass, smartweed sp.	None	Rainbow Trout, Atlantic Salmon, Brook Trout, Cyprinidae spp. (MNRF 2015)	Low
DUFFINS CREEK WATERSHED								
D1: West Duffins Creek	17T 646303 m E 4862095 m N	Permanent	Coldwater	Cobble, gravel, sand, silt, boulder	Riparian grasses	Direct	Rainbow Trout, Brook Trout, Pumpkinseed, Rainbow Darter, Mottled Sculpin, Cyprinidae spp. (MNRF 2015)	High
D2: Tributary of West Duffins Creek	17T 646450 m E 4862042 m N	Ephemeral	Coldwater	Silt, detritus	Cattails	None	none	Low
D3: Tributary of West Duffins Creek	17T 646510 m E 4862369 m N	Permanent	Coldwater	Silt, cobble, gravel, sand	Instream grasses	Direct	Rainbow Trout, Brook Trout, Pumpkinseed, Rainbow Darter, Mottled Sculpin, Cyprinidae spp. (MNRF 2015)	Moderate
D4: Tributary of West Duffins Creek	17T 646868 m E 4862482 m N	Intermittent	Coldwater	Silt, detritus, cobble, gravel, sand	Instream and overhanging grasses, cattails, <i>Phragmites</i>	Direct	Rainbow Trout, Brook Trout, Pumpkinseed, Rainbow Darter, Mottled Sculpin, Cyprinidae spp. (MNRF 2015)	Moderate
D5: Tributary of West Duffins Creek	17T 647495 m E 4862342 m N	Ephemeral	Warmwater	Upland soils	Active agriculture	None	Rainbow Trout, Brook Trout, Pumpkinseed, Rainbow Darter, Mottled Sculpin, Cyprinidae spp. (MNRF 2015)	
D6: Tributary of Whitevale Creek	17T 647903 m E 4862503 m N	Ephemeral	Warmwater	Upland soils	Active agriculture	None	Rainbow Trout, Brook Trout, Pumpkinseed, Mottled Sculpin, Cyprinidae spp. (MNRF 2015)	None
D7 Tributary of Whitevale Creek	17T 648260 m E 4862615 m N	Ephemeral	Warmwater	Upland soils	Active agriculture	None	Rainbow Trout, Brook Trout, Pumpkinseed, Mottled Sculpin, Cyprinidae spp. (MNRF 2015)	None
D8: Tributary of Whitevale Creek	17T 648388 m E 4862861 m N	Intermittent	Coldwater	Silt, gravel, sand, cobble	Mostly terrestrial vegetation (asters, goldenrod) and reed canary grass	Indirect	Rainbow Trout, Brook Trout, Pumpkinseed, Mottled Sculpin, Cyprinidae spp. (MNRF 2015)	Moderate
D9: Tributary of Whitevale Creek	17T 648823 m E 4862785 m N	Ephemeral	Coldwater	Silt, detritus	Grasses, some cattail, sedges, smartweed, cultural meadow veg.	Indirect	Rainbow Trout, Brook Trout, Pumpkinseed, Mottled Sculpin, Cyprinidae spp. (MNRF 2015)	Moderate
D10: Whitevale Creek	17T 648871 m E 4862808 m N	Intermittent	Coldwater	Silt, detritus, gravel, sand, cobble	Instream and overhanging grasses (reed canary grass, brome), cattails, <i>Phragmites</i> , cultural meadow veg.	Indirect	Rainbow Trout, Brook Trout, Pumpkinseed, Mottled Sculpin, Cyprinidae spp. (MNRF 2015)	Moderate
D11: Tributary of Ganatsekiagon Creek	17T 649334 m E 4863064 m N	Intermittent	Coldwater	Silt, detritus	Instream and overhanging grasses, cattails	Indirect	American Brook Lamprey, Rainbow Trout, Brook Trout, Redside Dace, Largemouth Bass, Rainbow Darter, Mottled Sculpin, Slimy Sculpin, Cyprinidae spp. (MNRF 2015)	High

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D12: Ganatsekiagon Creek	17T 650317 m E 4863508 m N	Ephemeral	Coldwater	Silt, detritus	Instream and overhanging grasses, cattails	Indirect	American Brook Lamprey, Rainbow Trout, Brook Trout, Redside Dace, Largemouth Bass, Rainbow Darter, Mottled Sculpin, Slimy Sculpin, Cyprinidae spp. (MNRF 2015)	High
D13: Tributary of Urfe Creek	17T 651137 m E 4863835 m N	Intermittent	Coldwater	Silt, detritus, gravel, sand	Algae, overhanging grasses, cattails, watercress	Direct	Brook Trout, Redside Dace, Pumpkinseed, Mottled Sculpin, Cyprinidae spp. (MNRF 2015) Northern Redbelly Dace, Fathead Minnow, Brook Stickleback (LGL 2015).	High
D14: Tributary of Urfe Creek	17T 651228 m E 4863681 m N	Permanent	Coldwater	Silt, detritus, gravel, sand	Watercress, overhanging grasses	Direct	Brook Trout, Redside Dace, Pumpkinseed, Mottled Sculpin, Cyprinidae spp. (MNRF 2015)	High
D15: Urfe Creek	17T 651702 m E 4863957 m N	Permanent	Coldwater	Cobble, gravel, silt, sand, boulder	None	Direct	Brook Trout, Redside Dace, Pumpkinseed, Mottled Sculpin, Cyprinidae spp. (MNRF 2015)	High
D16: Brougham Creek	17T 652461 m E 4864320 m N	Permanent	Coldwater	Fine substrates, gravel patches	Watercress	Direct	American Brook Lamprey, Rainbow Trout, Brown Trout, Brook Trout, Redside Dace, Pumpkinseed, Smallmouth Bass, Largemouth Bass, Rainbow Darter, Slimy Sculpin, Cyprinidae spp. (MNRF 2015)	High
D17: Tributary of Brougham Creek	17T 652626 m E 4864379 m N	Permanent	Coldwater	Upland soils	None	Indirect	American Brook Lamprey, Rainbow Trout, Brown Trout, Brook Trout, Redside Dace, Pumpkinseed, Smallmouth Bass, Largemouth Bass, Rainbow Darter, Slimy Sculpin, Cyprinidae spp. (MNRF 2015)	High
D18: Tributary of Brougham Creek	17T 653152 m E 4864912 m N	Permanent	Coldwater	Cobble, gravel, sand, silt, boulder	None	Direct	American Brook Lamprey, Rainbow Trout, Brown Trout, Brook Trout, Redside Dace, Pumpkinseed, Smallmouth Bass, Largemouth Bass, Rainbow Darter, Slimy Sculpin, Cyprinidae spp. (MNRF 2015)	High

** MNRF Correspondence, Aurora District Office received May 11, 2015 and March 11, 2016

FIGURE 3.1: FISH AND FISH HABITAT WITHIN THE STUDY AREA

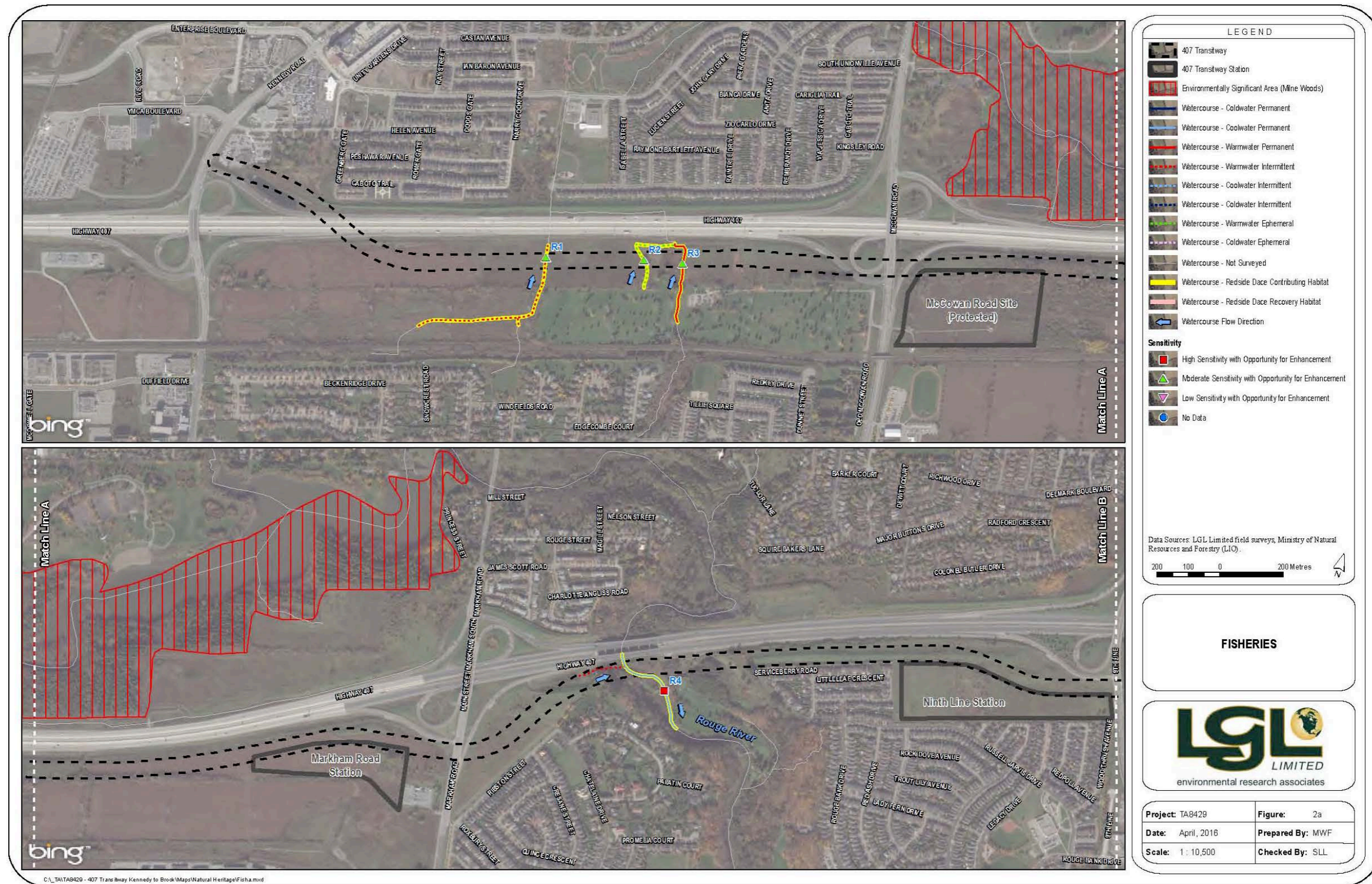
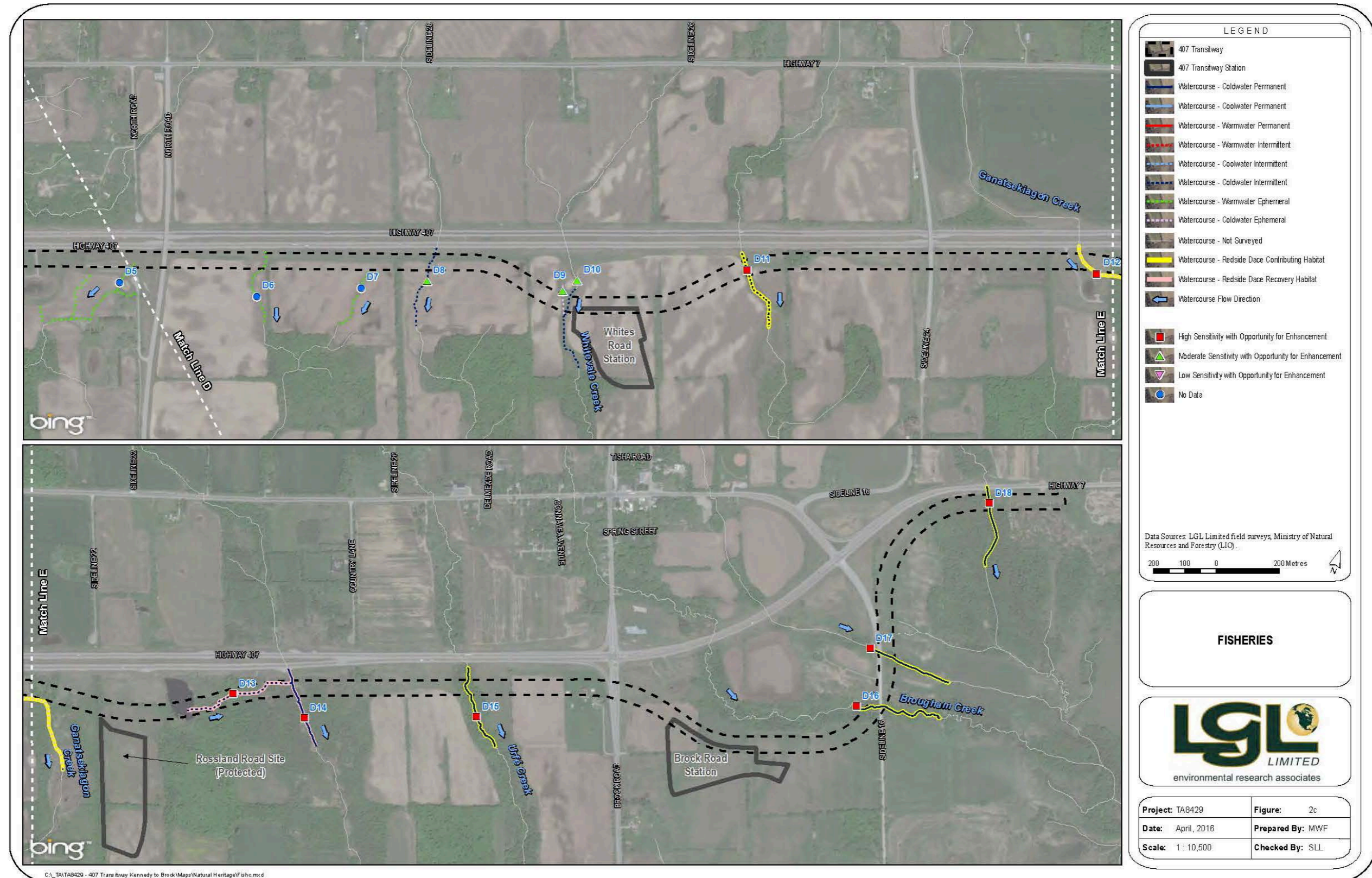


FIGURE 3.2: FISH AND FISH HABITAT WITHIN THE STUDY AREA



FIGURE 3.3: FISH AND FISH HABITAT WITHIN THE STUDY AREA



Sensitivity/Significance

The watercourses within the study area support a diversity of warmwater, coolwater, and coldwater fish communities. Many of the larger watercourse systems generally support healthy populations of native and non-native species including many which are migratory from Lake Ontario (i.e. salmonids). However all of the watercourses in the study area have experienced some type of impact from urbanization.

Redside Dace is listed provincially as an endangered species and is regulated by the ESA, 2007. The regulated watercourses within the study area which support this species will require specialized mitigation measures to prevent negative impacts to the species or its habitat, and may also require permits under the ESA, 2007 from the MNRF Aurora District office depending on the activities proposed.

The final sensitivity classifications, as agreed upon by MNRF and LGL, are outlined above for each watercourse in **Table 3.1**.

3.1.6. Vegetation and Vegetation Communities

The geographical extent, composition, structure and function of vegetation communities were identified through air photo interpretation and field investigations. Air photos were interpreted to determine the limits and characteristics of vegetation communities. Field investigations of the vegetation communities within the facility footprint of the 407 Transitway from Kennedy Road to east of Brock Road were conducted on April 29, May 1, May 6, June 9 and June 10, 2015.

The vegetation communities were classified according to the ELC for Southern Ontario: First Approximation and Its Application (Lee et al. 1998), to the extent possible. The communities were sampled using a plotless method for the purpose of determining general composition and structure of the vegetation. Plant species status was reviewed for Ontario (Oldham 2009), and the Toronto and Region Conservation Authority (2009). Vascular plant nomenclature follows Newmaster et al. (1998) with a few exceptions that have been updated to Newmaster et al. (2007).

Vegetation Communities

Vegetation communities consist of a mixture of forest, wetland and cultural communities. The majority of the vegetation has been disturbed by existing land uses including agricultural, residential, and infrastructure. 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 disturbance tolerant.

Natural/semi-natural features are typically restricted to the watercourse valleylands. The valleyland units contain a mixture of forest and wetland communities. These areas are generally of higher quality and contain a high proportion of specialized and native plant species.

Mixedwood Plains Ecozone

The Ontario portion of the Mixedwood Plains Ecozone is bounded along its southern and western edges by Lake Huron, Erie, and Ontario, and the St. Lawrence River (Crins, Grey, Uhlig, and Wester, 2009). The Mixedwood Plains Ecozone is the most densely populated area in Canada, and most of its natural areas have been converted for human uses (Crins, Grey, Uhlig, and Wester, 2009). The flora and fauna are among the most diverse in Canada, and the number of species at risk is high (Crins, Grey, Uhlig, and Wester, 2009).

Lake Erie-Lake Ontario Ecoregion

The Lake Erie-Lake Ontario Ecoregion extends from the Cities of Windsor and Sarnia east to the Niagara Peninsula and the City of Toronto, with shoreline on Lakes Huron, Erie, and Ontario (Crins, Grey, Uhlig, and Wester, 2009). This ecoregion contains the most diverse flora and fauna in Canada and is the most imperilled in Canada because of the amount of natural habitat that has been drained, cut, and converted to agricultural and suburban land uses (Crins, Grey, Uhlig, and Wester, 2009). Approximately 78% of the ecoregion has been converted to cropland and pasture, and 7% is developed land (Crins, Grey, Uhlig, and Wester, 2009). Of the remaining forest remnant, dense deciduous forest covers 10.3%, sparse deciduous forest covers 1.0%, and mixed deciduous forest covers 0.8% of the ecoregion (Crins, Grey, Uhlig, and Wester, 2009).

A total of 24 ecosites were identified within the study area. These communities include: Dry-Moist Old Field Meadow (CUM1-1), Mineral Cultural Savannah (CUS1), Mineral Cultural Thicket (CUT1), Mineral Cultural Woodland (CUW1), Coniferous Forest (FOC, FOC1-2, FOC2-2, and FOC4-1), Deciduous Forest (FOD5, FOD6-5, FOD7, and FOD7-2), Mixed Forest (FOM7-1 and FOM7-2), Meadow Marsh (MAM2-2, MAM2-5, MAM2-10), Shallow Marsh (MAS2, MAS2-1), Coniferous Swamp (SWC1-1), Deciduous Swamp (SWD2-2), Swamp Thicket (SWT2 and SWT2-2), and Open Aquatic (OAO).

There are several areas that are not identified by the ELC such as areas of manicured grass (M) which include mown lawns, gardens and planted trees. All vegetation communities identified through air photo interpretation are described in **Table 3.2** and presented in **Figures 3.4 to 3.6**. All of the vegetation communities identified within the study area are considered widespread and common in Ontario and are secure globally.

Flora

A total of 286 plant species have been recorded within the study area. Ten of these plants could only be identified to genus and are not included in the following calculations. Of the 276 plants identified to species, 183 (66%) plant species identified are native to Ontario and 93 (33%) plant species are considered introduced and non-native to Ontario.

TABLE 3.2: SUMMARY OF ECOLOGICAL LAND CLASSIFICATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
TERRESTRIAL – NATURAL/SEMI-NATURAL			
FOD	Deciduous Forest		
FOD5	Dry-Fresh Sugar Maple Deciduous	Canopy: includes sugar maple (<i>Acer saccharum</i> ssp. <i>saccharum</i>), red ash (<i>Fraxinus pennsylvanica</i>), white elm (<i>Ulmus americana</i>), and basswood (<i>Tilia americana</i>). Understory: includes chokecherry (<i>Prunus virginiana</i> var. <i>virginiana</i>), alternate-leaved dogwood (<i>Cornus alternifolia</i>), red-berried elder (<i>Sambucus racemosa</i> var. <i>racemosa</i>), and sugar maple. Ground Cover: includes Virginia water-leaf (<i>Hydrophyllum virginianum</i>), zig-zag goldenrod (<i>Solidago flexicaulis</i>), yellow avens (<i>Geum aleppicum</i>), and stellate sedge (<i>Carex rosea</i>).	<ul style="list-style-type: none"> • Tree cover > 60 % (FO). • Deciduous trees > 75 % of canopy cover (D). • Moderately dry to fresh moisture regime, sugar maple dominant (5).
FOD6-5	Fresh-Moist Sugar Maple-Hardwood Deciduous Forest	Canopy: includes sugar maple, American beech (<i>Fagus grandifolia</i>), red oak (<i>Quercus rubra</i>), yellow birch (<i>Betula alleghaniensis</i>), and basswood. Understory: includes ironwood (<i>Ostrya virginiana</i>), chokecherry, sugar maple, and bitternut hickory (<i>Carya cordiformis</i>). Ground cover: includes ostrich fern (<i>Matteuccia struthiopteris</i> var. <i>pennsylvanica</i>), wild lily-of-the-valley (<i>Maianthemum canadense</i>), purple trillium (<i>Trillium erectum</i>), stellate sedge, and Virginia water-leaf.	<ul style="list-style-type: none"> • Tree cover > 60 % (FO). • Deciduous trees > 75 % of canopy cover (D). • Moist to fresh moisture regime, sugar maple dominant (6). • Hardwood associates (-5).
FOD7	Fresh-Moist Lowland Deciduous Forest	Canopy: includes bur oak (<i>Quercus macrocarpa</i>), trembling aspen (<i>Populus tremuloides</i>), eastern white pine (<i>Pinus strobus</i>), sugar maple, and black walnut (<i>Juglans nigra</i>) Understory: includes common buckthorn (<i>Rhamnus cathartica</i>), guelder rose (<i>Viburnum opulus</i>), and tartarian honeysuckle (<i>Lonicera tatarica</i>). Ground Cover: includes blue cohosh (<i>Caulophyllum thalictroides</i>), graceful sedge (<i>Carex gracillima</i>), bitter nightshade (<i>Solanum dulcamara</i>), moneywort (<i>Lysimachia nummularia</i>).	<ul style="list-style-type: none"> • Tree cover > 60 % (FO). • Deciduous trees > 75 % of canopy cover (D). • Middle to lower slopes, seepage areas and bottomlands topographic positions (7).
FOD7-2	Fresh-Moist Ash Lowland Deciduous Forest	Canopy: includes Manitoba maple (<i>Acer negundo</i>), red ash, sugar maple, and slippery elm (<i>Ulmus rubra</i>). Understory: includes chokecherry, common buckthorn, riverbank grape (<i>Vitis riparia</i>), American fly honeysuckle (<i>Lonicera canadensis</i>), and red ash. Ground cover: includes field horsetail (<i>Equisetum arvense</i>), yellow rocket (<i>Barbarea vulgaris</i>), and dame's rocket (<i>Hesperis matronalis</i>).	<ul style="list-style-type: none"> • Tree cover > 60 % (FO). • Deciduous trees > 75 % of canopy cover (D). • Middle to lower slopes, seepage areas and bottomlands topographic positions (7). • Green ash or black ash dominant (-2).
FOC	Coniferous Forest		
FOC	Coniferous Forest	Canopy: includes European larch (<i>Larix decidua</i>), white spruce (<i>Picea glauca</i>), Austrian pine (<i>Pinus nigra</i>), and Scotch pine (<i>Pinus sylvestris</i>). Understory: includes white spruce, white elm, choke cherry, and eastern white cedar (<i>Thuja occidentalis</i>). Ground cover: includes prickly gooseberry (<i>Ribes cynobati</i>), common valerian (<i>Valeriana officinalis</i>), reed canary grass (<i>Phalaris arundinacea</i>), and zig-zag goldenrod.	<ul style="list-style-type: none"> • Tree cover > 60 % (FO). • Coniferous trees > 75 % of canopy cover (C).
FOC1-2	Dry-Fresh White Pine-Red Pine Coniferous Forest	Canopy: includes eastern white pine, eastern white cedar, and eastern hemlock (<i>Tsuga canadensis</i>). Understory: includes alternate-leaved dogwood, smooth juneberry (<i>Amelanchier laevis</i>), and paper birch (<i>Betula papyrifera</i>). Ground cover: includes garlic mustard (<i>Alliaria petiolata</i>), tall meadow-rue (<i>Thalictrum pubescens</i>), and blue-stem goldenrod (<i>Solidago caesia</i>).	<ul style="list-style-type: none"> • Tree cover > 60 % (FO). • Coniferous trees > 75 % of canopy cover (C). • Dry to fresh soil moisture regime (1) • White pine or red pine dominant (-2).
FOC2-2	Dry-Fresh White Cedar Coniferous Forest	Canopy: includes eastern white cedar, eastern hemlock, white elm, and red ash. Understory: includes riverbank grape, bitter nightshade, eastern white cedar, and common buckthorn, Ground cover: includes garlic mustard and swallow-wort (<i>Cynanchum rossicum</i>), and moneywort.	<ul style="list-style-type: none"> • Tree cover > 60 % (FO). • Coniferous trees > 75 % of canopy cover (C). • Dry-Fresh Cedar Forest (2). • White Cedar dominates (-2).
FOC4-1	Fresh-Moist White Cedar Coniferous	Canopy: includes eastern white cedar, eastern white pine, basswood, white elm and Scotch pine. Understory: includes common buckthorn, red-osier dogwood (<i>Cornus sericea</i> ssp. <i>sericea</i>), large-fruited thorn (<i>Crataegus punctata</i>) black walnut, and balsam poplar (<i>Populus balsamifera</i> ssp. <i>balsamifera</i>). Ground Cover: includes downy yellow violet (<i>Viola pubescens</i>), bulblet bladder fern (<i>Cystopteris bulbifera</i>), Canada anemone (<i>Anemone canadensis</i>), celandine (<i>Chelidonium majus</i>), moneywort, and spotted touch-me-not (<i>Impatiens capensis</i>).	<ul style="list-style-type: none"> • Tree cover > 60 % (FO). • Coniferous trees > 75 % of canopy cover (C). • White cedar dominant (4). • Dominated entirely by white cedar (-1).
FOM	Mixed Forest		
FOM7-1	Fresh-Moist White Cedar-Sugar Maple Mixed Forest	Canopy: includes eastern white cedar, sugar maple, yellow birch, and Manitoba maple. Understory: includes alternate-leaved dogwood, tartarian honeysuckle, staghorn sumac (<i>Rhus hirta</i>), purple flowering raspberry (<i>Rubus odartus</i>), and black walnut.	<ul style="list-style-type: none"> • Tree cover > 60 % (FO). • Coniferous trees > 25 % and deciduous trees > 25 % of canopy cover (M).

TABLE 3.2: SUMMARY OF ECOLOGICAL LAND CLASSIFICATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
		Ground Cover: includes tall meadow-rue, coltsfoot (<i>Tussilago farfara</i>), dame's rocket, blue cohosh, may-apple (<i>Podophyllum peltatum</i>), and downy yellow violet (<i>Viola pubescens</i>).	<ul style="list-style-type: none"> • Middle to lower slopes, seepage areas and bottomlands topographic positions (7). • White cedar and sugar maple dominant (-1).
FOM7-2	Fresh-Moist White Cedar-Hardwood Mixed Forest	<p>Canopy: includes eastern white cedar, balsam poplar, trembling aspen, white elm, black maple (<i>Acer nigrum</i>), and eastern cottonwood (<i>Populus deltoides</i> ssp. <i>deltoides</i>).</p> <p>Understory: includes common elderberry (<i>Sambucus nigra</i> ssp. <i>canadensis</i>), high bush cranberry (<i>Viburnum opulus</i> var. <i>americanum</i>), red ash, and chokecherry.</p> <p>Ground Cover: includes large-leaved aster (<i>Eurybia macrophylla</i>), zig-zag goldenrod, lily-of-the-valley (<i>Convallaria majalis</i>), stellate sedge, creeping Charlie (<i>Glechoma hederacea</i>), and moneywort.</p>	<ul style="list-style-type: none"> • Tree cover > 60 % (FO). • Coniferous trees > 25 % and deciduous trees > 25 % of canopy cover (M). • Middle to lower slopes, seepage areas and bottomlands topographic positions (7). • Hardwood associates (-2).
TERRESTRIAL – CULTURAL			
CUM		Cultural Meadow	
CUM1-1	Dry-Moist Old Field Meadow	<p>Emergent Trees/Shrubs: includes black walnut, hybrid willow (<i>Salix X sepulcralis</i>), red-osier dogwood (<i>Cornus sericea</i> ssp. <i>sericea</i>), common buckthorn, and red ash.</p> <p>Ground cover: includes curly-leaf dock (<i>Rumex crispus</i>), wild carrot (<i>Daucus carota</i>), reed canary grass, tall goldenrod (<i>Solidago canadensis</i> var. <i>scabra</i>), awnless brome (<i>Bromus inermis</i> ssp. <i>inermis</i>), and common mullein (<i>Verbascum thapsus</i>).</p>	<ul style="list-style-type: none"> • 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).
CUS1	Cultural Savannah		
CUS1	Mineral Cultural Savannah	<p>Canopy: includes trembling aspen, white willow (<i>Salix alba</i>), eastern white cedar, and balsam poplar.</p> <p>Understory: includes large-fruited hawthorn, common buckthorn, tartarian honeysuckle, and Manitoba maple.</p> <p>Ground cover: includes common comfrey (<i>Symphytum officinale</i> ssp. <i>officinale</i>), common valerian, Canada goldenrod (<i>Solidago canadensis</i>), New England aster (<i>Symphyotrichum novae-angliae</i>), and Kentucky blue grass (<i>Poa pretensis</i> ssp. <i>pratensis</i>).</p>	<ul style="list-style-type: none"> • Cultural communities (CU). • Tree cover <25% shrub cover >25% (S). • Mineral soil (1).
CUT1	Cultural Thicket		
CUT1	Mineral Cultural Thicket	<p>Canopy: includes Colorado spruce (<i>Picea pungens</i>), Scotch pine, eastern white cedar, black walnut, and Norway maple (<i>Acer platanoides</i>).</p> <p>Understory: includes common buckthorn, tartarian honeysuckle, black walnut, Manitoba maple, and eastern white cedar.</p> <p>Ground cover: includes common milkweed (<i>Asclepias syriaca</i>), awnless brome, poverty oat grass (<i>Danthonia spicata</i>), ribgrass (<i>Plantago lanceolata</i>), and black medick (<i>Medicago lupulina</i>).</p>	<ul style="list-style-type: none"> • Cultural community (CU). • Tree cover <25 %; shrub cover >25% (T). • Mineral soil (1).
CUW	Cultural Woodland		
CUW1	Mineral Cultural Woodland	<p>Canopy: includes eastern white pine, Scotch pine, black cherry (<i>Prunus serotina</i>), English hawthorn (<i>Crataegus monogyna</i>), and black locust (<i>Robinia pseudo-acacia</i>).</p> <p>Understory: includes English hawthorn, common lilac (<i>Syringa vulgaris</i>), red ash, eastern white cedar, and common buckthorn.</p> <p>Ground cover: includes field hawkweed (<i>Hieracium caespitosum</i>), tall buttercup (<i>Ranunculus acris</i>), alleghany blackberry (<i>Rubus allegheniensis</i>), and tufted vetch (<i>Vicia cracca</i>).</p>	<ul style="list-style-type: none"> • Cultural communities (CU). • 25 % < tree cover < 35 % • Mineral Soil (1).
WETLAND			
SWD	Deciduous Swamp		
SWD2-2	Green Ash Mineral Deciduous Swamp	<p>Canopy: includes balsam poplar, red ash, and slippery elm (<i>Ulmus rubra</i>).</p> <p>Understory: includes large-fruited thorn, red-osier dogwood, common buckthorn, and red ash.</p> <p>Ground cover: includes lake-bank sedge (<i>Carex lacustris</i>), common comfrey, fowl meadow grass (<i>Glyceria striata</i>), bristly sedge (<i>Carex comosa</i>), and spotted touch-me-not.</p>	<ul style="list-style-type: none"> • Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Deciduous tree cover >75% of canopy cover. • Ash dominant swamp (2). • Green ash dominant (-2).
SWC	Coniferous Swamp		
SWC1-1	White Cedar Mineral Coniferous Swamp	<p>Canopy: includes eastern white cedar, yellow birch and black ash (<i>Fraxinus nigra</i>).</p> <p>Understory: includes eastern white cedar, and riverbank grape.</p> <p>Ground cover: includes sensitive fern (<i>Onoclea sensibilis</i>), spotted touch-me-not and swallow-wort.</p>	<ul style="list-style-type: none"> • Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Conifer tree cover >75% of canopy cover (1). • Almost entire dominated by white cedar (-1).
SWT	Swamp Thicket		
SWT2	Mineral Thicket Swamp	<p>Canopy: includes crack willow (<i>Salix fragilis</i>), eastern cottonwood, white willow, red ash.</p> <p>Understory: includes red-osier dogwood, Missouri willow (<i>Salix eriocephala</i>), Manitoba maple, and red ash.</p>	<ul style="list-style-type: none"> • Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW).

TABLE 3.2: SUMMARY OF ECOLOGICAL LAND CLASSIFICATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Community Characteristics
		Ground cover: includes spotted-touch-me-not, reed canary grass, purple loosestrife (<i>Lythrum salicaria</i>), common reed (<i>Phragmites australis</i>), and broad-leaved cattail (<i>Typha latifolia</i>).	<ul style="list-style-type: none"> • Tree cover <25% hydrophytic shrubs >25% (T). • Mineral soil (2).
SWT2-2	Willow Mineral Thicket Swamp	Canopy: includes red ash, Manitoba maple, and crack willow. Understory: includes Missouri willow, red-osier dogwood, and Manitoba maple. Ground cover: includes fowl meadow grass, reed canary grass, fox sedge (<i>Carex vulpinoidea</i>), spotted-touch-me-not, and purple loosestrife.	<ul style="list-style-type: none"> • Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Tree cover <25% hydrophytic shrubs >25% (T). • Mineral soil (2). • Willow dominant (-2).
OAD	Open Aquatic		
OAD	Open Aquatic	Not applicable.	<ul style="list-style-type: none"> • Water depth >2 m (O). • No macrophyte vegetation, no tree or shrub cover (A). • Plankton dominated (O).
MAS	Shallow Marsh		
MAS2	Graminoid Mineral Shallow Marsh	Emergent Trees/Shrubs: includes red-osier dogwood. Ground cover: includes common reed and broad-leaved cattail.	<ul style="list-style-type: none"> • Tree and shrub cover <25% with variable flooding regimes (water depth <2m) (MA). • Water up to 2 m deep (MAS). • Mineral soil (2).
MAS2-1	Cattail Mineral Shallow Marsh	Emergent Trees/Shrubs: includes corkscrew willow (<i>Salix matsudana</i>), Missouri willow, and silver poplar (<i>Populus alba</i>). Ground cover: includes narrow-leaved cattail (<i>Typha angustifolia</i>), broad-leaved cattail, lesser duckweed (<i>Lemna minor</i>), common water plantain (<i>Alisma plantago-aquatica</i>), and water speedwell (<i>Veronica anagallis-aquatica</i>).	<ul style="list-style-type: none"> • Tree and shrub cover <25% with variable flooding regimes (water depth <2m) (MA). • Water up to 2 m deep (MAS). • Mineral soil (2). • Cattails are dominant (-1).
MAM	Meadow Marsh		
MAM2-2	Reed-canary Grass Mineral Meadow Marsh	Emergent Trees/Shrubs: includes red ash, trembling aspen, and Missouri willow. Ground cover: includes reed canary grass, spotted joe-pye weed (<i>Eupatorium maculatum</i> var. <i>maculatum</i>), fox sedge, cursed buttercup (<i>Ranunculus sceleratus</i> var. <i>sceleratus</i>), dark-green bulrush (<i>Scirpus atrovirens</i>), and narrow-leaved cattail.	<ul style="list-style-type: none"> • Tree and shrub cover <25% with variable flooding regimes (water depth <2m) (MA). • Species less tolerant of prolonged flooding (MAM). • Mineral soil (2). • Reed-canary grass dominant (2).
MAM2-5	Narrow-leaved Sedge Mineral Meadow Marsh	Emergent Trees/Shrubs: includes red osier dogwood, eastern white cedar, white elm and white willow. Ground cover: includes cursed buttercup, blue vervain (<i>Verbena hastata</i>), perfoliate thoroughwort (<i>Eupatorium perfoliatum</i>), blue flag (<i>Iris versicolor</i>), Canada rush (<i>Juncus canadensis</i>), and porcupine sedge (<i>Carex hystericina</i>).	<ul style="list-style-type: none"> • Tree and shrub cover <25% with variable flooding regimes (water depth <2m) (MA). • Species less tolerant of prolonged flooding (MAM). • Mineral soil (2). • Narrow-leaved sedges dominant (-5).
MAM2-10	Forb Mineral Meadow Marsh	Emergent Trees/Shrubs: includes red-osier dogwood. Ground cover: includes purple loosestrife, cut-leaved water-horehound (<i>Lycopus americanus</i>), mouse-ear scorpion-grass (<i>Myosotis scorpiodes</i>), cursed buttercup, and watercress (<i>Rorippa nasturtium-aquaticum</i>).	<ul style="list-style-type: none"> • Tree and shrub cover <25% with variable flooding regimes (water depth <2m) (MA). • Species less tolerant of prolonged flooding (MAM). • Mineral soil (2). • Forb dominant (-10).
OTHER	Manicured and Hedgerow		
M and H	Manicured grasses and planted shrubs and/or trees	Areas where large expanses of grass/shrubs/trees are maintained and/or planted. Trees/shrubs: includes black walnut, white elm, red-osier dogwood, chokecherry, Manitoba maple and red ash.	

FIGURE 3.4: NATURAL HERITAGE - EXISTING CONDITIONS

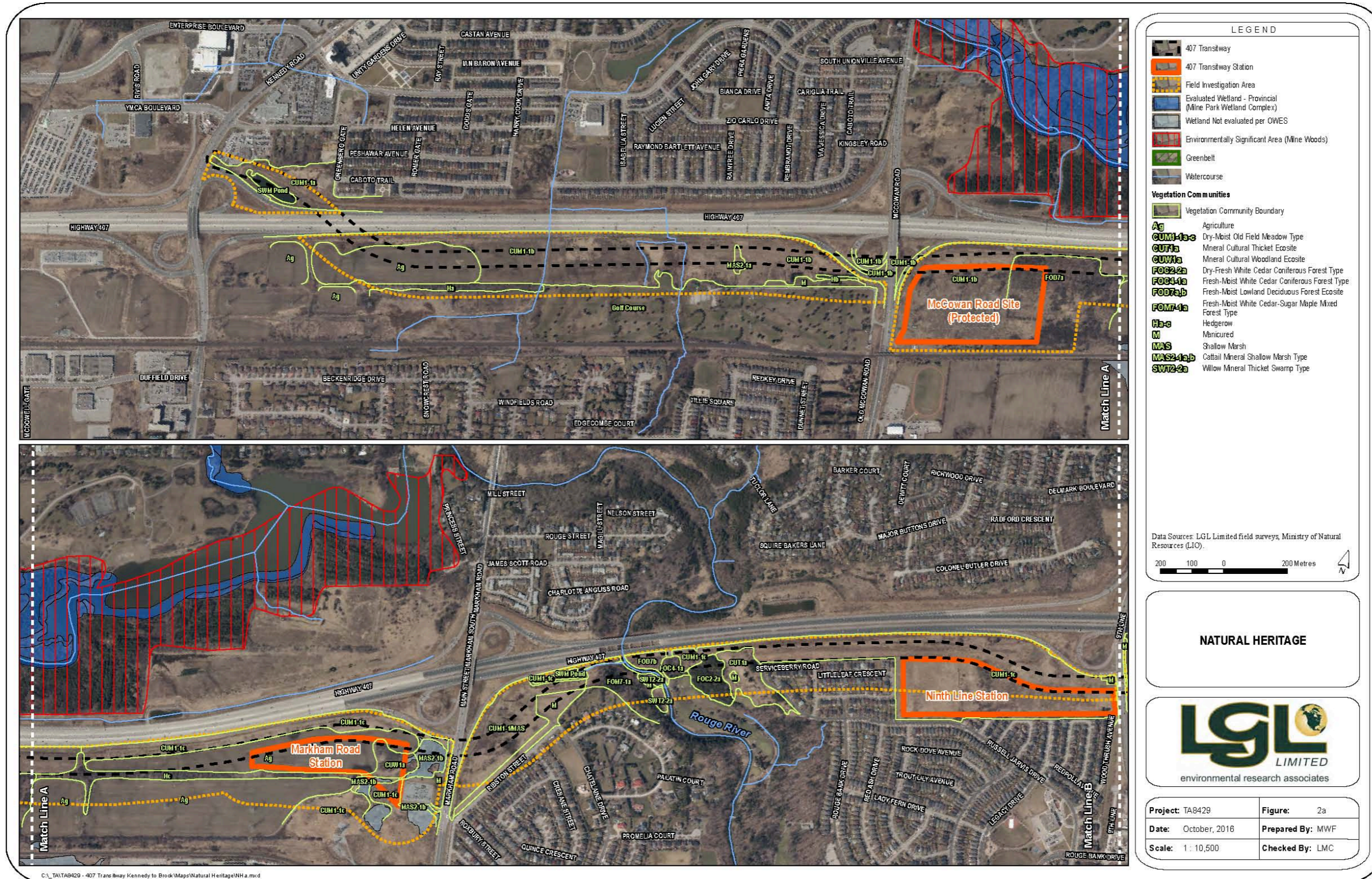


FIGURE 3.5: NATURAL HERITAGE – EXISTING CONDITIONS

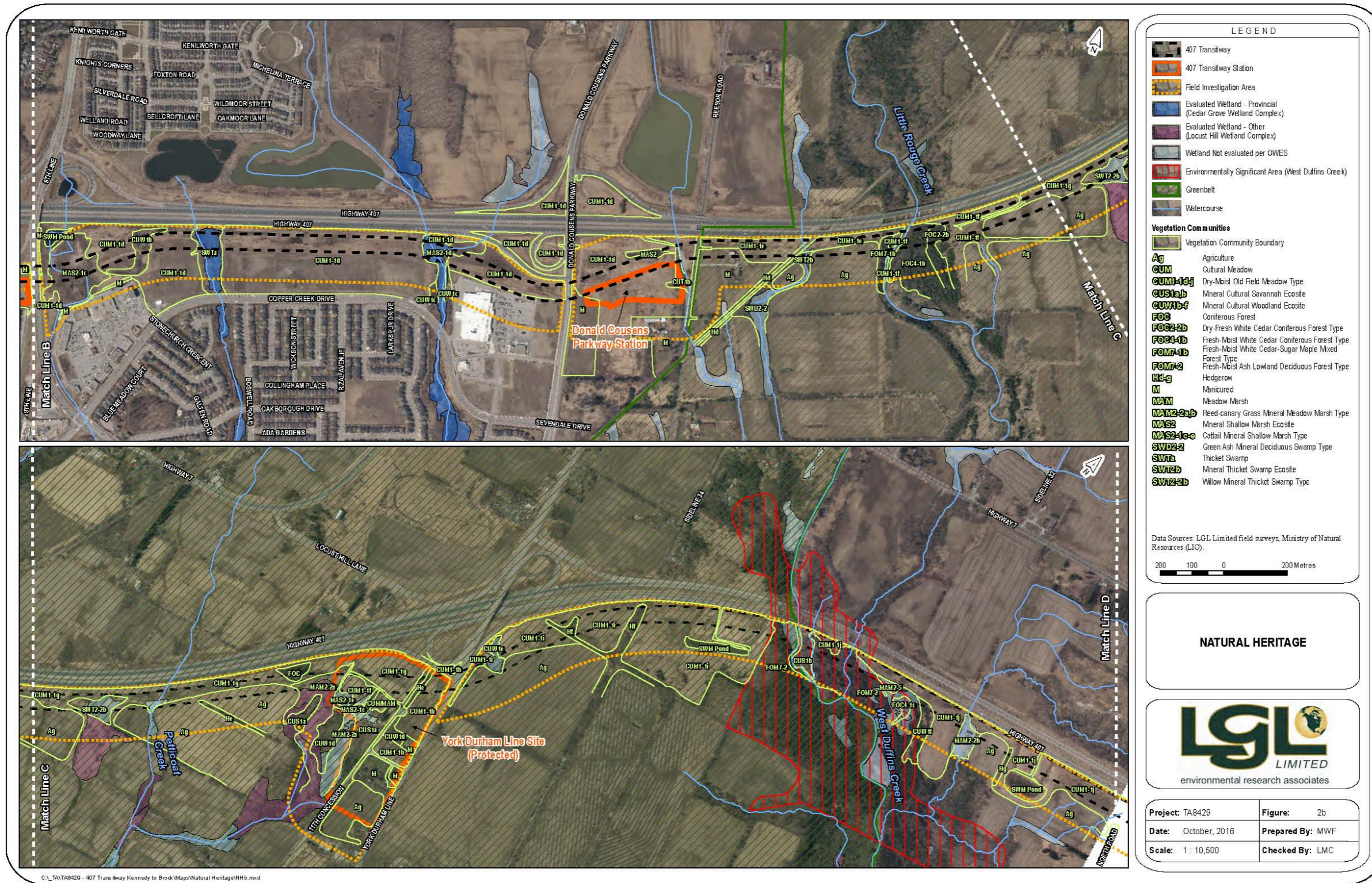
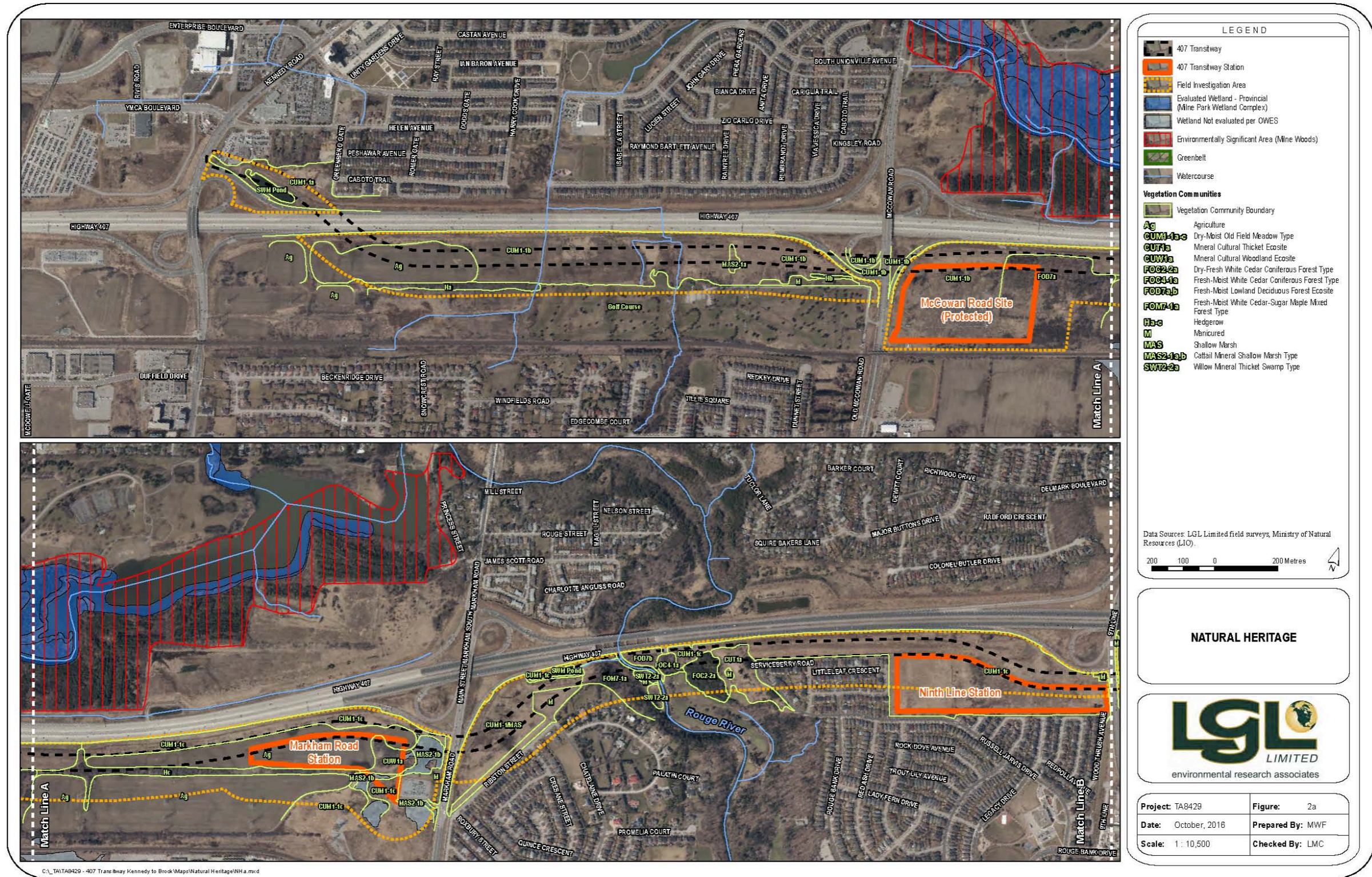


FIGURE 3.6: NATURAL HERITAGE - EXISTING CONDITIONS



Species at Risk

One plant species regulated under the Ontario *ESA, 2007* was identified during LGL's botanical investigation. A total of 14 butternut (*Juglans cinerea*) were identified south of the transitway in the valleylands associated with a tributary of Urfe Creek. Butternut is regulated as Endangered under the Ontario *ESA, 2007*.

In addition, a review of MNRF Natural Heritage Information Centre (2015) for plant species at risk within the study area was conducted. One butternut element occurrence was identified in the valleylands associated with West Duffins Creek. It should be noted that the presence of this tree was not confirmed during the botanical investigation.

A total of 35 TRCA plant species of concern (L1 to L3) were identified within the study area. **Appendix E** presents the list of those rare species and in which vegetation community each species was identified.

3.1.7. Wildlife and Wildlife Habitat

A review of secondary source data was undertaken in 2014 and field surveys were conducted on April 28, 29 and May 8, 13, 14 and 29, 2015 to document wildlife habitat and wildlife occupation and to characterize the nature, extent and significance of wildlife usage within the project limits. The purpose of this search was to characterize the extent and significance of natural heritage features and determine the potential for wildlife usage.

The study area investigated included all habitats along a one kilometer wide corridor centered along 407 ETR for the secondary source review from east of Kennedy Road to east of Brock Road. Field investigations of the wildlife and wildlife habitat were conducted for the facility footprint and adjacent lands up to a distance of 120 m from the infrastructure footprint for the 407 Transitway between Kennedy Road and Brock Road.

Information concerning species at risk, previously recorded within the study area limits, was obtained from the NHIC. Data requests from MNRF Aurora District and TRCA were made and data were received from both agencies. More general information relating to wildlife and wildlife habitat was obtained following a review of published and non-published sources, including data provided by BSC.

Wildlife Habitat

There are many natural heritage features located along the 407 Transitway, especially in the eastern half of the study area, where major watercourse crossings occur. The Rouge River, Little Rouge Creek, Whitevale Creek, and Urfe Creek combined with wetland complexes such as the Locust Hill Wetland Complex and Whitevale Wetlands make up the most dominant natural heritage features along the 407 Transitway, or in the immediate vicinity, that wildlife would use as potential breeding areas and travel corridors throughout the year. Numerous woodlots exist along both sides of 407 ETR, some of them considered environmentally sensitive, such as the Provincially Significant Milne Park Wetland Complex and West Duffins ESA. Interspaced between these natural heritage features are numerous open areas classified as cultural meadows, thickets and agricultural lands.

Evidence of wildlife use was widespread throughout the study area. Widely distributed species, based on observations during field work, include White-tailed Deer (*Odocoileus virginianus*), Coyote (*Canis latrans*), Song Sparrow (*Melospiza melodia*) and Red-winged Blackbird (*Agelaius phoeniceus*). Storm water management (SWM) ponds, wetlands associated with watercourse crossings and valleylands associated with large watercourse crossings contained the highest diversity of species. Some SWM ponds supported breeding Green Frogs (*Lithobates clamitans*) and several with large open water components were used as foraging areas for Tree Swallow (*Tachycineta bicolor*), Northern Rough-winged Swallow (*Stelgidopteryx serripennis*) and Barn Swallow (*Hirundo rustica*). Old fields and agricultural lands contained species typically associated with these habitats. The 407 ETR crosses the larger valleys with bridges. These areas provided significant corridors for wildlife movement as indicated by the high number of tracks observed. Roadkill was not observed, with the exception of a single Great Blue Heron (*Ardea herodias*) and a White-tailed Deer, indicating that the majority of corridor crossings by wildlife species occur under the larger structures. The structures also provided nesting areas for birds.

Fauna

A list of wildlife recorded within habitats along the 407 Transitway corridor by LGL and others, including wildlife expected to be present based on habitat conditions observed, is presented in **Table 3.3**. A total of 105 wildlife species (75 observed, 30 expected) are listed in **Table 3.3** as occurring or expected to occur within the study area.

A total of 60 bird species were observed within the study area during field investigations. As the field surveys were conducted during the spring migration period, some of the species observed were likely migrants passing through the study area on the way to breeding areas to the north. Based on the habitat types present in the study area, additional bird species (13) that inhabit open country, thicket, forest, forest edge, wetland, aquatic and anthropogenic habitat types may be expected to breed within and immediately adjacent to the study area. Almost all species observed or expected to occur within the study area are typical of the natural, rural and urban habitats associated with the 407 Transitway corridor specifically and Southern Ontario in general.

Twenty-three bird species identified during field investigations are designated as priority species for conservation by BSC (see **Table 3.3**). These species are representative of all habitat types within the study area. Nests, or potential nesting activity, of some of these species were observed under the larger watercourse crossing structures (bridges) and are discussed below.

Six herpetofauna species were observed in the study area during field investigations. Based on the habitat types present, an additional nine species may be expected to occur within or adjacent to the study area. Breeding evidence (calls and/or tadpoles) of American Toad (*Anaxyrus americanus*), Wood Frog (*Lithobates sylvatica*), Leopard Frog (*L. pipiens*) and Green Frog (*L. clamitans*) were observed in some wetland habitats, including storm water management facilities. The large pond located between Sideline 24 and Brock Road contained habitat for Painted Turtles (*Chrysemys picta*), which were observed, and likely provides habitat for Snapping Turtle (*Chelydra serpentina*), Northern Watersnake (*Nerodia sipedon*) and toads/frogs.

TABLE 3.3: WILDLIFE SPECIES DOCUMENTED WITHIN THE STUDY AREA

WILDLIFE	SCIENTIFIC NAME	COMMON NAME	COSEWIC ¹	ESA ¹	LEGAL STATUS ¹	LOCAL ²
Herpetofauna	<i>Plethodon cinereus</i>	Red-backed Salamander*			FWCA(P)	
	<i>Anaxyrus americanus</i>	American Toad				
	<i>Lithobates sylvatica</i>	Wood Frog				
	<i>Lithobates pipiens</i>	Leopard Frog				
	<i>Lithobates clamitans</i>	Green Frog				
	<i>Hyla versicolor</i>	Gray Treefrog*			FWCA(P)	
	<i>Pseudacris crucifer</i>	Spring Peeper*				
	<i>Chelydra serpentina</i>	Snapping Turtle*	SC	SC	SARA(1)/FWCA(G)	
	<i>Chrysemys picta</i>	Painted Turtle			FWCA(P)	
	<i>Thamnophis sirtalis</i>	Eastern Gartersnake				
	<i>Thamnophis sauritus</i>	Eastern Ribbonsnake*	SC	SC	SARA(1)	
	<i>Nerodia sipedon</i>	Northern Watersnake*				
	<i>Storeria dekayi</i>	Dekay's Brown Snake*				
	<i>Storeria occipitomaculata</i>	N. Red-bellied Snake*				
<i>Lampropeltis triangulum</i>	Milksnake*	SC	SC	SARA(1)/FWCA(P)		
Birds	<i>Branta canadensis</i>	Canada Goose			MBCA	
	<i>Anas platyrhynchos</i>	Mallard			MBCA	
	<i>Anas rubripes</i>	American Black Duck*			MBCA	BSC
	<i>Ardea herodias</i>	Great Blue Heron			MBCA	
	<i>Buteo jamaicensis</i>	Red-tailed Hawk			FWCA(P)	
	<i>Accipiter cooperi</i>	Cooper's Hawk*			FWCA(P)	BSC
	<i>Falco sparverius</i>	American Kestrel*			FWCA(P)	BSC
	<i>Rallus limicola</i>	Virginia Rail*			MBCA	BSC
	<i>Porzana carolina</i>	Sora*			MBCA	BSC
	<i>Charadrius vociferus</i>	Killdeer			MBCA	
	<i>Actitis macularis</i>	Spotted Sandpiper			MBCA	BSC
	<i>Zenaidura macroura</i>	Mourning Dove			MBCA	
	<i>Columba livia</i>	Rock Pigeon				
	<i>Megascops asio</i>	Eastern Screech Owl*			FWCA(P)	
	<i>Ceryle alcyon</i>	Belted Kingfisher			FWCA(P)	
	<i>Picoides pubescens</i>	Downy Woodpecker			MBCA	
	<i>Picoides villosus</i>	Hairy Woodpecker			MBCA	
	<i>Colaptes auratus</i>	Northern Flicker			MBCA	
	<i>Dryocopus pileatus</i>	Pileated Woodpecker			MBCA	BSC
	<i>Contopus virens</i>	Eastern Wood Pewee	SC	SC	MBCA	
	<i>Empidonax traillii</i>	Willow Flycatcher			MBCA	
	<i>Empidonax alnorum</i>	Alder Flycatcher*			MBCA	BSC
	<i>Empidonax minimus</i>	Least Flycatcher*			MBCA	BSC
	<i>Sayornis phoebe</i>	Eastern Phoebe			MBCA	BSC
	<i>Myiarchus crinitus</i>	Great Crested Flycatcher*			MBCA	
	<i>Tyrannus tyrannus</i>	Eastern Kingbird			MBCA	BSC
	<i>Vireo olivaceus</i>	Red-eyed Vireo			MBCA	
	<i>Vireo gilvus</i>	Warbling Vireo			MBCA	
	<i>Cyanocitta cristata</i>	Blue Jay			FWCA(P)	
	<i>Corvus corax</i>	Common Raven				
	<i>Corvus brachyrhynchos</i>	American Crow				
	<i>Eremophila alpestris</i>	Horned Lark			MBCA	BSC

TABLE 3.3: WILDLIFE SPECIES DOCUMENTED WITHIN THE STUDY AREA

WILDLIFE	SCIENTIFIC NAME	COMMON NAME	COSEWIC ¹	ESA ¹	LEGAL STATUS ¹	LOCAL ²
	<i>Tachycineta bicolor</i>	Tree Swallow			MBCA	
	<i>Stelgidopteryx serripennis</i>	N. Rough-winged Swallow			MBCA	BSC
	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow			MBCA	BSC
	<i>Hirundo rustica</i>	Barn Swallow	THR	THR	MBCA	BSC
	<i>Poecile atricapillus</i>	Black-capped Chickadee			MBCA	BSC
	<i>Sitta canadensis</i>	Red-breasted Nuthatch			MBCA	BSC
	<i>Sitta carolinensis</i>	White-breasted Nuthatch			MBCA	
	<i>Troglodytes aedon</i>	House Wren*			MBCA	
	<i>Regulus calendula</i>	Ruby-crowned Kinglet			MBCA	BSC
	<i>Turdus migratorius</i>	American Robin			MBCA	
	<i>Mimus polyglottos</i>	Northern Mockingbird			MBCA	BSC
	<i>Dumetella carolinensis</i>	Gray Catbird			MBCA	BSC
	<i>Toxostoma rufum</i>	Brown Thrasher			MBCA	BSC
	<i>Sturnus vulgaris</i>	European Starling				
	<i>Bombycilla cedrorum</i>	Cedar Waxwing			MBCA	
	<i>Mniotilta varia</i>	Black-and-white Warbler			MBCA	BSC
	<i>Oreothlypis ruficapilla</i>	Nashville Warbler			MBCA	BSC
	<i>Geothlypis trichas</i>	Common Yellowthroat*			MBCA	
	<i>Dendroica petechia</i>	Yellow Warbler			MBCA	
	<i>Dendroica pensylvanica</i>	Chestnut-sided Warbler*			MBCA	BSC
	<i>Setophaga caerulescens</i>	Black-throated Blue Warbler			MBCA	BSC
	<i>Setophaga palmarum</i>	Palm Warbler			MBCA	
	<i>Spizella pusilla</i>	Field Sparrow			MBCA	BSC
	<i>Spizella passerina</i>	Chipping Sparrow			MBCA	
	<i>Poocetes gramineus</i>	Vesper Sparrow			MBCA	BSC
	<i>Passerculus sandwichensis</i>	Savannah Sparrow			MBCA	BSC
	<i>Melospiza melodia</i>	Song Sparrow			MBCA	
	<i>Melospiza georgiana</i>	Swamp Sparrow			MBCA	BSC
	<i>Zonotrichia albicollis</i>	White-throated Sparrow			MBCA	BSC
	<i>Piranga olivacea</i>	Scarlet Tanager*			MBCA	BSC
	<i>Cardinalis cardinalis</i>	Northern Cardinal			MBCA	
	<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak			MBCA	
	<i>Passerina cyanea</i>	Indigo Bunting			MBCA	
	<i>Quiscalus quiscula</i>	Common Grackle				
	<i>Agelaius phoeniceus</i>	Red-winged Blackbird				
	<i>Quiscalus quiscula</i>	Common Grackle				
	<i>Molothrus ater</i>	Brown-headed Cowbird				
	<i>Icterus galbula</i>	Baltimore Oriole			MBCA	
	<i>Caprodacus mexicanus</i>	House Finch			MBCA	
	<i>Carduelis tristis</i>	American Goldfinch			MBCA	BSC
	<i>Passer domesticus</i>	House Sparrow				
Mammals	<i>Didelphis virginianus</i>	Opossum*			FWCA(F)	
	<i>Eptesicus fuscus</i>	Big Brown Bat*			FWCA(P)	
	<i>Sylvilagus floridanus</i>	Eastern Cottontail*			FWCA(G)	
	<i>Sciurus carolinensis</i>	Gray Squirrel			FWCA(G)	
	<i>Tamias striatus</i>	Eastern Chipmunk			FWCA(P)	
	<i>Marmota monax</i>	Woodchuck*				

TABLE 3.3: WILDLIFE SPECIES DOCUMENTED WITHIN THE STUDY AREA

WILDLIFE	SCIENTIFIC NAME	COMMON NAME	COSEWIC ¹	ESA ¹	LEGAL STATUS ¹	LOCAL ²
	<i>Ondatra zibethicus</i>	Muskrat			FWCA(F)	
	<i>Castor canadensis</i>	Beaver			FWCA(F)	
	<i>Peromyscus</i> sp.	White-footed (Deer) Mouse*				
	<i>Microtus pennsylvanicus</i>	Meadow Vole				
	<i>Erethizon dorsatum</i>	Porcupine				
	<i>Procyon lotor</i>	Raccoon			FWCA(F)	
	<i>Mustela vison</i>	American Mink			FWCA(F)	
	<i>Mephitis mephitis</i>	Striped Skunk*			FWCA(F)	
	<i>Canis latrans</i>	Coyote			FWCA(F)	
	<i>Vulpes vulpes</i>	Red Fox*			FWCA(F)	
	<i>Odocoileus virginianus</i>	White-tailed Deer			FWCA(G)	

¹Federal and Provincial Legislation:

SARA: Species at Risk Act (Federal)

ESA: Endangered Species Act (Ontario)

MBCA: Migratory Birds Convention Act (Federal)

FWCA: Fish and Wildlife Conservation Act (Ontario)

Refer to Appendix E for further information on federal and provincial species ranks.

²Local Status:

BSC: Bird Studies Canada Species of Conservation Priority for the Regional Municipality of Durham and York.

³An “*” indicates that the species presence was determined based on the presence of suitable habitat within the study area, and/or based on secondary sources.

Species at Risk

A review of the NHIC database for rare species records indicated four species at risk have been documented:

- Eastern Ribbonsnake (*Thamnophis sauritus*-SC) was documented in the eastern half of the study area where more suitable habitat for this species exists; however it has not been recorded since 1984.
- Snapping Turtle (*Chelydra serpentina*-SC), last recorded in 2003, was predominantly recorded in the western half (urbanized section) of the study area.
- Bobolink (*Dolichonyx oryzivorus*-THR), last recorded in 2003, has been documented around Reesor Road, north of 407 ETR, along North Road south of 407 ETR and along Brock Road.
- Eastern Meadowlark (*Sturnella magna*-THR) was last recorded in 2004 and was documented north of 407 ETR west of the York-Durham Line and around Brock Road. No Bobolink or Eastern Meadowlark were recorded during 2015 field investigations.

The Eastern Meadowlark and Bobolink are considered threatened and regulated under the federal SARA and ESA, 2007. Both species are also protected under the MBCA. The Snapping Turtle and Ribbonsnake are both listed as Special Concern in Ontario under the ESA. The FWCA also protects the Snapping Turtle.

Two species at risk, Barn Swallow and Eastern Wood Pewee (*Contopus virens*) were confirmed to be present within the study area during field investigations. The Barn Swallow is regulated under the ESA and SARA as Threatened and Eastern Wood Pewee is listed as Special Concern in Ontario. Forty-nine recorded bird species are protected under the MBCA and one reptile, three bird and six mammal species are protected under the FWCA.

Eastern Meadowlark

Review of the NHIC database indicated records of Eastern Meadowlark within the vicinity of the York-Durham Line and Sideline 20. The NHIC database had relatively recent (2003 and 2004) records for Eastern Meadowlark. The Eastern Meadowlark, a species with a broad distribution across southern Ontario, is regulated as Threatened under the ESA and the SARA. The Eastern Meadowlark, formerly a prairie species, has adapted to agricultural practices of the European settlers (hayfields, pastures, etc.) (Cadman et al. 2007). As farming practices have become more efficient, Eastern Meadowlark numbers have declined. No individuals of this species were observed during the field investigations and, although surveys were conducted outside of the MNRF identified Eastern Meadowlark survey window, they were completed during a time (mid-spring) when this species typically returns to Southern Ontario to establish territories. However, even though this species was not observed, it is not possible to determine if Eastern Meadowlark are present / nesting within the study area. During the Spring 2015 field investigations, habitat was identified which has the potential to be suitable to support Eastern Meadowlark. These areas are a cultural meadow north of Russel Jarvis Drive west of Ninth Line and the cultural meadows located between Donald Cousens Parkway and Reesor Road.

Bobolink

Review of the NHIC database indicated records of Bobolink as recently as 2003, within the vicinity of the North Road, Sideline 20 and Brock Road. The Bobolink, a species with a broad distribution across southern Ontario, is regulated as Threatened under the ESA and the SARA. Bobolinks are typically described as residents of grassland

communities with an abundance of grass species that are typical of old fields (Cadman et al. 2007). Bobolink are also commonly associated with agricultural lands. No individuals of this species were observed during the field investigations and, although surveys were conducted outside of the MNRF identified Bobolink survey window, they were completed during a time (mid-spring) when this species typically returns to Southern Ontario to establish territories. However, even though this species was not observed, it is not possible to determine if Bobolink are present / nesting within the study area. During the Spring 2015 field investigations, habitat was identified which has the potential to be suitable to support Bobolink. These areas are a cultural meadow north of Russel Jarvis Drive west of Ninth Line and the cultural meadows located between Donald Cousens Parkway and Reesor Road.

Barn Swallow

The Barn Swallow is regulated as Threatened under the ESA and the SARA. The Barn Swallow generally builds mud nests on bridges, walls, ledges and barns (Cadman et al. 2007). The Barn Swallow typically forages in open areas such as agricultural lands, meadows or over water. During field investigations several individuals were observed foraging over agricultural fields and open water areas throughout the study area. Two potential unoccupied Barn Swallow nests were observed under the Crossing D1/D2 structure of the 407 ETR. No other Barn Swallow nests were identified within any other culverts or under/on any other structures within study area. Habitat considered suitable to support foraging Barn Swallow was identified across much of the study area, with the exception of forested habitats, and many were observed foraging over agricultural lands and open water habitats.

3.1.8. Designated Natural Areas

Designated natural areas include areas identified for protection by the MNRF, TRCA and upper tier and lower tier municipalities.

Environmentally Significant/Sensitive Areas

A total of two Environmentally Significant/Sensitive Areas exist within 150 m of the 407 Transitway. Provincially Significant Milne Park Wetland Complex is one of the largest natural areas in the City of Markham and contains a Class 4 wetland. It is located on the north side of 407 ETR between McCowan Road and Markham Road and is approximately 140 m north of the 407 Transitway. In addition, the West Duffins Environmentally Significant/Sensitive Area is located north and south of 407 ETR between York Durham Line and North Road. The 407 Transitway bisects the northern portion of the West Duffins Environmentally Significant/Sensitive Area.

Provincially Significant Wetlands

The Cedar Grove PSW Complex is located within 120 m of the study area. Specifically, a portion of wetland complex is located on the north and south side of the 407 ETR between Ninth Line and Donald Cousens Parkway. The location of the Cedar Grove PSW Complex is presented in **Figure 3.5**. In addition, a portion of the Milne Park PSW Complex is located on the north side of the 407 ETR. The location of the Milne Park PSW Complex is presented in **Figure 3.4**

Non-provincially Significant Wetlands

A total of four non-provincially significant wetlands are located within the study area. These include the Whitevale Wetland located south of 407 ETR and west of North Road and three wetland pockets associated with the Locust Hill Wetland Complex located south of 407 ETR between Reesor Road and York Durham Line.

Areas of Natural and Scientific Interest

There are no ANSIs located within 120 m of the study area.

Greenbelt

A portion of the study area between Reesor Road and North Road is a component of the Greenbelt Plan (2005) including 'Protected Countryside' and 'Natural Heritage System'.

Rouge Park North Management Plan

Lands north and south of 407 ETR between Reesor Road and York Durham Line are a component of the Rouge Park North Management Plan. Specifically, the Rouge Park North Management Plan identified the lands surrounding Milne Park and Bruce's Conservation Area as 'Special Management Zones.'

Rouge National Urban Park

The *Rouge National Urban Park Act*, which came into force on May 15, 2015, protects and allows for the preservation of natural and cultural resources and the encouragement of sustainable farming practices within the park area. In June of 2014, a draft Management Plan was released for public review by Parks Canada. The proposed Transitway and associated facilities are not included within the Management Plan area. However, the Management Plan should be taken into account, given that the Transitway would cross through the park area.

Natural Heritage System

The York Region Official Plan (2009) identifies a portion of the study area between Kennedy Road and York Durham Line as a component of the 'Regional Greenlands System', 'Woodlands', and 'Conservation Area/Regional Forest' of York Region.

The Durham Region Official Plan (2013) identifies a portion of the study area between York Durham Line and Brock Road as a component of the 'Regional Greenlands Systems' and a 'Key Natural Heritage and Hydrological Feature' of Durham Region.

The City of Markham Official Plan (2005) identifies a portion of the study area between Markham Road and York Durham Line as 'Hazard Lands' and 'Environmental Protection Area' of the City of Markham.

The City of Pickering Official Plan (2010) identifies a portion of the study area between York Durham Line and Brock Road as 'Natural Areas'.

3.1.9. Air Quality

The MOECC measures air contaminants at various locations throughout Ontario, and reports on the state of

Ontario's air quality on an annual basis. There are currently two continuous air monitoring stations located in the general vicinity of the study area – MOECC Toronto East (MOECC Station #33003 – Kennedy Road and Lawrence Avenue East), which is located approximately 11 km south of the study area and MOECC Oshawa (MOECC Station #45026 – 2000 Simcoe Street N.), which is located approximately 17 km east of the study area.

To assess existing conditions in the study area, historical air quality monitoring data from the MOECC Toronto East and MOECC Oshawa monitoring stations was considered to be representative. **Tables 3.4 to 3.6** outline the recent measurement history (2009 to 2013) at the Toronto East and Oshawa monitoring locations, and present a summary of the data in terms of mean, 90th percentile and maximum concentrations.

The tables indicate that historically NO_x has been well within the accepted standards at the Oshawa station, but the 1-hr criteria has been periodically exceeded at the more urban Toronto East location. Compliance with the 24-hour PM_{2.5} CWS is measured as the 98th percentile over three years, therefore 10 exceedances of the 24-hr criteria is within compliance for three years and both the Oshawa and Toronto East stations show compliance with this standard. Annual PM_{2.5} has been well within applicable criteria. 8-hour ozone concentrations have been observed at values 121% and 113% of the CWS at the Toronto East and Oshawa stations respectively. In summary, the historical data outlines a typical urban/suburban airshed with occasional smog periods during which air quality is compromised. In Ontario, the smog season occurs from May through September.

TABLE 3.4: HISTORICAL NO_x AMBIENT AIR QUALITY DATA

Station ID	Station Location	Averaging Time	NO _x (µg/m ³)					
			AAQC	Year				
				2009	2010	2011	2012	2013
#33003	Toronto East	1-hr Average	-	43	43	43	39	36
		24-hr Average	-	43	43	43	39	36
		1-hr 90 th Percentile	-	85	80	85	77	70
		24-hr 90 th Percentile	-	78	77	76	65	59
		1-hr Maximum	400	608	658	489	467	619
		24-hr Maximum	200	213	717	190	206	173
		No. of Times Above 1-hr Criteria	-	14	9	7	1	7
#45026	Oshawa	No. of Times Above 24-hr Criteria	-	1	0	0	1	0
		1-hr Average	-	20	18	17	15	14
		24-hr Average	-	20	18	17	15	14
		1-hr 90 th Percentile	-	41	38	36	30	28
		24-hr 90 th Percentile	-	38	35	35	26	25
		1-hr Maximum	400	179	248	201	220	160
		24-hr Maximum	200	83	72	100	85	64
No. of Times Above 1-hr Criteria	-	0	0	0	0	0		
No. of Times Above 24-hr Criteria	-	0	0	0	0	0		

Note: All values are calculated from hourly data available from the <http://www.airqualityontario.ca/> website.

Compliance is measured as the 98th percentile over three years, therefore 10 exceedances (1% of 365x3) of the 24-hr criteria is within compliance for three years or nominally three exceedances per year on average for the three most recent monitoring years.

TABLE 3.5: HISTORICAL PM_{2.5} AMBIENT AIR QUALITY DATA

Station ID	Station Location	Averaging Time	PM _{2.5} (µg/m ³)					
			AAQC	Year				
				2007	2008	2009	2010	2011
#33003	Toronto East	Annual	10	5.8	6.7	6.2	6.2	8.2
		24-hr Mean	-	5.8	6.7	6.1	6.2	8.1
		24-hr 90 th Percentile	-	11	13	12	12	16
		24-hr Maximum	28*	36	32	21	21	33
		No. of Times Above Proposed CWS	-	3	4	0	0	2
#29000	Hamilton Downtown	Annual	10	5.2	5.6	5.5	5.5	7.4
		24-hr Mean	-	5.2	5.6	5.4	5.5	7.4
		24-hr 90 th Percentile	-	10	12	11	11	13
		24-hr Maximum	28*	33	30	22	21	40
		No. Of Times Above Proposed CWS	-	2	3	0	0	3

Note: All values are calculated from hourly data available from the <http://www.airqualityontario.ca/> website.

TABLE 3.6: HISTORICAL OZONE AMBIENT AIR QUALITY DATA

Station ID	Station Location	Averaging Time	Ozone (ppb)					
			AAQC	Year				
				2007	2008	2009	2010	2011
#33003	Toronto East	8-hr Mean	-	22	23	23	25	24
		8-hr 90 th Percentile	-	38	39	39	43	39
		8-hr Maximum	63	63	72	76	76	67
		No. of Times Above CWS	-	1	3	1	12	3
#29000	Hamilton Downtown	8-hr Mean	-	26	28	27	27	27
		8-hr 90 th Percentile	-	39	41	40	42	40
		8-hr Maximum	63	65	70	71	68	66
		No. Of Times Above CWS	-	1	4	2	6	1

Note: All values are calculated from hourly data available from the <http://www.airqualityontario.ca/> website.

3.2. Socio-Economic and Cultural Environment

3.2.1. Land Use Planning Policies

The 407 Transitway is an integral element of the Growth Plan, which has been developed to support social, economic and environmental objectives for this area. Therefore, there is a need to view the project in a broader context than the traditional transportation demand/capacity relationship. It is recommended to assess the economic benefit in terms of its job creation potential, its role in supporting development adjacent to the corridor, and its support for the competitiveness of the entire region.

Rouge National Urban Park Management Plan

The *Rouge National Urban Park Act*, which came into force on May 15, 2015, protects and allows for the presentation of natural and cultural resources and the encouragement of sustainable farming practices within the park area. In June of 2014, a draft Management Plan was released for public review by Parks Canada. The proposed 407 Transitway and associated facilities study are not included within the Management Plan area. However, the Management Plan should be taken into account, given that the Transitway would cross through the park area.

The Management Plan is adopting an ecosystem approach that recognizes the Park's increasingly urban surroundings and its working farms, major roads and hydro corridors. It aims for the protection, conservation, and restoration of the park's natural, cultural and agricultural resources. One of its main objectives is "Collaboration leads to compatible land use and infrastructure abutting the park". Therefore as an action to this objective, the study has identified that participation in "provincial planning, municipal land use, and other planning and environmental processes to advance the interests of ecosystems connectivity (e.g., water quality, road ecology, minimal light pollution), farm viability (e.g., movement of farm vehicles, roadside stands, tile drainage/salt spray), visitor experience (e.g., visitor safety/comfort, trail continuity), and cultural heritage.

Provincial Policy Statement 2014

The Provincial Policy Statement (PPS 2014) is issued under Section 3 of the *Planning Act* and provides policy direction on matters of provincial interest related to land use planning and development. The PPS, 2014 requires the planning of major infrastructure to support long term economic prosperity by providing for an efficient, cost effective, reliable multi-modal transportation system that is integrated with adjacent systems and those other jurisdictions and is appropriate to address expected growth. In addition, it requires that planning for transportation and infrastructure corridors must consider significant resources such as natural heritage, agriculture, and cultural heritage resources.

The 407 Transitway includes connections with other regional and local transit systems such as GO Transit, VIVA Rapid Transit, YRT, DRT and TTC. It will directly serve regional UGCs like the Markham Centre and the Seaton Community, while connecting to the Richmond Hill Centre/ Langstaff Gateway and the Vaughan Metropolitan Centre

Places to Grow Growth Plan for the Greater Golden Horseshoe, 2006, Amended 2013

The Places to Grow Growth Plan provides a framework for implementing the Provincial vision for building stronger, prosperous communities by better managing growth in the region by 2041. The intent of the Growth Plan is to reduce urban sprawl and consumption of land while making more efficient use of existing infrastructure.

It promotes transit-supportive densities and a healthy mix of residential and employment land uses. It supports a transportation network that links urban growth areas through an extensive multi-modal system anchored by efficient public transit together with highway systems. Though there are no urban growth areas within the study area identified by the Growth Plan, this section of the 407 Transitway will connect to the three growth areas in York Region including the Vaughan Metropolitan Centre, Richmond Hill Regional Centre/Langstaff Gateway, and Markham Centre, with linkages to the growth centers in Durham Region of downtown Pickering and downtown Oshawa.

Parkway Belt West Plan, 1978

The PBWP was implemented for the purposes of creating a multi-purpose utility corridor, urban separator and linked open space system. Its purpose is to link urban areas with each other by providing space for the movement of people, goods, energy, and information, without disrupting community integrity and function. The Parkway Belt West was developed to provide a land reserve for future linear facilities and for unanticipated activities requiring sites of high accessibility and substantial land area.

The original PBWP was approved by the Lieutenant Governor in Council in 1978. Since its approval the PBWP had been subject to numerous amendments. An Office Consolidation compiling amendments to the PBWP was prepared for information purposes in June 2008. This Office Consolidation document was reviewed to obtain land use information within the Parkway Belt West of the study area.

The area covered by the PBWP is divided into two general land use categories; the Public Use Area and the Complementary Use Area. Public Use Areas are defined as presently used or to be predominantly used in the future for public uses. The Public Use Areas consist of areas designated as: Public Open Space and Buffer Area; Utility, Electric Power Facility; and, Road and Inter-Urban Transit. Complementary Use Areas are to be predominantly used for private uses that aid in the PBWP's objective of preserving the country landscape and encouraging land uses such as agricultural, recreational and institutional pursuits that do not require intense urbanization. The Complementary Use Area consists of the General Complementary Use Area and the Special Complementary Use Area.

The PBWP only covers the west portion of the 407 Transitway study area, from Kennedy Road to Main Street (Markham Road). The lands under the PBWP in this section are designated Road, Inter-Urban Transit, Electric Power facility and Utility, with small pockets of Public Open Space between McCowan Road and Main Street.

Greenbelt Plan

The Greenbelt Plan was established under Section 3 of the *Greenbelt Act*, 2005, and took effect on December 16, 2004. The Greenbelt Plan area is comprised of a number of plan areas, including: the Niagara Escarpment Plan area, Oak Ridges Moraine Conservation Plan area, Parkway Belt West Plan area, and the Greenbelt Plan

‘Protected Countryside’ and ‘Urban River Valley’. The area between Reesor Road and the east limit of the Duffins Rouge Agricultural Preserve is located within the Greenbelt Plan area.

Within the Greenbelt Plan area, the Protected Countryside contains a number of land use designations, including an Agricultural System, comprised of specialty crop areas, prime agricultural areas, and rural areas; a Natural Heritage System, which protects a system of natural heritage, hydrologic and/or landform features; and Settlement Areas, that provide economic, social, and commercial functions to prime agricultural areas and rural areas. All of the Greenbelt Plan lands between Reesor Road and York Durham Line are part of the Greenbelt Plan ‘Natural Heritage System’. East of York Durham Line, the study area is designated as ‘Protected Countryside’, with some small areas designated as ‘Natural Heritage System’.

Section 4.2.1.1 of the Greenbelt Plan states that all existing, expanded or new infrastructure subject to and approved under the *Canadian Environmental Assessment Act*, the *Environmental Assessment Act*, the *Planning Act*, the *Aggregate Resources Act*, the *Telecommunications Act* or by the National or Ontario Energy Boards, or which receives a similar environmental approval, is permitted within the Protected Countryside, subject to the policies of this section and provided it meets one of the following two objectives: a) It supports agriculture, recreation and tourism, rural settlement areas, resource use or the rural economic activity that exists and is permitted within the Greenbelt; or b) It serves the significant growth and economic development expected in southern Ontario beyond the Greenbelt by providing for the appropriate infrastructure connections among UGCs and between these centres and Ontario’s borders.

An EA Study was completed in 1997 for Highway 407 and the 407 Transitway from Markham Road to Highway 7 East of Brock Road. The EA received approval prior to the establishment of the Greenbelt Plan in 2005. The EA documents the process that was followed to determine the location of the transitway facility. The need for this transportation infrastructure was demonstrated during the EA, and a number of route planning alternatives were developed and evaluated, considering a range of factors including potential impacts on the agricultural system and natural environment.

During this planning and preliminary design study, efforts have been made to minimize the footprint of the runningway within the Greenbelt Plan lands. The runningway is located just south of the Highway 407 alignment, concentrating urban infrastructure within one corridor. In addition, no stations have been planned within the Greenbelt Plan area. Key natural heritage features include Little Rouge Creek, an unnamed watercourse, and Petticoat Creek, and the Non-Provincially Significant Locust Hill Wetland Complex. The potential impacts of the runningway on these features, and the recommended environmental protection and mitigation measures are described in Chapter 6.

The design and construction practices identified in Section 4.2.1.2 of the Greenbelt Plan will be evaluated and addressed in the Detail Design phase of the Transitway

York Region Official Plan

According to Census Canada (2011), York Region has a population of approximately 1,024,000. York Region is expected to have a population of 1.79 million and employment of 900,000 by the year 2041 (Places to Grow Growth Plan).

The Region of York Official Plan (2013) identifies the need to promote the implementation of a regional rapid

transit network such as a Transitway within the Highway 407 corridor and to encourage the development of transportation inter-modal stations at appropriate locations. It aims to develop stations that are coordinated with urban centers and to serve as both destinations and transfer facilities between different modes of travel. A transportation station would typically include facilities to allow transfers between local transit services and rapid transit, as well as providing a PPUDO area and an adequate commuter parking area.

The York Region Official Plan designates most of the lands adjacent to the study area west of Reesor Road as Urban Area and east of Reesor Road as Greenbelt Protected Countryside, Agriculture, and Regional Greenland System. The Regional Greenlands System in this area is identified as a north-south corridor that connects natural features and habitats within the Region.

Natural heritage features identified in the Official Plan include: Woodlands and Conservation Area/Regional Forest (Map 5 of Official Plan), and Provincially Significant or Provincial Plan Area Wetlands (Map 4 of Official Plan).

Region of Durham Official Plan

According to Census Canada (2011), Durham Region has a population of approximately 601,000. Durham Region is expected to have a population of 1.19 million and employment of 430,000 by the year 2041 (Places to Grow).

The Official Plan (1993, consolidated 2013) identifies the need to promote the implementation of a regional rapid transit network such as a Transitway within the Highway 407 corridor and to encourage the development of transportation inter-modal stations at appropriate locations. It aims to develop stations that are coordinated with urban centers and to serve as both destinations and transfer facilities between different modes of travel. A transportation station would typically include facilities to allow transfers between local transit services and rapid transit, as well as providing a PPUDO area and an adequate commuter parking area.

The Durham Regional Official Plan designates the area adjacent to the study as Specific Policy Area Schedule A, the Seaton Urban Area, which is to be developed in accordance with the Central Pickering Development Plan. This plan is incorporated in the City of Pickering Official Plan, and is discussed below.

City of Markham

In the Transportation, Services and Utilities policies of the Official Plan, it is acknowledged that the City of Markham has an important role in promoting transit supportive development, with a community structure having walkable streets and higher density mixed use. The Markham Transportation Strategic Plan has identified a number of ways to attempt to shift residents from an auto-dependent transportation system to more sustainable travel choices. Improvements to the transit system is a key component of making alternative travel options attractive to automobile users. A number of policies are included in the Official Plan that support this objective. The Transitway is consistent with these objectives. It is the policy of Markham Council to work with other levels of government to facilitate the implementation of planned transit facilities. To encourage increased use of public transit and economic efficiency of the transit system, higher density development will be considered on major transit routes. In addition, all major development proposals and changes and additions to the road network will be evaluated in a transportation demand management

strategy.

According to the Official Plan (2014), land uses within and directly adjacent to the preferred Transitway facility footprint include: Parkway Belt West, Transportation and Utilities, Residential Low Rise, Residential Mid Rise, Mixed Use Mid Rise, Greenway, Commercial, , and Business Park Employment. The Transitway facility is primarily located within the Parkway Belt West and Transportation and Utilities land use designations.

Parkway Belt West lands are lands used in accordance with the provisions of the PBWP, July 1978.

Transportation and Utilities includes the 407 ETR, the 407 Transitway and a utility corridor. Areas with this land use designation provide corridors for transportation and utility facilities including highways, railways, hydroelectric transmission, gas and oil pipelines, telephone and other cabled services.

Residential Low Rise includes all of the low-rise residential land uses located in the areas surrounding the Transportation and Utilities Corridor. These are established residential areas with lower-scale buildings such as detached and semi-detached dwellings, duplexes and townhouses, which will experience minimal physical change in the future. Building heights of up to three stories are permitted. Within this designation are local institutions such as public schools and places of worship. Infill development is permitted, subject to the policies of the Plan.

Mixed Use Mid Rise lands are located on the east side of Kennedy Road north of the 407 ETR. Areas identified for Mixed Use are to provide a mix of residential, retail, restaurant and services that contribute to the creation of a “complete community”, with development that is compatible with the surrounding community. In the Mixed Use Mid Rise designation, lands primarily along major collector roads/intensification areas, land uses will include mid to large scale retail development and other service facilities to provide the goods and services needed by the local communities. It is intended that this intensification will ultimately support planned transit services adjacent to these lands.

Greenway includes lands that contain natural heritage and hydrologic features and associated vegetation protection zones and lands within the “Oak Ridges Moraine Conservation Plan Area” and the “Greenbelt Plan Area”. These lands are intended to protect valleylands and stream corridors, sensitive groundwater features, landforms, woodlands and agricultural lands. The entire area north of 407 ETR between McCowan Road and Main Street is Greenway/Parkway Belt, along with a corridor for the Little Rouge Creek west of Main Street. The Greenway System also protects the cultural heritage resources associated with valleylands and watercourse corridors through the Rouge National Urban Park and Rouge Watershed, located generally east of Donald Cousens Parkway.

Commercial designation applies to lands that accommodate existing or approved large format retail development serving a wide area. Lands designated as “Commercial” are part of the Employment Area lands, to allow for office, retail and service uses in these areas. There are two areas of Commercial designation in the study area at the intersections of the Transitway with Ninth Line and Donald Cousens Parkway.

Employment Areas are those lands that will accommodate future office and industrial uses. There is a diversity of uses of these lands which is captured in four land use designations: business park employment, business office park priority employment, service employment, general employment and future employment. The

employment lands within the study area are designated as ‘Business Park Employment’. These lands are located in the Box Grove area and at the planned GO Station near Reesor Road.

The lands designated Business Park Employment at the south east quadrant of Highway 407 and Ninth Line include the Box Grove retail plaza (commercial land use) and the undeveloped business park lands. These lands are identified as ‘Deferral Area’ in the Official Plan, as development applications to convert the Business Park Employment lands to ‘Mixed Use Mid Rise’, ‘Mixed Use Low Rise’ and ‘Residential Low Rise’ (banquet hall, seniors residence, and approximately 200 residential units) were submitted. The Region of York deferred these development applications until a review of the overall impact of all conversions of Employment Land within the region was completed, to evaluate the cumulative effect of these conversions. On May 8, 2015, the Region issued notices of decision for these Official Plan Amendments, supporting the conversion of these employment lands. However, the notices of decision have been appealed to the OMB.

City of Pickering Official Plan

The City of Pickering Official Plan was originally adopted in 1997, and the amendments to the Official Plan have been consolidated into Edition 6 (2010 Office Consolidation).

The land uses within and directly adjacent to the preferred Transitway facility footprint include: Controlled Access Area along the transportation corridor, ‘Natural Areas’ adjacent to watercourses throughout the study area, ‘Agricultural Areas’ within the Duffins Rouge Agricultural Preserve, and ‘Seaton Urban Study Area’ within the planned Seaton Community. The Rural Hamlets of Green River, Whitevale, and Brougham are located in close proximity to the study area; however, none of these hamlets are located within the Transitway facility footprint.

The Official Plan supports the introduction of transit priority lanes, including the 407 Transitway, among other transit facilities (Policy 4.6, Official Plan). The Official Plan also identifies the need to provide vehicular, cyclist and pedestrian crossings at all north south roads, to prevent a barrier being created by the 407 ETR and Transitway.

Amendment 22 to the City of Pickering Official Plan (approved by OMB Decisions in 2012, 2013 and 2014) implements the Central Pickering Development Plan for the Seaton Urban Area. This amendment is not part of Edition 6 of the City of Pickering Official Plan, which consolidates up to Amendment 21. Six Neighbourhood Plans (Lamoreaux, Brock-Taunton, Mount Pleasant, Wilson Meadows, Thompson’s Corners, and Pickering Innovation Centre) for the Seaton Urban Area are presented in the Official Plan. The Neighbourhood Plans further define the land uses for the Seaton Urban Area. A policy was added (Section 11.19, Pickering Official Plan) to require the Highway 407 ETR Transitway to be shown in Neighbourhood Plans along with Transitway stations at each of the planned interchanges. Provision is to be made in the Neighbourhood Plans for commuter parking areas, park and ride and car-pooling areas located adjacent to the Transitway stations. The Neighbourhood Plans also must identify higher intensity employment uses in the vicinity of the Highway 407 ETR Transitway stations in the Prestige Employment land use designation (Section 11.35, Pickering Official Plan).

Central Pickering Development Plan

In May 2006, the CPDP was approved by the Province of Ontario under the *Ontario Planning and Development Act, 1994*. The CPDP establishes a natural Heritage System, land use structure, population and employment allocations, an arterial and collector road network, regional level transit framework, policy framework and urban design guidelines for development of the CPDP Planning Area. The CPDP sets out context, vision and policies for a community supported by sustainable land uses and infrastructure.

The CPDP consists of essentially two distinct zones: The Duffins Rouge Agricultural Preserve and the Seaton Development Lands.

The 407 Transitway study area traverses a narrow portion of the northern part of the agricultural preserve between the City of Markham boundary and the Duffins Creek watershed. From there easterly to Brock Road the study area is in the Seaton lands.

The Seaton Development Plan designates the lands adjacent to Highway 407 and future Transitway as either employment lands or natural heritage. The Province of Ontario has maintained ownership of the employment lands and they will be marketed by IO. The natural heritage lands will be governed by a Natural Heritage System prepared by MNRF and TRCA. Amendment 1 of the CPDP set the population forecast of 61,000 and 30,500 jobs for Seaton by 2031 with an ultimate population of 70,000 and 35,000 jobs.

Master Environmental Servicing Plan Amendment

The MESPA, along with a number of other studies/reports are intended to inform the development of the Neighbourhood Plans, draft Plans of Subdivision, and Zoning By-laws. The MESPA followed the Master Planning Process of the Municipal Class Environmental Assessment. The MESPA includes a water resources assessment, hydrological assessment, water balance and groundwater modelling, surface water analysis, SWMF analysis, natural heritage assessment and water balance, SWM plan, review of transportation improvements and proposed road network, review of municipal servicing, endangered species assessment, fisheries and aquatic habitat assessment, major community facilities assessment, and public consultation summary. The recommendations in the MESPA will be implemented through NFSSRs and Environmental Study Reports prepared for future Class EA Studies. The NFSSRs will provide more information regarding servicing routes, environmental constraints, and SWMF locations, size, outfall locations and low impact development measures. The provisions of the MESPA are to be monitored by a TRCA Watershed System Monitoring and Management Program and monitoring programs to be undertaken by individual developers.

3.2.2. Existing Land Uses

As of 2011, the City of Markham had a population of 310,000 and employment of 160,000, which is expected to increase to 420,000 and 240,000 respectively by the year 2031 (Statistics Canada 2011). The City of Markham's employment lands are primarily oriented to the highway corridors of Highways 407 and 404. The study area is located in the southern part of the City of Markham, which is the most intensely developed area within the City. The Markham City Centre is located just north of the 407 ETR between Warden Avenue and Kennedy Road, west of the study area for this section of the 407 Transitway.

The City of Markham has an intensification strategy that aims to see 60% of all residential and 66% of all new

job growth to be located in the existing built up areas. The 407 Transitway study area runs through the centre of this built up area.

The lands through the City of Pickering within the Transitway footprint are currently all rural in nature. The area between the York Durham Line and Duffins Creek will remain rural as part of the Duffins Rouge Agricultural Preserve. The lands east of Duffins Creek to Sideline 16 are designated as Seaton lands and will be developed in the future. The population of Seaton is expected to be 70,000. The plan designates about 54% of those lands as part of the Natural Heritage System.

Agriculture

There are lands within the study area currently used and designated as agricultural lands in the Cities of Markham and Pickering. The lands between Reesor Road and York Durham Line, City of Markham, are part of the Rouge National Urban Park. Agriculture is one of the current and future uses permitted in the Park Management Plan. Adjacent to this in the portion between York Durham Line and the Seaton Lands lies the Duffins-Rouge Agricultural Preserve, which has been set aside by the Province of Ontario to be used for agriculture in perpetuity.

A significant portion of the lands under the hydro corridor between Kennedy Road and McCowan Road is farmed along with the lands between the 407 ETR and the hydro corridor. Much of the land has prime agricultural potential, being of Class 1 or 2 soil classification, and an agricultural tile drainage system is located within the Duffins-Rouge Agricultural Preserve.

Residential

Between Kennedy Road and McCowan Road, existing residential land uses are located adjacent to the north side of the 407 ETR, and south of the hydro corridor on the south side of the 407 ETR. Residential subdivisions are located on both north and south sides between Markham Road and Donald Cousens Parkway. From Donald Cousins Parkway to Brock Road, existing residential uses are comprised of single dwelling units in a rural/agricultural setting. However, many of these residential dwellings have been purchased by IO and are rented by tenants. A number of hamlets are located in the City of Pickering, including Green River, Belford, Whitevale and Brougham.

Commercial and Industrial

The vision for the Markham Centre is to become the City's 'downtown' area with mixed land use and transit supportive focus. Markham Centre lies west of the study area and will be a significant destination point for future transit users, being also a transportation hub with connections to GO Transit rail, VIVA and local transit service.

Hydro transmission lines run immediately adjacent on the south side of the 407 ETR between Kennedy Road and Markham Road. A portion of the hydro corridor is farmed.

A rail line runs adjacent to the hydro corridor between Kennedy Road and McCowan Road and follows the hydro corridor away from the study area east of McCowan Road.

There are two areas of existing commercial land use immediately adjacent to the 407 ETR, one just east of Kennedy Road north of the 407 ETR and the other between Ninth Line and Donald Cousens Parkway on the south side.

There are no commercial or industrial areas in the City of Pickering within the study area at the present time. Seaton is planned to support about 35,000 jobs, many of them located with the employment lands adjacent to the study area.

Community and Recreational Facilities

There are two cemeteries located on the south side of the study area just west of McCowan Road and just south of the hydro corridor. The Eckardt Cemetery has existed since the mid-1800s with some Markham Loyalist pioneers buried there. The other, the Mandaean Cemetery is more recent, since 2002 and serves the recent Mandaean immigrants who have come predominantly from Iraq.

Also off the same driveway as the cemeteries is the access to the Cresthaven Golf Course, which is located within the hydro corridor.

The remainder of the land uses adjacent to the 407 ETR are greenbelt, greenway or hydro corridor.

Atos Markham Pan Am / Parapan Am Centre

The City of Markham has a new recreational facility for the 2015 Pan Am/ Parapan Am games. It is a multi-purpose athletic center, located in the City of Markham's newly developing downtown, west of Kennedy Road, adjacent to the Unionville GO Station and future 407 Transitway Kennedy Station.

Recreational Trails

The City of Markham has designated bike lanes on all the major road crossings of the 407 ETR. The only pedestrian trail crossing is the Seaton Trail located along Duffins Creek.

Regional Transit

The only regional transit line crossing the 407 ETR is the rail line just east of Donald Cousens Parkway identified for future use under GO Transit 2020. The plan is to have peak period train service every 30 minutes to East Markham/Locust Hill.

3.2.3. Future Land Uses

This section presents proposed future land uses within the study area that may interact with the 407 Transitway. In general, the Markham Centre, located west of the study area is planned to be a centre of mixed use with high density development. The Seaton Community Plan indicated employment lands nestled in the natural heritage system immediately adjacent to both sides of the study area. **Figures 3.7 and 3.8** shows the official plan land use designations within the study area.

City of Markham

The City of Markham recently updated its Official Plan to guide the City over the next 25 years. As a component of the new Official Plan, Markham Centre is proposed to become the city's "downtown", which is located west of the study area.

As mentioned above, the City of Markham has an intensification strategy that aims to see 60% of all residential and 66% of all new job growth to be located in the existing built up areas. The 407 Transitway runs through the centre of this built up area.

The Official Plan shows a future GO station at Box Grove at the junction of the rail tracks, 407 Transitway and Ninth Line. Box Grove is identified as a future secondary hub (growth center).

City of Pickering

The lands east of Duffins Creek to Brock Road are designated as Seaton lands and will be built in the future. Seaton is a planned community of 70,000 residents and 35,000 jobs. The development lands immediately adjacent to the Transitway are designated employment lands. The linkage to transit is an important component of the plan. The plan designates about 54% of those lands to fall under its Natural Heritage System. A number of studies and plans for this new community have been conducted or are in progress. In addition, the Duffins-Rouge Agricultural Preserve, just east of York-Durham Line is planned for agricultural and natural heritage protection.

The land use designations for the Cities of Markham and Pickering within the 407 Transitway study area are shown in **Figures 3.7 and 3.8**.

FIGURE 3.7: LAND USE

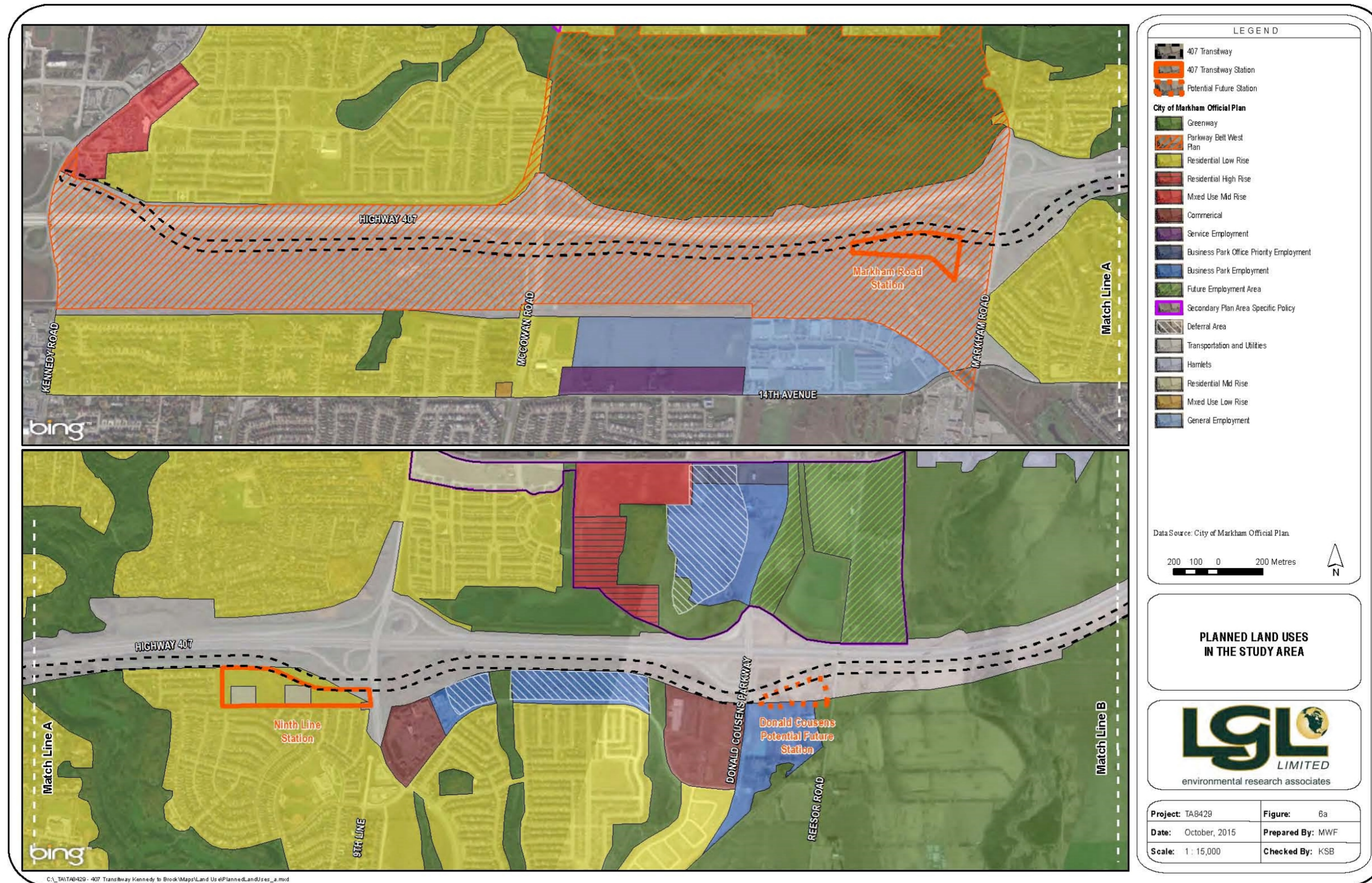
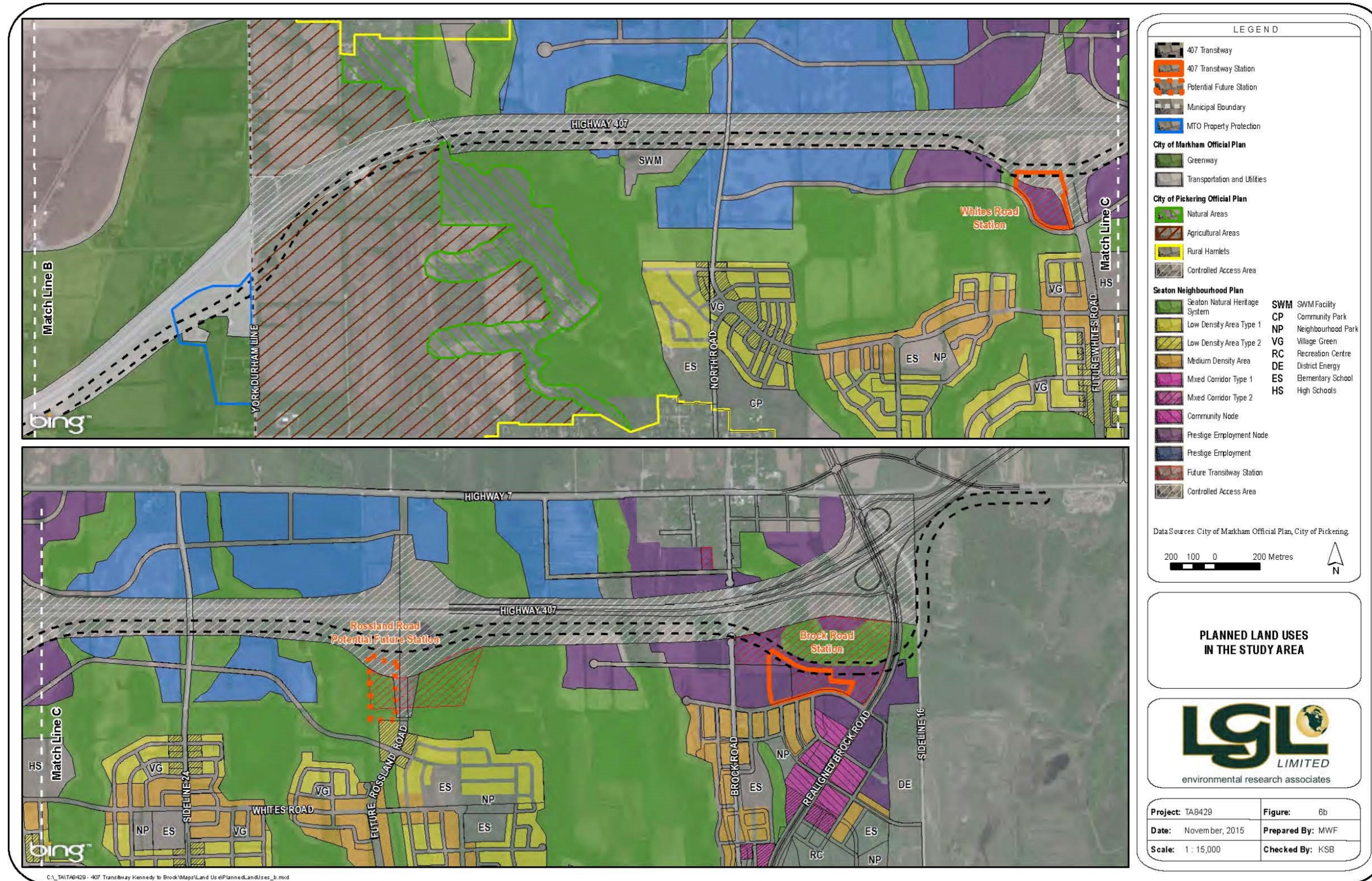


FIGURE 3.8: LAND USE



3.2.4. Built Heritage and Cultural Heritage Landscapes

Preliminary identification of existing cultural heritage resources within the study area was undertaken by consulting the following resources: the Federal Government’s *Canadian Register of Historic Places*; the Ministry of Tourism, Culture and Sport’s *Ontario Heritage Properties Database* (2008); the heritage inventories of the City of Markham and the City of Pickering; the Canadian Heritage Rivers System inventory; the Federal Heritage Buildings Review Office (these properties are recognized under the Treasury Board Policy on the Management of Real Property), and through communication with the Cities of Markham and Pickering. Based on results of the background research and field review, 10 cultural heritage resources were identified within the study area (south of 407 ETR), which are presented in **Table 3.7**.

TABLE 3.7: SUMMARY OF BUILT HERITGE RESOURCES (BHR) AND CULTURAL HERITAGE LANDSCAPES (CHL) IDENTIFIED

FEATURE	LOCATION	TYPE	RECOGNITION	DESCRIPTION/COMMENTS
CHL1	8119 Reesor Road	Farmscape	Designated, Part IV of the <i>Ontario Heritage Act</i>	This farmhouse was built by William Harding in the Gothic Revival Style sometime in the mid-nineteenth century.
CHL2	8042 Reesor Road	Farmscape	Designated, Part IV of the <i>Ontario Heritage Act</i>	This one-and-a-half-storey Gothic Revival residence was built by Christopher Reesor. Heritage attributes include a large gothic window in the front gable, board and batten siding, and Classical Revival detailing.
CHL3	7960 Reesor Road	Farmscape	Listed, City of Markham	This two-and-a-half storey farmhouse, known as Silver Spring Farm, was owned by David Reesor. Heritage attributes include the two-storey veranda, shutters, and gingerbread.
CHL4	Reesor Road	Streetscape	Identified during field review	Reesor Road is a two-lane paved roadway with narrow gravel shoulders and shallow ditches. It is bounded on either side by agricultural properties, some of which are lined with trees. Reesor Road is an historically surveyed road which appears on 1860 mapping.
CHL5	CP Rail Line	Railscape	Identified during field review	The CP Rail Line crosses the study area in a southwest-northeast direction and is generally constructed at grade. It is bounded on both sides by tree lines. The rail line appears on 1914 mapping.
CHL6	Rouge Creek (Crossing R4, see Section 3.1.5)	Watercourse	Identified during field review	Watercourse and associated wooded valleylands present in mapping beginning in 1860. Rouge creek served as an important drainage in the communities of Markham and Sparta (renamed

FEATURE	LOCATION	TYPE	RECOGNITION	DESCRIPTION/COMMENTS
				Box Grove), and facilitated the operation of numerous grist and sawmills in the area.
CHL7	Little Rouge Creek (Crossing R10, see Section 3.1.5)		Identified during field review	Watercourse and associated wooded valleylands present in mapping beginning in 1860. Little Rouge Creek was an important drainage for the community of Cedar Grove, and facilitated the development of numerous sawmills and gristmills in the area.
CHL8	West Duffins Creek (Green River) (Crossings D1 and D3, see Section 3.1.5)	Watercourse	Identified during field review	Watercourse and associated wooded valleylands present in mapping beginning in 1860. The Green River is a tributary of the West Duffins Creek, and served as an important watercourse for the residents of the communities of Green River and Whitevale (depicted as Major in the 1860 mapping).
CHL9	Seaton Hiking Trail		Identified during field review	The Seaton Hiking Trail is a recreational forest and trail system that was founded in the early 1970s and follows the course of the West Duffins Creek and passes through woodlots depicted beginning in the 1914 topographical maps. It is a well used 13 km long trail maintained by various organizations.
CHL10	3490 Brock Road	Farmscape	Identified during field review	This one-and-a-half story frame farmhouse was once property of Mrs. T.C. Hubbard. Notable elements include symmetrical fenestration, wooden clapboard siding, internal red brick chimney.

3.2.5. Archeological Features

A Stage 1 Archaeological Assessment was conducted as per the 2011 *Standards and Guidelines for Consultant Archaeologists*, administered by the Ministry of Tourism, Culture and Sport. The background research indicated that 104 previously registered archaeological sites are located within the 1 km of the study area, 14 sites within 50 m of the study area. Out of the 14, nine require further archaeological assessments (**Table 3.8**).

In addition to registered sites, a review of the geography and history of the study area suggested that the study area has potential for the identification of Aboriginal and Euro-Canadian archaeological resources, depending on how much disturbance the soils have been subjected to. The 2011 *Standards and Guidelines for Consultant Archaeologists*, Section 1.3.1, lists criteria which are indicative of potential for the identification of archaeological resource. The study area meets the following criteria:

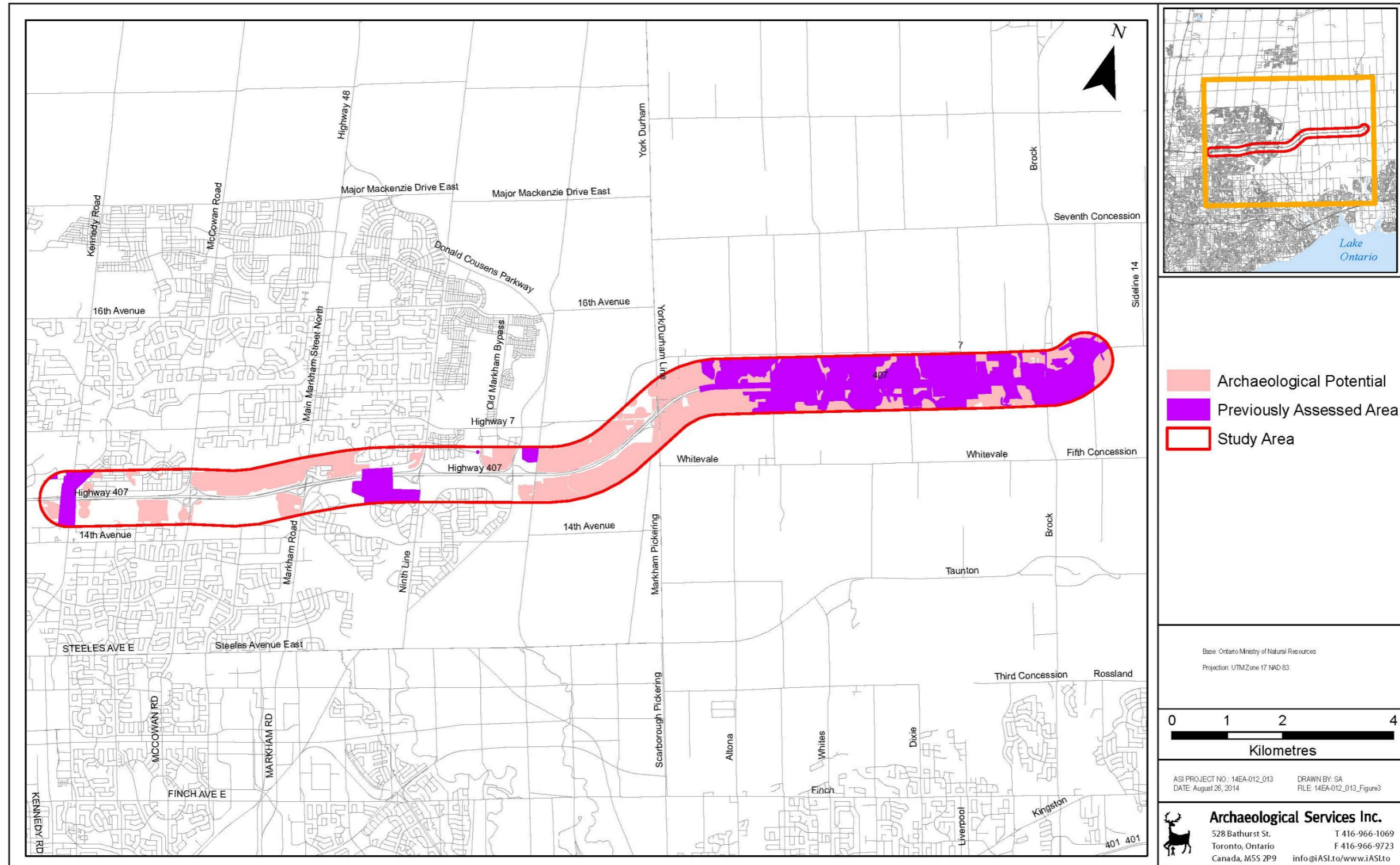
- Previously registered archaeological sites (e.g. Ludger Gros-Louis *ALGs-302*)
- Well-drained sandy soil (e.g. Woburn sandy loam)
- Water source: primary, secondary, or past water source (e.g. Rouge River)
- Euro-Canadian settlement (e.g. farmhouses)
- Early transportation route (e.g. York-Durham Townline)

Please see **Figure 3.9** for areas of archaeological potential.

TABLE 3.8: PREVIOUSLY REGISTERED ARCHAEOLOGICAL SITES WITHIN 50 METRES OF THE STUDY AREA

BORDEN #	SITE NAME	RECOMMENDATION
ALGs-175	Sideline	Requires Stage 2 Property Assessment (Requires Stage 3 Site Assessment and Stage 4 Mitigation of Impacts if Intact)
ALGs-176	Cobb	Requires Stage 2 Property Assessment (Requires Stage 3 Site Assessment if Intact)
ALGs-177	n/a	Requires Stage 3 Site Assessment (Requires Stage 4 Mitigation of Impacts if Inside Study Area)
ALGs-179	n/a	Requires Stage 3 Site Assessment (Requires Stage 4 Mitigation of Impacts if Inside Study Area)
ALGs-302	Ludger Gros-Louis	Requires Stage 4 Mitigation of Impacts
ALGs-368	Carl R. Murphy	Requires Stage 4 Mitigation of Impacts
ALGt-14	Ken Reesor 2	Requires Stage 2 Property Assessment
ALGt-29	Ansell	Requires Stage 2 Property Assessment
ALGt-202	n/a	No Further Work Required
ALGt-224	Crosby	No Further Work Required
ALGt-244	n/a	No Further Work Required
ALGt-246	Fyfe	Requires Stage 2 Property Assessment (Requires Stage 3 Site Assessment and Stage 4 Mitigation of Impacts if Intact)
ALGt-500	Tenth Line	No Further Work Required
ALGt-510	Springhill 1	No further Work Required

FIGURE 3.9: ARCHAEOLOGICAL POTENTIAL AREAS



3.2.5.1. Noise and Vibration

Predominant Noise Sources

The existing noise environment varies throughout the study area. In the City of Markham, especially eastward from Kennedy Road to Ninth Line, the noise environment is characterized by urban hum, mainly road traffic on 407 ETR, and major commuter roads such as McCowan Road, Markham Road, Ninth Line, Highway 7, and Fourteenth Avenue. Frequent freight rail traffic along the CN Rail line is also a significant source of sound, especially between Kennedy Road eastward to Markham Road. The higher density of residential subdivisions and commercial establishments in this area results in higher levels of domestic and commercial noises.

East of Ninth Line in the City of Markham to Brock Road in the City of Pickering, 407 ETR and Highway 7 remain significant sources of noise within the study area. Due to the much lower population, the local roads are smaller and carry much lower traffic volumes. With large areas of farmland, forests, vacant undeveloped lands, parklands and trails, sounds of nature dominate in areas that are set back from both highways.

Residences, especially on the north side of 407 ETR on Caboto Trail, near the ramp from southbound McCowan Road to westbound 407 ETR and on Rougehaven Way and Schouten Crescent near the ramp from westbound 407 ETR to northbound Markham Road, are the closest receptors in the road segment east of Kennedy Road to Markham Road. Eastward from Markham Road to Ninth Line, the closest receptors are residences on Serviceberry Road and Little Leaf Crescent on the south side of the 407 ETR, and on the north side of 407 ETR on Colonel Butler Drive, near the ramp from southbound Ninth Line to westbound 407 ETR, and on Woodway Lane, near the ramp from westbound 407 ETR to northbound Ninth Line.

East of Ninth Line toward Donald Cousens Parkway, there are residences on the south side of the 407 ETR ROW in a subdivision immediately south of Copper Creek Drive. A few farm houses and other sparsely located residences are found between Donald Cousens Parkway and the York Durham Line. East of the York Durham Line, there are pockets of residential development mainly on the north end of the study area close to Highway 7, near Sideline 34, for example. Further east, there are a few individual residences to the north of the 407 ETR, along Highway 7, near Sideline 26 and 24 Side Road. There are also some residences in the vicinity of Brock Road, especially on the north side of 407 ETR, near Highway 7 in the Brougham area.

From a noise perspective, the locations of some of these receptors would need to be considered in evaluating alignment options for the proposed 407 Transitway.

3.3. Transportation

The following provides an overview of the road- and transit-based elements of the existing transportation system within the 407 ETR Corridor.

3.3.1. Existing Road Network

407 ETR is the east-west highway that defines the corridor alignment. West of the Rouge Valley, the highway falls in York Region and interchanges are provided at major arterials (Kennedy Road, McCowan Road, Markham Road, Ninth Line, and Donald Cousens Parkway). No flyovers are located within this segment and therefore all north-south traffic is channeled through interchanges.

East of the Rouge Valley, the character of the adjacent land changes to predominantly rural. An interchange is provided at York-Durham Line, and two flyovers are provided at North Road and Sideline Road. At the time of this writing (April 2016) the tolled highway ends at a signalized intersection at Brock Road, however, the 407 East Extension, Phase 1 is under construction and expected to be opened to traffic in Spring 2016. Ontario Highway 407 East will remove the signals at Brock Road, extend the freeway level-of-design standard east to Harmony Road, and it will connect south to Highway 401.

A grid network of arterial roads connects 407 ETR to adjacent land uses. The major transportation corridors within the study area include:

Kennedy Road – also known as York Regional Road 3, this four lane corridor provides a north-south connection throughout York Region to the City of Toronto.

McCowan Road – a north-south corridor with four lanes and urban cross section, York Regional Road 67 provides connections within York Region to the City of Toronto.

Markham Road – also known as York Regional Road 68, this four lane Regional Road provides a north-south connection with York Region to the City of Toronto.

Ninth Line – also known as York Regional Road 69, this four lane corridor with urban cross section provides a north-south connection that connects to Donald Cousens Parkway via the Box Grove Bypass.

Donald Cousens Parkway – a four lane north-south corridor, also known as York Regional Road 48 that connects to Steeles Avenue to the south and Ninth Line to the north.

York Durham Line – York Regional Road 30 is a north-south arterial that acts as the border between York Region and Durham Region.

Brock Road – Durham Regional Road 1 is a north-south corridor that connects the municipalities within Durham Region.

Highway 7 – running parallel to 407 ETR, the four lane Regional Road provides a non-tolled alternative to the 407 ETR. Within York Region it is a major arterial with signalized intersections and some accesses to private developments. East of Donald Cousens Parkway the road becomes a provincial highway through Durham Region again with private driveway access.

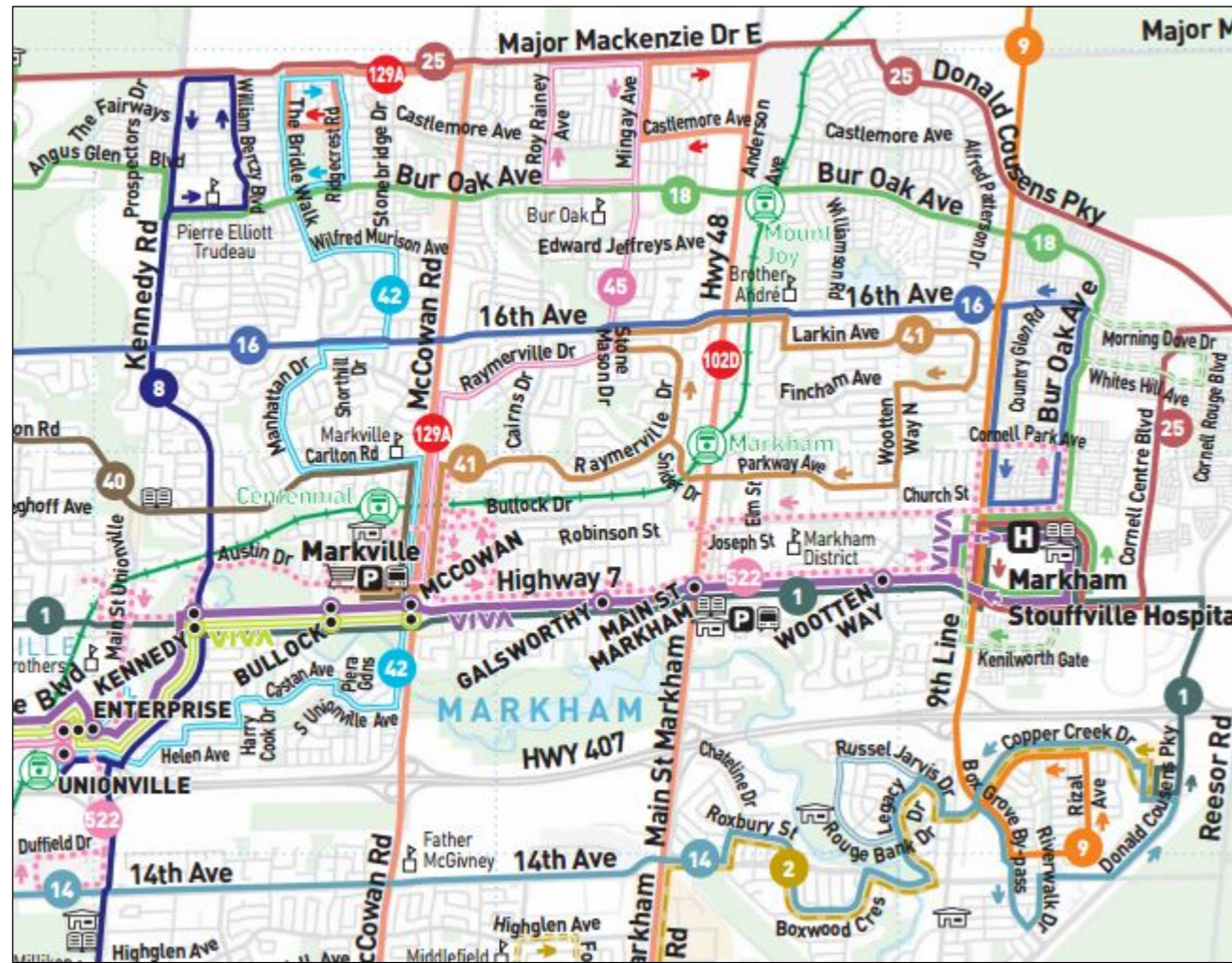
14th Avenue – also referred to as York Regional Road 71, this four lane Regional Road provides an east-west connection within the City of Markham.

3.3.2. Transit Services within the Study Area

Four transit operators including GO Transit, YRT, DRT, and the TTC are currently providing transit services in the 407 ETR Corridor and adjacent areas. These services connect to other rapid transit services such as TTC Subway lines, GO Rail lines and VIVA services as well as major activity centers including employment and commercial centers and post-secondary schools in the GTA.

Existing services are illustrated in **Figures 3.10 to 3.12**.

FIGURE 3.10: EXISTING YRT & TTC SERVICES IN 407 TRANSITWAY EAST SECTION AREA - MARKHAM



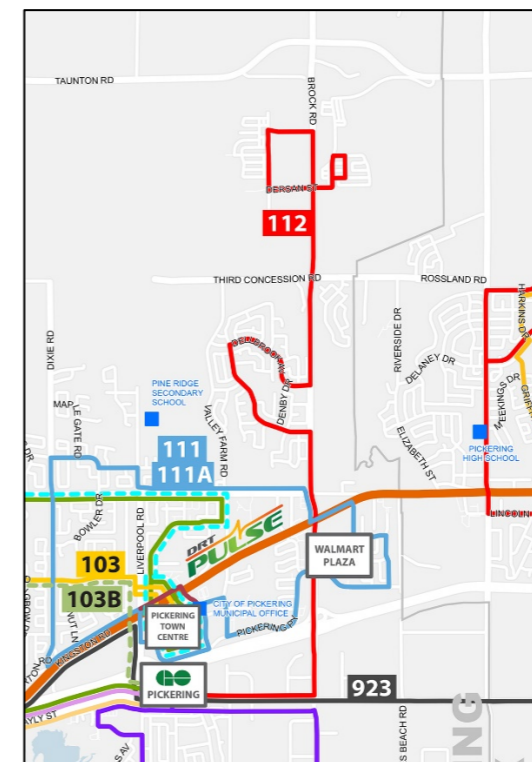
Source: York Region Transit System Map (Apr. 2015)

FIGURE 3.11: EXISTING GO TRANSIT BUS SERVICES FOR 407 ETR EAST IN THE CITY OF MARKHAM



Source: Go Transit 407 East Bus Map (Feb. 2015)

FIGURE 3.12: EXISTING DURHAM REGION TRANSIT SERVICE FOR BROCK ROAD AREA



Source: Durham Region Transit System Map (May 2015)

3.3.3. GO Transit

GO Transit provides both rail and bus services within the study area. The Stouffville GO Rail service, provides five southbound trains during morning peak period and five northbound train trips during afternoon peak period, with bus services throughout the day as well as on weekends. As part of the Stouffville GO Line, four stations are located within or adjacent to the study area, consisting of:

- **Milliken GO Station:** Located to the southeast of Kennedy Road and Steeles Avenue East, primary access is via Steeles Avenue or Redlea Avenue;
- **Unionville GO Station:** Located at the Kennedy Road and YMCA Boulevard in the City of Markham, with primary access via Kennedy Road;
- **Centennial GO Station:** Located next to the Centennial Community Centre at the northwest corner of McCowan Road and Bullock Drive; and,
- **Markham GO Station:** Located at the northwest corner of Markham Road and Station Street, with primary access via both roads.

In addition to GO Rail services, GO Transit also provides bus services including direct services in the 407 ETR Corridor focusing on serving postsecondary school students. The existing 407 ETR GO buses operate in mixed traffic through the study area and connect:

- The Oshawa Bus Terminal to UOIT Durham Campus;
- Pickering GO Station and Mount Joy GO Station to York University (three branches: 51, 52 and 54) with connections in the City of Oshawa (Durham College-University of Ontario Institute of Technology);
- The Town of Whitby (Brooklin), the City of Toronto (Centennial College, University of Toronto Scarborough Campus);
- Scarborough Town Centre, the City of Markham (Markham GO Station, Centennial GO Station, Unionville GO Station, Langstaff GO Station) to GO Transit Stations, postsecondary institutions and other activity centres.
- Unionville GO Station through routes 52, 52A, 54, 54A, and 54B;
- Centennial GO Station through routes 54 and 54B; and,
- Markham GO Station through routes 54 and 54C.

The 407 ETR East GO Bus also travels down Brock Road via route 51B connecting to Pickering GO Station.

3.3.4. York Region Transit

YRT provides transit services throughout York Region including four express routes operating along the 407 ETR Corridor between Yonge Street and Ninth Line. These routes are only operational during peak periods. These transit services, connect the major residential areas in York Region to the Finch GO Bus Terminal.

In addition, YRT also operates a number of routes on the major north-south roads intersecting 407 ETR as well as major east-west roads parallel to 407 ETR within the study area including its BRT service in the Highway 7 corridor.

YRT/VIVA is a BRT network in York Region with connections to three TTC subway stations (Finch, Downsview and Don Mills), York University in Toronto, and major activity centres within York Region. YRT/VIVA began

operations in September 2005 and currently provides services on six routes. Three of the VIVA routes operate in the study area, including:

1. VIVA Purple:
 - Eastbound-Westbound directional service along Highway 7;
 - Terminus stations at York University and Markham Stouffville Hospital; and,
 - All day service.
2. VIVA Green:
 - Northbound-Southbound directional service;
 - Terminus stations at Don Mills Station and Highway 7/McCowan Road; and,
 - Rush hour service only.
3. VIVA Pink:
 - Northbound-Southbound directional service;
 - Terminus stations at Finch GO Bus Terminal and Unionville GO Station;
 - Service along Yonge Street and Highway 7; and,
 - Rush hour service only.

These YRT/VIVA services currently operate in mixed traffic with queue-jump lanes as well as traffic signal priority at certain intersections. Service is provided every three to ten minutes during peak periods and less than fifteen minutes during off-peak hours.

YRT's routes (including VIVA) connect to the existing 407 ETR GO Bus at Unionville GO Station. As well, connections to the TTC's Yonge, Spadina, and Sheppard subway lines and to a number of TTC bus routes are provided. North-south YRT connections in the study area include:

- Bus Route 8 which travels along Kennedy Road ;
- Bus Route 42 which travels along McCowan Road and is a rush hour only service that connects to Unionville GO Station; and,
- Bus Route 9 which operates along Ninth Line and connects to the Town of Stouffville in the north.

3.3.5. Durham Regional Transit

DRT provides transit service throughout Durham Region. In the study area, Brock Road is served by Route 199 Claremont, which connects Pickering Town Centre to the Town of Claremont. The route offers weekday and weekend service, with rapid high frequency service during peak hours.

3.3.6. Toronto Transit Commission

The TTC is responsible for services in the City of Toronto (i.e. south of Steeles Avenue). The TTC also operates several routes on major north-south arterials north of Steeles Avenue in York Region. These services are operated under contract to York Region, with two routes in the study area:

- Bus Route 129A which connects the Scarborough Civic Centre and travels on McCowan Road to Major

MacKenzie Drive East; and,

- Bus Route 102D which connects Warden Station and travels on Markham Road to Major MacKenzie Drive East. This is a new route which came into effect May 10, 2015.

There are currently no east-west TTC routes that operate within the 407 ETR Corridor.

3.4. Municipal Services and Utilities

Through the Planning stage, utility companies/municipalities within the 407 Transitway study area were contacted to gather all the existing and planned utility and municipal service information. The following agencies were contacted:

Enbridge;	Hydro One;	City of Markham;
Power Stream;	Rogers;	City of Pickering;
Allstream;	Bell Canada;	York Region; and,
	407 ETR;	Durham Region

The utility and municipal service information affecting the runningway/stations and associated facilities is illustrated on the horizontal and vertical alignment plates (end of **Chapter 5**). **Chapter 6** of this report addresses the potential conflicts and proposed mitigation measures.