Ontario

407 TRANSITWAY

From East of Highway 400 to Kennedy Road

Environmental Project Report

Section 4: Study Area Conditions

Delcan IBI GROUP

in association with

LGL

4. STUDY AREA 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 kilometre wide corridor centred on Highway 407 ETR from east of Highway 400 to Kennedy 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.

4.1 Natural Environment

4.1.1 Physiography and Soils

The study area is located within the Peel Plain physiographic region, which extends through the central portions of the Regions of Halton, Peel and York. The Peel Plain is a level to undulating tract of clay soils with imperfect drainage, through which the Credit, Humber, Don and Rouge Rivers have carved deep valleys.

The soils surrounding Highway 407 in the study area are classified as Peel clay, Fox sandy loam, Berrien sandy loam, Malton clay, Chinguacousey clay loam, Jeddo clay loam, Oneida clay loam, Cashel clay, Bookton sandy loam, Brady sandy loam and Bottom Lands. Within different sections of the study area, soil classification is listed below:

- Weston Road and Highway 400 soils are predominantly Malton Clay;
- Highway 400 and midway between Keele and Dufferin Streets soils are predominantly Chinguacousey clay loam with Bottom Lands surrounding one watercourse;
- From midway between Keele and Dufferin Streets to Dufferin Street where Highway 407 jogs north, soils are predominantly Peel clay with Jeddo clay loam and Bottom Lands surrounding one watercourse;
- Dufferin Street and Bathurst Street soils are predominantly Chinguacousey clay loam and Oneida clay loam;
- Bathurst Street and Yonge Street soils are predominantly Cashel clay with Peel clay and Bottom Lands surrounding two watercourses;
- Yonge Street and Bayview Avenue soils are predominantly Chinguacousey clay loam;
- Bayview Avenue and Warden Avenue soils are predominantly Peel clay with Bookton sandy loam, Cashel clay, Malton clay, Brady sandy loam, Berrien sandy loam and Bottom Lands surrounding four watercourses; and,
- Warden Avenue and McCowan Road soils are predominantly Berrien sandy loam with Malton clay, Peel clay and Bottom Lands surrounding two watercourses.

4.1.2 Contaminated Properties and Waste

Fill placement is noted at interchanges along the Highway 407 corridor. The origin and quality of the fill used is not known and therefore represents an issue of potential environmental concern.

A hydro corridor runs parallel to the south of Highway 407 in the study area. A CN Rail corridor is located between Keele Street and Dufferin Street. There are three GO Transit lines located between Keele Street and Dufferin Street, Yonge Street and Bayview Avenue and Warden Avenue and Kennedy Road.

Commercial/industrial properties are located between Jane Street and Keele Street, Yonge Street and Bayview Avenue and Highway 404 to Kennedy Road, where potential contamination to the soil and groundwater associated with processes related to industrial properties represent an issue of potential environmental concern. There are two transformer stations located within the study area: one west of Bayview Avenue and another between Rodick Road and Warden Avenue.

Properties that are ‘highly likely’ to have waste materials/contamination have been identified. There is potential that the subsurface of these properties will be disturbed by construction activities. The following are a list of properties where further environmental site assessments are warranted prior to construction:

- SW Aggregates and other industries – south of Highway 407 from east of the CN Rail corridor to Keele Street. The 407 Transitway crosses over the CN Rail corridor and under Keele Street;
- Keele Street and Snidercroft Road, 150 metres south of Highway 407, an oil spill occurred in June 21, 2009. The 407 Transitway travels under Keele Street;
- Sunoco Service Station and a transformer station – north of Highway 7 between Silver Linden Drive and Bayview Avenue. The 407 Transitway is south of Highway 7 and travels below grade;
- Miller Waste (formerly Direct Waste Systems) - south of Highway 407, west of Woodbine Avenue. The 407 Transitway is at or above grade;
- Miller Asphalt/Aggregates/Offices/Maintenance Yard – south of Highway 407, east of Woodbine Avenue. The 407 Transitway crosses at grade;
- Town of Markham Works Yard – west of Rodick Road. The 407 Transitway crosses below grade;
- Transformer Station – south of Highway 407 between Rodick Road and Warden Avenue. Two stormwater ponds are being proposed just south of Highway 407 (north of the transformer station); and,
- BMW Sales and Service Centre – northeast quadrant of Kennedy Road and Helen Avenue. The 407 Transitway crosses Kennedy Road below grade.

4.1.3 Drainage

The study area is located in the upstream areas of the Humber River, Don River and Rouge River watersheds. Locally, watercourse slopes are generally less than 1%. The general direction of drainage is from the north side of Highway 407, south and east towards Lake Ontario. Tributaries at the Rouge River flow in a northerly direction before entering the Rouge River which generally flows in south east direction.

The existing drainage system consists of open ditches, culverts and storm sewers. The Highway 407 corridor has a total of 21 stormwater management facilities with an average depth of 1.0 metre. Drainage along the centre median of Highway 407 is provided by a system of storm sewers/culverts and/or ditch inlet catchbasins that outlet either directly to the transverse drainage crossings or to the outside ditches and ponds. The drainage along the outside edge of Highway 407 varies. At some locations there is a curb or concrete barrier wall. Surface runoff from the outside lanes, speed change land and paved shoulder drains toward the curb/concrete barrier wall and is picked up by catchbasins and/or outlet directly to the adjacent roadside ditch. At other locations, the highway has a “rural” type cross-section and the highway runoff flows across the shoulder and directly into the ditch.

4.1.4 Groundwater

Groundwater conditions are expected to vary considerably within the study area limits. Groundwater levels are generally controlled by the local subsurface stratigraphy, with shallow groundwater flow associated with watercourses and deeper regional groundwater flow expected further south of the study area.

Groundwater recharge areas relate to local topographic and geologic conditions, with recharge areas located throughout the study area away from watercourses, which are generally associated with areas of discharge. Groundwater discharge areas are associated with the watercourses, including Black Creek, West Don River, East Don River, German Mills Creek, Apple Creek, and Beaver Creek.

An inventory of the water supply wells that historically have been present in the study area was compiled, based on the MOE database of water supply wells, and verbal reports from municipal public works staff. The MOE database records indicate the historic presence of about 143 water supply wells within the study area. Additional water supply wells may be located in the study area, but their records are not included in the MOE database.

The construction details of supply wells that are still in use are not known from available data. There are at least 44 wells listed as historically located in the study area that are of shallow/dug well construction.

Hydrogeologic cross-sections were taken based on the analysis of borehole data and/or well elevations on MOE water well records. The cross-sections indicate that the study area consists of thick overburden resting on bedrock). The thickness of overburden varies and is generally undefined as wells do not reach bedrock surface when drilled. The Paleozoic bedrock is primarily Georgian Bay Formation, including shale, siltstone, sandstone and limestone. Bedrock depths within the study area will likely exceed conventional excavation necessary for construction of the transitway.

4.1.5 Fish and Aquatic Habitat

The study area is located within the Humber River, Don River, and Rouge River watersheds. The watercourses in the study area support a diversity of warmwater, coolwater, and coldwater fish communities. Many of the aquatic habitats have been altered and degraded by historical and recent urban development activities resulting in poor quality habitat throughout most of the study area. 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. The highly altered hydrology of the watercourses resulting from the surrounding urbanization has caused widespread degradation to the natural channel form and function. Barriers in the form of weirs and lengthy enclosures have created impassable structures to upstream fish migration, further leading to a loss in aquatic productivity and natural function.

There are 16 watercourse crossings in the study area. **Table 4-1** illustrates all the watercourse crossings located along the 407 Transitway alignment from west to east:

Table 4-1: Watercourse crossings within the Study Area

Reference Number	Watercourse Name	Location	Fish Community
H1	Tributary 1 of Black Creek	east of Highway 400	warmwater
H4	Black Creek	east of Jane Street	warmwater
H5	Tributary 2 of Black Creek	east of Jane Street	warmwater
D1	Tributary 1 of West Don River	east of GO Barrie line	warmwater
D3	West Don River	west of Centre Street	warmwater
D17	Westminster Creek	west of Dufferin Street and Highway 7	warmwater
D22	Tributary 1 of East Don River	west of Bathurst Street	warmwater
D6	Tributary 2 of East Don River	east of Bathurst Street	warmwater
D7	East Don River	west of Yonge Street	coldwater
D8	Pomona Mills Creek	west of CN Rail Bala	coldwater
D12	German Mills Creek	east of Bayview Street and Highway 407	coolwater
D14	Tributary 1 of German Mills Creek	west of Leslie Street	warmwater
D15	Tributary 2 of German Mills Creek	Highway 404/Highway 407	warmwater
R8	Tributary of Beaver Creek	west of Warden Avenue	warmwater
R6	Markham Centre Tributary of Rouge River	east of Warden Avenue	warmwater
R7	Kennedy Tributary of Rouge River	west of Kennedy Road	warmwater

Figures 4-1(a) and 4-1(b) show the watercourse crossings in the study area.

Figure 4-1(a): Watercourse Crossing and Fish Habitat

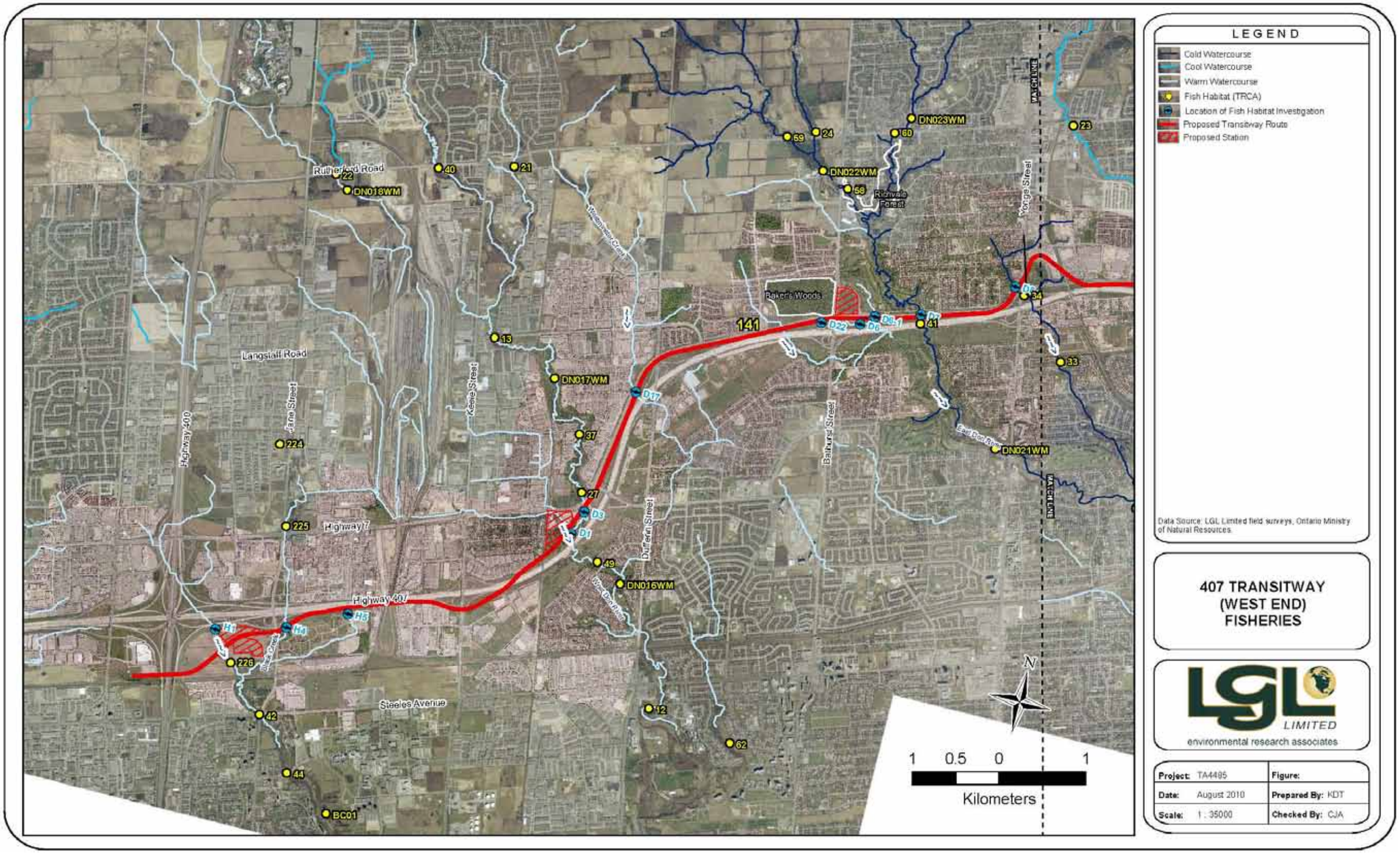
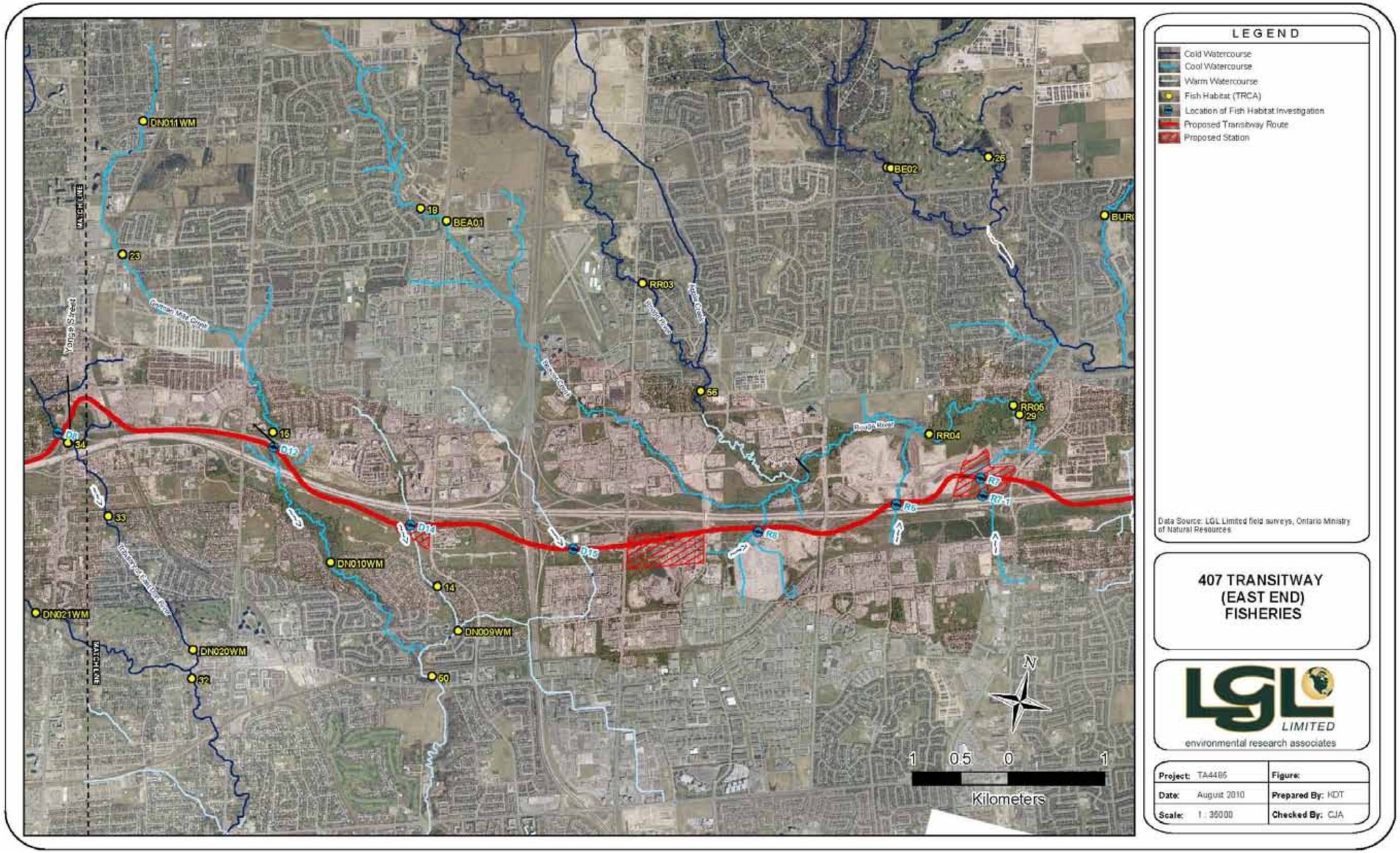


Figure 4-1(b): Watercourse Crossing and Fish Habitat



Humber River

The western portion of the study area, from Weston Road to immediately east of Jane Street passes through the Humber River watershed. Tributary systems of the Humber River watershed crossed by the proposed 407 Transitway are limited to Black Creek and its tributary.

Station H1 is a tributary of Black Creek and is designated as a warmwater system by the TRCA. The area affected by the 407 Transitway is found 25 metres south of the on-ramp from Highway 400 to Highway 407 and 520 metres east of Highway 400. Station H4 is located on Black Creek, approximately 125 metres south of Highway 407 and 110 metres east of Jane Street. Black Creek is designated as a warmwater system by the TRCA. A tributary of Black Creek, Station H5, is designated as a warmwater system by the TRCA and located approximately 75 metres south of Highway 407 and 850 metres east of Jane Street.

Don River

The central portion of the study area, from east of Keele Street to Highway 404, passes through the Don River watershed. Tributary systems of the Don River watershed crossed by the proposed 407 Transitway include both the East and West Don River and their tributaries, including German Mills Creek and its tributaries.

Station D1 is approximately 75 metres northwest of Highway 407 and 825 metres west of Dufferin Street. More specifically they are located at the confluence of the West Don River and a tributary, which are both designated as warmwater systems by the TRCA. From this location, the 407 Transitway will cross the West Don River at Station D3

Station D17, is located on Westminster Creek, approximately 30 metres northwest of Highway 407 and 185 metres west of Dufferin Street. Station D18, a tributary of Westminster Creek, is located approximately 535 metres south of Highway 407 and 485 metres east of Dufferin Street. This watercourse is disconnected from other watercourses and is now a grassed swale.

Station D22, a tributary of the East Don River would be crossed by the 407 Transitway approximately 30 metres north of Highway 407 and 460 metres west of Bathurst Street. This watercourse has been realigned to flow eastward toward Bathurst Street for approximately 350 metres before being piped under Highway 407. This watercourse is designated as a warmwater system by the TRCA.

Station D6 located, approximately 85 metres north of Highway 407 and 135 metres east of Bathurst Street. This station is a now a drainage ditch that is connected to the next fisheries station via a pipe. Station 6-1 is a Tributary of East Don River and is located approximately 65 metres north of Highway 407 and 440 metres east of Bathurst Street. This tributary also has an associated storm water pond and is classified as a warmwater system by the TRCA. The East Don River is crossed by the 407 Transitway, at Station D7, between Highway 407 and Highway 7 approximately 975 metres east of the Bathurst Street. The East Don River is classified as a coldwater system by the TRCA.

Pomona Creek is crossed by the proposed 407 Transitway (Station D8) at the northwest corner of Yonge Street and Highway 7. Pomona Creek is designated a cold water system by the TRCA. There is also a large storm water pond located adjacent to Station D11.

German Mills Creek at Station D12 is crossed by the 407 Transitway just south of Highway 7, approximately 315 metres east of Bayview Avenue. German Mills Creek is a tributary of the East Don River and is designated as a coldwater system by the TRCA. Station D13, a tributary of German Mills Creek, is located approximately 150 metres north of Highway 407 and 580 metres east of Bayview Avenue. This tributary was previously designated as a coolwater system by the TRCA, but only a grassy swale now exists at this station as it has been disconnected. Station D14 is located approximately 90 metres south of Highway 407 and 200 metres east of Leslie Street. This tributary of German Mills Creek is designated as a warmwater system by the TRCA. Station D15 is crossed by the 407 Transitway approximately 390 metres south of Highway 407 and 445 metres east of Highway 404. This watercourse is also a tributary of German Mills Creek and is designated as a warmwater system by the TRCA. During the site investigation only a swale containing cattails (*Typha sp.*) was present.

Rouge River

The middle and eastern portions of the study area, between Highway 404 and Kennedy Road, pass through the Lower Rouge River watershed.

Station R8, a tributary of Beaver Creek, is crossed by the proposed 407 Transitway approximately 115 metres south of Highway 407 and 620 metres west of Warden Avenue. This tributary is designated as a warmwater system by the TRCA. Station R6 is crossed by the proposed 407 Transitway just north of Highway 407, approximately 720 metres east of Warden Avenue. This tributary of the Lower Rouge River, known as the Markham Centre Tributary, is designated as a warmwater system by the TRCA. Station R7, the Kennedy Tributary of the Lower Rouge River, is crossed by the proposed 407 Transitway approximately 210 metres north of Highway 407 and 260 metres west of Kennedy Road. The Kennedy Tributary is designated as a warmwater system by the TRCA, and during a site investigation in September 2008, it appeared to be a seasonal system.

Watercourse/drainage features are present within the proposed Woodbine/Rodick Station area, which appear to be intermittent watercourse systems. The features flow in a northerly direction into a poorly defined swale within the woodland swamp adjacent to Highway 407. The swale eventually flows into the Tributary of Beaver Creek (R8) and as such likely supports a seasonal warmwater fish community. Further analysis of these features and the design of the crossing structure will need to be addressed at the Detailed Design Stage of this project.

Rare, Threatened or Endangered Species

Redside Dace *(Clinostomus elongatus)* is designated Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and by the Committee on the Status of Species at Risk in Ontario (COSSARO).

This species was recorded within Black Creek and its tributaries and collected by the TRCA in the main branch of the West Don River, East Don River and Upper Rouge River.

American brook lamprey was also collected by the TRCA in the main branch of the East Don River and the Upper Rouge River. American brook lamprey has a Provincial Rank (Srank) of Rare to Uncommon, but it is not listed by COSEWIC or MNR.

4.1.6 Vegetation and Vegetation Communities

Vegetation communities found along the proposed 407 Transitway alignment consist of a mix of forest, cultural and wetland communities. The forests in the study area are typical of those arising from secondary growth on previously disturbed/cleared areas. One high quality swamp community is found near Woodbine Avenue along the proposed 407 Transitway. Bordering the natural vegetation communities the land has been cleared of all original forest cover to accommodate industrial, commercial and residential land use.

The study area is dominated by disturbed cultural communities including meadows, thickets, savannah and woodlands with few occurrences of mixed and deciduous forests. Natural areas are relatively narrow and disturbed due to the anthropogenic influence of hydro corridors. Along the hydro corridor, located south of Highway 407 between Keele Street and Centre Street, there is a narrow wetland pocket which is significant for the native riparian species and wildlife. One good quality swamp community is located near Woodbine Avenue in the area of the proposed transit station.

A total of twenty-six Ecological Land Classification (ELC) communities have been identified within the study area. These communities include: mixed forest (FOM3-2, FOM5 and FOM6-2); deciduous forest (FOD5-1, FOD7, FOD7-1 and FOD7-3); cultural plantation (CUP1- 7); cultural meadow (CUM1-1); cultural thicket (CUT1 and CUT1-1), cultural savannah (CUS1); cultural woodland (CUW1); deciduous swamp (SWD2-2, SWD4 and SWD6-1); mixed swamp (SWM), thicket swamp (SWT2, SWT2-2 and SWT2-5); meadow marsh (MAM2, MAM2-2 and MAM2-10), shallow marsh (MAS2 and MAS2-1), and submerged shallow aquatic (SAS).

The above vegetation communities are considered widespread and common in Ontario and secure globally. However, the FOM5 and FOM6-2 vegetation communities are considered locally rare (L3) in the TRCA watershed. FOM5 is located adjacent to the riparian area north of Highway 407 near Bayview Avenue FOM6-2 is located in the riparian area along Bathurst Street, south of Highway 407. These communities are delineated in **Figures 4-2(a) and 4-2(b).** A description of the ELC communities is presented in **Appendix F**.

As a result of the vegetation survey 152 plants were identified to species, of which 67 species (44%) are considered introduced and non-native to Ontario. Introduced species were dominant within the existing ROW and in cultural communities. Native species were mostly confined to natural and forested areas. A working vascular plant checklist is presented in **Appendix F**.

Rare, Threatened or Endangered Species

No plant species that are regulated under the provincial 2007 ESA or the federal SARA were encountered during field botanical investigation.

The study area contains eleven plant species that regionally and/or locally rare (TRCA and York Region): red pine *(Pinus resinosa),* swamp rose *(Rosa carolina),* hairy aster *(Aster pilosus var. pilosus),* Eastern buttonbush *(Cephalanthus occidentalis),* ninebark *(Physocarpus opulifolius),* white spruce *(Picea glauca),* tall cord grass *(Spartina pectinata),* Virginia stickweed *(Hackelia virginiana),* one-seeded bur-cucumber *(Sicyos angulatus),* black walnut (*Juglans nigra*), and red cedar *(Juniperus virginiana var. virginiana).* All of the above plant species have populations that are apparently secure or secure (S4 or S5) within Ontario.

A review of the MNR's Natural Heritage Information Centre database (2009), indicates that there are a total of four plant species, one of which is a moss, lurking leskea, *(Plagiothecium latebricola),* whose populations are critically imperiled to vulnerable (S1 to S3) located variably along the proposed transit route or within one kilometre of this route. The other three plant species are American gromwell *(Lithospermum latifolium), s*carlet beebalm *(Monarda didyma)* and biennial gaura *(Gaura biennis).* All of these plant species have not been observed in over 60 years, except for lurking leskea which was last observed over 20 years ago. None of these plant species were identified during the botanical field investigation. With the concentrated development that has occurred from the City of Vaughan through to the Town of Markham over the last 20 years, it is unlikely that those plant species persist within the study area.

4.1.7 Wildlife and Wildlife Habitat

Only small areas of wildlife and wildlife habitat were found along the proposed routes of the 407 Transitway. Most of the preferred alternatives are within urbanized areas, cultural meadows and agricultural fields. However, these fragmented natural areas, found either around the water tributaries or in small natural heritage patches along Highway 407, contain wildlife activity. Since most of the habitats along the transitway have been disturbed, the few remaining natural areas have become more significant as they are the only areas that are considered safe for wildlife breeding and wildlife corridors.

The dominant habitat-type found along the 407 Transitway corridor consisted of cultural meadows. Only local urbanized wildlife would be expected to inhabit these areas. Areas that contained natural fauna of some diversity were limited and usually located adjacent to the watercourses.

The area between Highway 400 and Jane Street consisted of agricultural land uses. A small watercourse (Black Creek) flowing through the margins of Beechwood Cemetery east of Jane Street had been channelized. Minimal habitats exist along this watercourse. Most of the area surrounding the CN Rails tracks between Jane Street and Keele Street were industrial buildings.

The habitat extending west from the Don River to the CN Rails tracks and east to Centre Street is primarily cultural woodlot and cultural thicket. Small mammal (e.g. squirrels) tracks along the banks of the Don River and throughout the woodlots indicated that the area is being used as a wildlife corridor to the bridge that crosses under Highway 407. An Eastern Phoebe *(Sayornis phoebe)* nest was found on the northwest corner of the bridge. Although no direct breeding bird evidence could be found in the cultural thickets and woodlots surrounding the river and in the expansive area west of the river, habitat in this area is characteristic of the type used by numerous species of breeding migratory birds. Westminster Creek showed little evidence of wildlife activity.

Between Bathurst Street and Yonge Street numerous tracks from red fox (tracks and faeces), raccoon, muskrat, mink and white-tailed deer were observed inside the culverts and along the East Don River tributary banks under the Highway 407. This corridor connected habitat on the golf course north of Highway 7 and the areas of cultural meadows, cultural thickets and forest located south of Highway 407.

Figure 4-2(a): Existing Natural Heritage Features

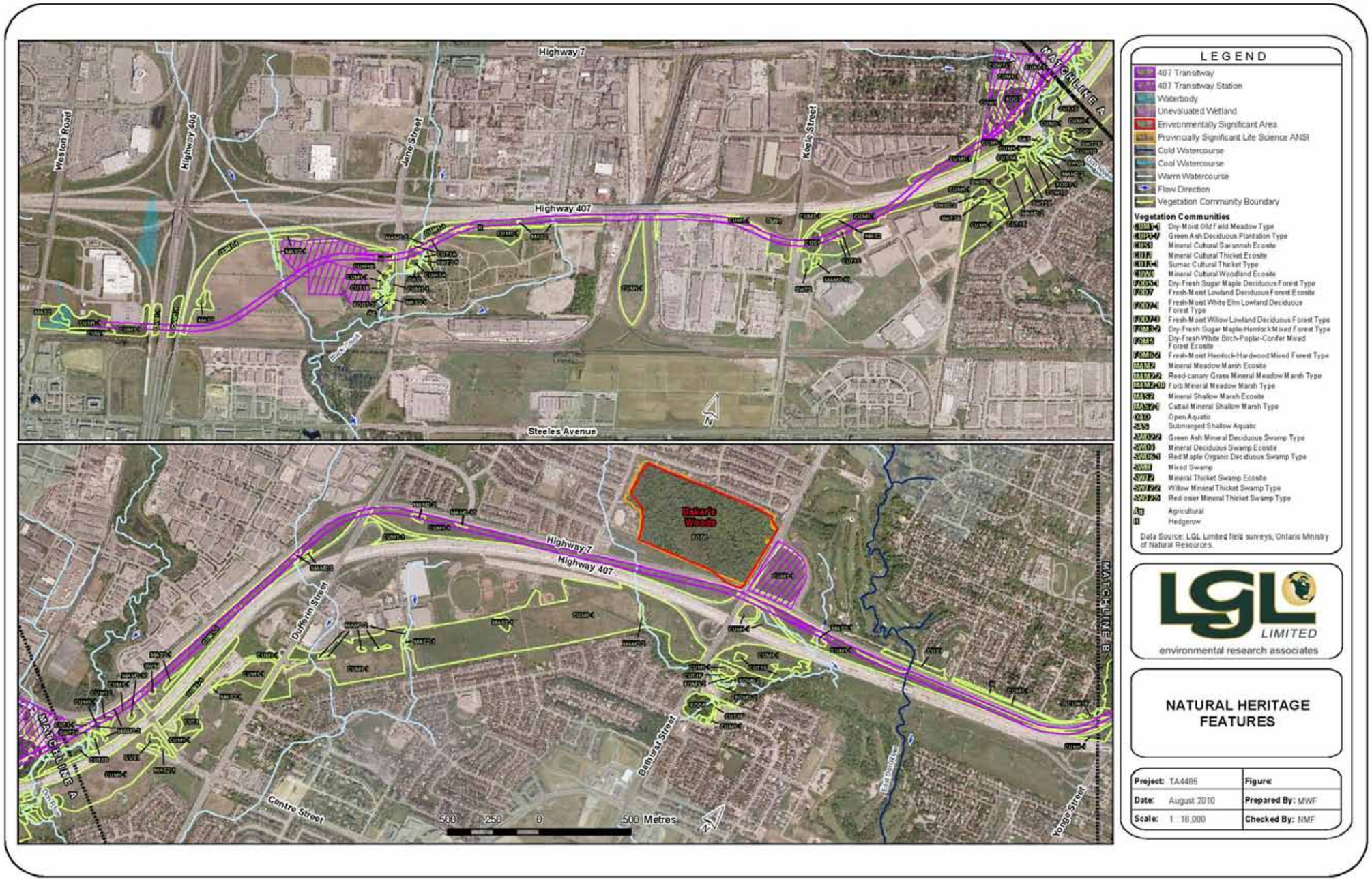
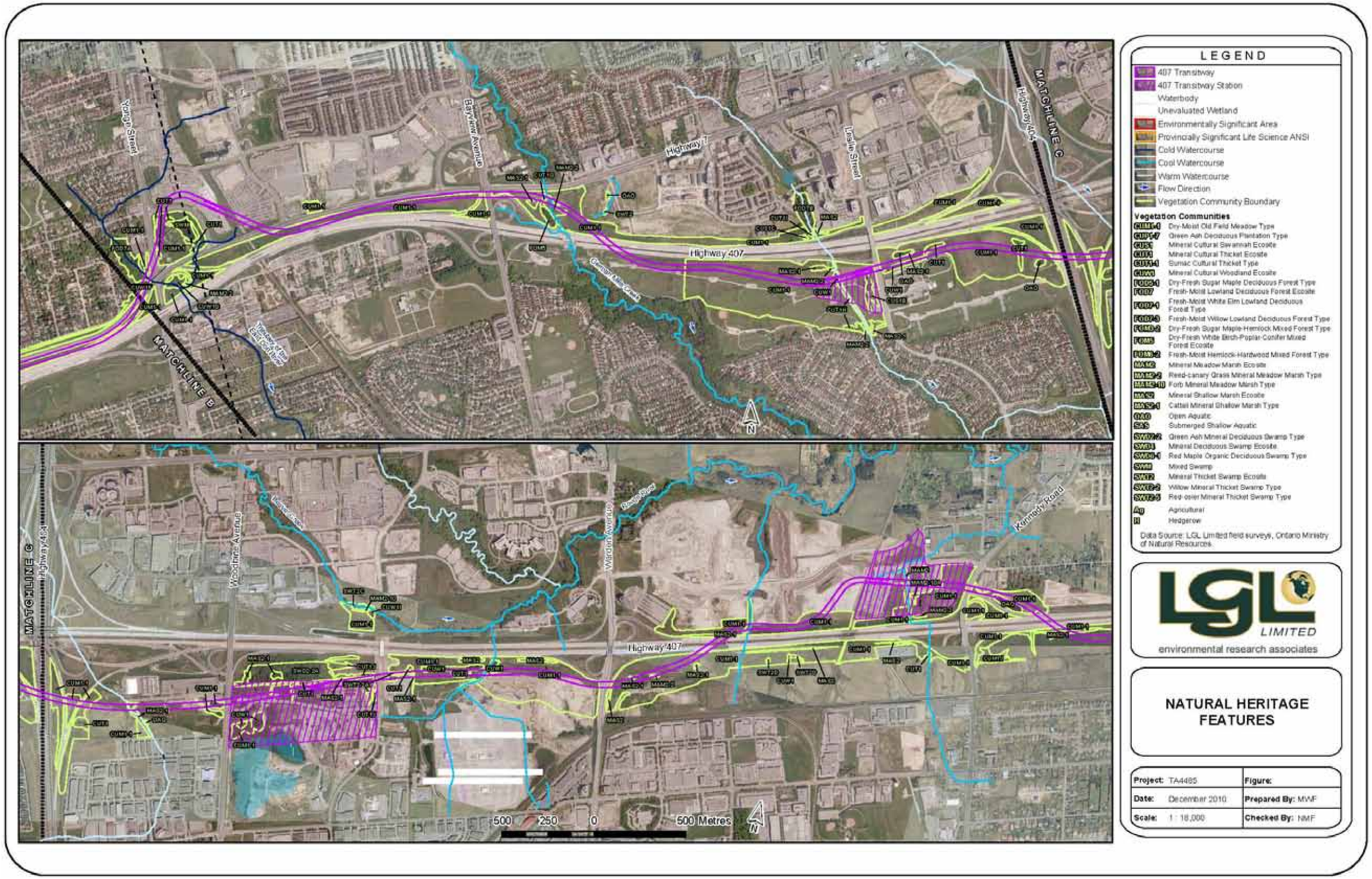


Figure 4-2(b): Existing Natural Heritage Features



Two natural areas occur around both tributaries of German Mills Creek that cross under Highway 7 and Highway 407 just east of Bayview Avenue and west of Leslie Street. The German Mills Creek and its tributary were surrounded by marsh and cultural thickets. Many tracks along the creek and down the side road on the east side of the creek indicated the area is a useful corridor and feeding area for species such as Eastern cottontail *(Sylvilagus floridanus),* red fox, white-tailed deer and raccoon. The large corrugated steel pipe culvert under Highway 7 did not contain any migratory bird nests and did not show evidence that mammals were crossing through it. The marsh habitat looked as if it would contain breeding migratory birds. Red-tailed Hawks were staging in this area. The creek tributary just west of Leslie Street was surrounded by a small cultural woodlot. Mammals may use this area as a protective wildlife corridor. No other evidence was found in this area, given the time of year and weather conditions.

The mixed natural area just east of Rodick Road consisted of cultural meadow, cultural thicket, cultural woodlots and meadow marsh. The variety of habitats, combined with nests found in the area, indicated the seasonal presence of Brown Thrasher *(Toxostoma rufum),* Gray Catbird *(Dumetella carolinensis),* American Robin, Song Sparrow *(Melospiza melodia),* Willow Flycatcher *(Empidonax traillii),* American Goldfinch and Mourning Dove *(Zenaida macroura).* Mammal trails and tracks indicated that the area is used as a wildlife corridor. In the cattail marsh area at Burncrest Road a Red-tailed Hawk was observed hunting. This marsh also looked suitable for marsh breeding birds, mammals and some herpetofauna in the spring and summer seasons.

A small patch of natural habitat exists along the Rouge River tributary crossing under Highway 407 just west of Warden Avenue. The other two tributaries flow between Warden Avenue and Kennedy Road. The Rouge River tributary between the Unionville Transit Station and the YMCA building was surrounded by cultural meadow in a very urbanized setting and was dry at the time of field investigations. The east end of the proposed 407 Transitway, just east of Kennedy Road, is comprised of agricultural fields. The only wildlife recorded at this time was the staging Red-tailed Hawks seen around the areas of the Unionville Transit Station and the YMCA building. The tributaries may be used by mammals as travel corridors but no evidence was found.

Based on previous work undertaken by LGL Limited along the neighbouring Highway 7 ROW and including fieldwork undertaken in 2008 within the proposed alignments, to date 126 species of birds, 23 species of mammals, and 10 species of herpetofauna have been identified through secondary source data. **Appendix F** presents wildlife documented in the study area through field investigations and secondary sources of information.

Rare, Threatened or Endangered Species

Background information indicated that of the 159 wildlife species recorded within the study area, six are regulated under the Ontario ESA and the Canada SARA. The presence of these species is based on a review of secondary source data and available habitats within the study area. The Milk Snake *(Lampropeltis triangulum)* and Snapping Turtle *(Chelydra serpentina)* are listed as special concern under both acts. The Canada Warbler *(Wilsonia canadensis)* and Golden-winged Warbler *(Vermivora chrysoptera)* are listed as special concern under ESA and threatened under SARA. The Chimney Swift *(Chaetura pelagica)* is listed as threatened under both acts. The Bobolink *(Dolichonyx oryzivorus)* is listed as threatened under the ESA.

A review of the available database information from the MNR Biodiversity Explorer (NHIC) indicates that additional three rare species may be found within the study area. Blanding's Turtle *(Emydoidea blandingii)* and Musk Turtle *(Sternotherus odoratus)* are listed as threatened under ESA and SARA and Jefferson X Blue-spotted Salamander, Jefferson genome dominates *(Ambystoma hybrid pop)* is listed as endangered under ESA and threatened under SARA. Last observed dates are 1986, 1982 and 1978 respectively for these element occurrences. A Blanding's Turtle *(Emydoidea blandingii)* individual was documented in the West Don River in 2010. This recent occurrence was in the vicinity of the study area. The stretch of the West Don River the Blanding's Turtle was documented in does not contain habitat suitable for this species. However, approximately 1.2 kilometres upstream, the Keffer Marsh provides habitat suitable for the species. Field investigations during the Detail Design Stage should place an emphasis on confirming presence/absence and distribution of these three species within the study area.

Evidence for numerous birds protected under the *Migratory Birds Convention Act* (MBCA) was found. Some of the proposed routes come close to several bridges and culverts on Highway 407 and Highway 7 where evidence of migratory birds nesting was noted. Two of these species, Cliff Swallow and Eastern Phoebe, have a strong nesting fidelity for the same site each year and will likely return there to nest each spring. Many of the mammal species recorded are protected under the *Fish and Wildlife Conservation Act* (FWCA). They are regular travellers of the wildlife corridors found along the creek and river systems. No herpetofauna were recorded. The TRCA also gives protection to many of the wildlife species recorded.

Three species of significance were noted within the vicinity of the study area: Rough-legged Hawk *(Buteo lagopus)*, Northern Shrike *(Lanius excubitor),* and Milk Snake. Rough-legged Hawk is designated by MNR as a non-breeding migrant/vagrant with a SRank of S1B (extremely rare breeding occurrence). Northern Shrike is designated by MNR as a non-breeding migrant/vagrant with a SRank of S2S3B (very rare to uncommon breeding occurrence).

Sixty-four birds have been identified by Bird Studies Canada (BSC) as species of conservation priority (Couturier 1999). Thirty-six birds and one amphibian have been identified by TRCA as species of concern within TRCA's jurisdiction.

Twelve birds, one mammal (northern short-tailed shrew), one amphibian (Northern Red-Backed Salamander), and two reptiles (Midland Painted Turtle and Milk Snake) are regulated under the FWCA and 103 birds are regulated under the MBCA.

4.1.8 Designated Natural Areas

One Environmentally Significant/Sensitive Area exists in the study area. Baker's Woods (ESA #128), an approximately 35 hectares tract of Dry-Fresh Sugar Maple Deciduous Forest (FOD5), is located in the northwest corner of the intersection of Highway 7 and Bathurst Street in the City of Vaughan. Baker's Woods is also designated as a provincially significant Areas of Natural and Scientific Interest (ANSI) by the MNR.

There are no Provincially Significant Wetlands (PSWs) located in the study area.

The Rouge Park North Management Plan includes valleylands surrounding the Rouge River to the north of Highway 407 between Woodbine Avenue and Warden Avenue and valleylands surrounding the main branch and tributaries of the Rouge River to the northwest, northeast and southeast of the intersection of Highway 407 and Kennedy Road. The Rouge Park North Management Plan includes valleylands surrounding Beaver Creek north of

Highway 407 to the east of Woodbine Avenue. According to the Rouge Park North Management Plan, valleylands surrounding the Rouge River to the north of Highway 407 between Woodbine Avenue and Warden Avenue are designated 'Special Management Zones.' According to the Rouge Park North Management Plan, land surrounding Walden Pond to the northwest of the intersection of Highway 7 and Kennedy Road is designated a 'Natural Area.

Natural Features/Natural Systems

The study area is located within the Humber River, Don River, and Rouge River watersheds. The major watercourses crossing the corridor are Black Creek, West Don River, Westminster Creek, Pomona Mills Creek, East Don River, German Mills Creek, Beaver Creek and the Rouge River.

Baker's Woods Environmentally Sensitive Area is located west of Bathurst Street and north of Highway 7. This area is also of historical significance as it includes the Jonathan Baker Farmhouse, which is included on the Vaughan Heritage Inventory and on the Register as a Class A building. In addition, Baker's Woods is also a provincially significant ANSI.

4.1.9 Noise and Vibration

Similar to the air quality assessment, three scenarios were reviewed: existing conditions, future without the 407 Transitway (2041, 10-year horizon beyond planned commencement of 407 Transitway operations), future with the 407 Transitway (2041). Details for the future with the 407 Transitway will be discussed in **Section 7**.

A total of ten noise sensitive areas were selected for assessment, including nine residences and one school area. Traffic data for existing conditions for Highway 407 were used in the assessment. Highway 407 is regarded as the dominant source of background traffic noise within the study area.

The MTO has a policy agreement with MOE in the assessment of noise impacts on transportation projects. The Policy states that where there is a noise increase greater than 5 decibels (dB) or the resulting sound level at the noise sensitive area is greater than 65 A-weighted decibels (dBA), mitigation must be considered.

The existing conditions at the nine noise sensitive area do not exceed the 65 dBA. There are two noise sensitive areas that have greater than 65 dBA in the future scenario without the 407 Transitway. The two areas are in the northeast quadrant of Dufferin Street and Highway 7 (68.1 dBA) and in the northeast corner of Warden Avenue and Highway 407 (65.7 dBA). Therefore, the 407 Transitway is predicted to comply with the MTO requirements with no need for additional mitigation.

4.1.10 Air Quality

To assess the current air quality in the study area, historical air quality monitoring data from the closest MOE monitoring stations to the study area were considered. This data was used as the existing background level of air quality for the study. A model was used to simulate the impact of the proposed transitway as well as the contribution of Highway 407. A total of ten sensitive receptors were chosen to summarize the modelling results and at which a comparison was made to applicable standards and criteria. The chosen sensitive receptors included nearby existing/future residential areas or schools located throughout the study area at varying distances from Highway 407 corridor.

To place the project into perspective over its lifetime, the air quality assessment covered three different scenarios: existing conditions (2008), future without the 407 Transitway (2031), and future with the 407 Transitway (2031).

The study concluded that the existing condition concentrations for carbon monoxide (CO), nitrogen dioxides (NO_x) and particulate matter less than 2.5 microns ($PM_{2.5}$) were well within MOE Air Ambient Quality Criteria (AAQC). Exceedances of the PM_{10} AAQC at three sensitive receptors within the study area for the existing conditions scenario were identified.

Air quality in both future scenarios will slightly improve for most gaseous pollutants (e.g. CO, NO_x) due to newer engine technologies and fuels, despite predicted increases in traffic due to population growth. The pollutant burden of carbon dioxide (CO_2) is expected to increase in the future due to increased traffic volumes from population growth. Without mitigation, air quality is predicted to degrade for particulate based compounds (i.e. $PM_{2.5}$, PM_{10} and TSP) due to increased traffic flow on Highway 407 resulting from population growth in the future.

The air quality study predicts a negligible difference in gaseous pollutant concentrations between the future with and future without the 407 Transitway scenarios. The study does predict that implementation of the 407 transitway will result in an increase in particulate matter concentrations, however, when recommended mitigation measures (planting of vegetation or where planned for safety and/or noise issues solid barriers) are considered it is expected that particulate matter concentrations at sensitive receptor locations will be within MOE standards.

4.2 Socio-Economic and Cultural Environment

4.2.1 Land Use

Parkway Belt West Plan

The study area is predominantly located within the Parkway Belt West Plan (PBWP), which was implemented for the purposes of creating a multi-purpose utility corridor, urban separator, inter-urban transit corridor 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 area covered by the Plan 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, 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.

Several pockets of lands designated as General Complementary Use Area are located in: the southeast quadrant of Highway 407 and Jane intersection (Beechwood Cemetery); the southeast quadrant of Highway 7 and Dufferin Street Interchange, northeast quadrant of Highway 407 and Bayview Avenue interchange; southeast quadrant of Highway 407 and Leslie Street Interchange, and southwest and southeast quadrant of Highway 407 and

Woodbine Avenue interchange. There is one area designated as Special Complementary Use Area, which is located in the northwest quadrant of Highway 7 and Bathurst Interchange (Baker's Wood Environmental Sensitive Area).

York Region

York Region Official Plan (2008) Office Consolidation and the updated Official Plan (2009), which was submitted to the Ministry of Municipal Affairs and Housing for approval, support the implementation of the 407 Transitway. One of the Official Plan's goals is to cooperate with area municipalities, GO Transit, the TTC, Ministries of the Province of Ontario and the adjacent municipalities in the planning, coordination, integration and operation of existing and new transit services and to encourage increases in transit modal splits across the Region's boundaries.

The Official Plan identifies the Vaughan, Richmond Hill and Markham regional centres as future hubs of business, cultural, government, and social activity. These regional centres are expected to contain the highest concentration and greatest mix of uses in the Region, including range in employment and housing opportunities. Development will be compact, well-designed form that contributes to an urban fabric that is vibrant, safe, attractive, pedestrian-friendly and transit-supportive.

City of Vaughan

The City of Vaughan's Official Plan (OPA 600) states that the City will work with the Province and the affected utilities to provide the transit ROW and related facilities, such as stations, commuter parking, passenger pick-up and drop-off, pedestrian entrances and vent shafts within the PBWP area. This is to maximize the use of valuable public lands while maximizing the potential for the 407 Transitway and complementing the development of the Vaughan Corporate Centre.

Town of Richmond Hill

The Town's Official Plan (1993) includes policies regarding transit. It states that the use of public transit is encouraged and promoted. It calls for local transit routings to be integrated with and supportive of inter-regional and inter-municipal public transit systems.

The 407 Transitway alignment is planned to leave the PBWP to reach the hub of the Richmond Hill Regional Centre near Yonge Street. The details within the Richmond Hill Regional Centre are being determined by a separate land use study. The Richmond Hill Regional Centre Design and Land Use Study – Final Recommendations was released in February 2010. This study was undertaken as a specific background study to the new Official Plan, which is now in development. The purpose of the study was to establish a long-term vision and growth management direction to facilitate the growth of the Richmond Hill Regional Centre as designated by the Growth Plan.

Town of Markham

The Town of Markham Official Plan states that 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 with respect to their impact on existing or proposed transit services. The Town will cooperate with other agencies to achieve integration of local and high speed bus services, intra-regional transit and commuter rail services.

Langstaff Gateway is the Markham portion of the Urban Regional Centre identified by the Growth Plan. It is located south of Highway 407 between Yonge Street and Bayview Avenue. Unlike the Richmond Hill Regional Centre, Langstaff Gateway has not been identified as the convergence spot for the level of public transit investment that the Richmond Hill Regional Centre is anticipating. The *Langstaff Land Use and Built Form Master Plan and the Draft Official Plan Amendment* was presented to the public in 2009. The Town of Markham is currently preparing a recommendation report on the proposed Official Plan Amendment and new Secondary Plan. Langstaff Gateway is being planned for a mixed land use designation linked to transit.

Agriculture

There are no lands within the study area designated as agricultural lands in the Official Plans of the City of Vaughan, Town of Richmond Hill and Town of Markham. However, in the west limits of the study area, lands between Highway 400 and Jane Street are currently used for agriculture.

Residential

Pockets of residential areas found adjacent to the 407 Transitway are located (from west to east):

- southwest quadrant of Highway 7 and the GO Barrie line;
- south of the Highway 407 corridor from west of Dufferin Street to east of Bathurst Street;
- north of the Highway 407 corridor and west of Dufferin Street;
- north of Highway 7 between Bathurst Street and Yonge Street; and,
- south of the Highway 407 corridor, between Bayview Avenue and Highway 404.

Residential areas typically consist of single family dwellings.

Commercial and Industrial

Three Regional Centres located within and adjacent to the study area comprise the Vaughan Metropolitan Centre, Richmond Hill Regional Centre-Langstaff Gateway and Markham Centre. The land uses within these regional centres are a mix of office, retail, residential and commercial uses. Vaughan Metropolitan Centre is located to the north of the Highway 407 corridor, immediately east of Highway 400.

The Richmond Hill Regional Centre-Langstaff Gateway is located to the north and south of the Highway 407 corridor and east of Yonge Street. The northern part of this regional centre, Richmond Hill Regional Centre is a mix of office, retail and other commercial space including a Famous Players Silvercity complex. A land use study for the future of the Richmond Hill Regional Centre was carried and the "Richmond Hill Regional Centre Design and Land Use Study – Final Recommendations" report was released in February 2010. The study's recommended concept for the centre was a transit-oriented community able to accommodate approximately 15,800 people and 15,700 jobs within differing built forms and mix of uses. This centre would be the location where transit lines integrate including the 407 Transitway, GO Rail, Yonge Subway Extension, YRT local and rapid bus network. The southern part of this regional centre, Langstaff Gateway, is mainly commercial and industrial.

Markham Centre, located in the eastern limits of the study area, is expected to house 25,000 residents in 10,000 units (condominiums and townhouses) and employ 17,000 people.

Industrial and commercial pockets are found adjacent to the study area from Highway 400 to Dufferin Street, between Yonge Street and Bayview Avenue, between Woodbine Avenue and Warden Avenue including Woodside

Centre and First Markham Place. Places of interest are the Richmond Hill Town Hall, the Beaver Creek Business Park, located on the north side of Highway 7, which provide 10,000 jobs and the Thornhill Square Shopping Centre with 60 retail stores. Other places of interest is the CN MacMillan Classification Yard located between Jane Street and Keele Street north of the study area and Buttonville Airport which is located north of the study area, just east of the Highway 404. It employs 300 people and houses over 300 aircrafts for local residents. Further south of the study area is the Pacific Mall, which is considered the largest indoor Asian mall in North America with 400 retail stores.

Community and Recreational Facilities

There are a number of cemeteries located within and adjacent to the study area. Beechwood Cemetery is located to the south of the Highway 407 corridor and east of Jane Street. South of Highway 407 and east of Yonge Street, just west of Langstaff Gateway is the Holy Cross Catholic Cemetery. Bethel/Lunau Cemetery, which is listed on the Markham Register of Property of Cultural Heritage Value or Interest, is located on the northwest quadrant of Highway 407 and Warden Avenue.

Recreational Trails such as the Bartley Smith Greenway runs within the Don River valley extending from Steeles Avenue to Langstaff Road. This trail crosses the study area twice between the GO Barrie Rail line and Centre Street. Also, there is the Huntington Trail, which is located south of Highway 407, extends from Bayview Avenue to Leslie Street and crosses Beaver Creek.

Richmond Hill Golf and Country Club, a golf course, is located at the northeast corner of Highway 7 and Bathurst Street.

4.2.2 Built Heritage and Cultural Heritage Landscapes

Built heritage resources and cultural heritage landscapes within the study area are those above-ground, person-made heritage resources which are over 40 years old. The application of this rolling forty-year principle is an accepted federal and provincial practice for the preliminary identification of cultural heritage resources that may be of heritage value. However, its application does not imply that all built heritage resources or cultural heritage landscapes over 40 years old in age are worthy of the same levels of protection or preservation.

There are 31 built heritage features and cultural heritage landscapes located within the study area **(Table 4-2)**. Most identified resources are associated with roads that intersect or roads that are in the vicinity of Highway 407. None are located within the Highway 407 ROW.

4.2.3 Archaeological Features

The Stage 1 Archaeological Assessment has determined that 47 archaeological sites have been registered within the study area. In addition, a review of the general physiography and local nineteenth century land uses of the study area suggested that large areas within the study area exhibit archaeological potential.

The Ministry of Culture's draft *Standards and Guidelines for Consulting Archaeologists* (2006: Unit 1c. 5-7. 10) stipulates that undisturbed land within 300 metres of a primary water source (lakeshore, river, large creek, etc.), undisturbed land within 200 metres of a secondary water source (stream, spring, marsh, swamp, etc.), as well as undisturbed land within 300 metres of ancient water source (remnant beaches, shorecliffs, terraces, abandoned river channel features, etc.), are considered to have archaeological potential. Therefore, due to the proximity of the numerous rivers and creeks, it may be concluded that there is potential for the recovery of Aboriginal archaeological remains within the study area depending on the degree of previous land disturbance. The physiography of the study area and the close proximity of the above noted sites attest to the significant potential for the recovery of archaeological remains, from undisturbed lands within the study area.

The *1878 Illustrated Atlas of York County* indicates that the study area is located in the former Townships of Markham and Vaughan and passes through the historic communities of Edgeley, Concord, Langstaff and Dollar. The atlas also showed that there are a number of structures, including homesteads, mills, post offices, churches and schools within the study area. The majority of early nineteenth century farmsteads are likely to be captured by the basic proximity of water and the development of the network of concession roads through the course of the nineteenth century. All the major intersections bisected by the transitway (Jane Street, Keele Street, Dufferin Street, Bathurst Street, Yonge Street, Bayview Avenue, Leslie Street, Woodbine Avenue, Warden Avenue and Kennedy Road) follow the old concession line, and Langstaff Road and Highway 7 follow the major dividing line between lots. In addition Bradford GO line follows the old Northern Railway line, which ran between the City of Toronto and Town of Aurora. The Stouffville GO line follows the old Toronto and Nipissing Railway which ran between the City of Toronto and the village of Coboconk. The Kennedy and Unionville Stations are still in existence in their original locations, with the Kennedy Station being used as a GO Transit stop. Therefore depending on the degree of previous land disturbance, it may be concluded that there is potential for the recovery of Euro-Canadian cultural material within the study area.

Most of the archaeological sites located within the study area were located far from the proposed 407 Transitway alignment and station sites or underwent testing and mitigation as part of other developments such as the Highway 407 construction, hydro lines, watermains, etc. Of the 47 archaeological sites, the Stage 1 Archaeological Assessment identified two registered archaeological sites with outstanding concerns:

- The Reaman Site, AkGu-16, listed as Late Woodland Iroquoian village site in the 1986 "Archaeological Master Plan for the Town of Vaughan". It is located on the southwest quadrant of Highway 407 and Bathurst Street interchange. In 1990, part of Reaman Site was under a Stage 1-2 Archaeological Assessment for the Claireville TS x Cherrywood TS 500kV Transmission Line 2 and a Stage 3-4 Archaeological Assessment and mitigation as part of the Tower 122. Stage 4 mitigation took place in 1994 for the site that was within the Highway 407 ROW. Stage 3-4 excavations took place in 1995 on part of the site that was to be affected by the PD6 Interconnecting Watermain.

- The J.J. Lunau Site 1, AlGt-219 is a Euro-Canadian homestead site discovered in 1995. The site is located north of the transformer station site between Rodick Road and Warden Avenue, south of Highway 407.

It was determined that if these two sites were to be impacted, a Stage 2 Archaeological Assessment is required.

Table 4-2: Identified Cultural Heritage Landscapes (CHL) and Built Heritage Resources (BHR) within the 407 Transitway Study Corridor

Site #	Resource	Type	Location	Description	Within or Adjacent the Preferred Transitway Route
1.	CHL	Funerary	No. 7241 Jane Street, east side, adjacent Highway 407, City of Vaughan.	Beechwood Cemetery: A mid 20th century cemetery established in 1965.	Adjacent to preferred transitway route.
2.	BHR	Transportation	Jane Street at Pellar Road, City of Vaughan.	401 Underpass: Concrete rigid frame overpass, date unknown. It carries Jane Street over Pellar Road.	Within larger study corridor.
3.	CHL	Railscape	Crosses north-south at Highway 407 to west of Keele Street, City of Vaughan.	CN Line: It connects with CN Rail Freight Yard north of Highway 7.	Within larger study corridor.
4.	CHL	Transportation	Railscape Crosses under Highway 407 to east of Keele Street, City of Vaughan.	CN Line: It runs north-south at Highway 407.	Within the proposed preferred transitway route.
5.	BHR	Residential	No. 1929 Highway 7, south side, City of Vaughan.	Residence: This 19th Century, 1_ storey brick residence has a multi gable roof and with one storey bay windows, decorative dichromatic bands of brickwork and dichromatic voussoirs and segmental window openings. Included on the Vaughan Heritage Inventory and on the Register.	Within larger study corridor
6.	BHR	Transportation	Railway Subway Highway 7 west of Centre Street, City of Vaughan.	CN Overpass: Steel girder overpass with steel sidewalls and concrete abutments, datestone of 1963. Associated with the mid 19th Century. Ontario Simcoe and Huron Railway. Later the Grand Trunk and then CN.	Within larger study corridor.
7.	CHL	Waterscape	Crosses under Highway 407 to west of Centre Street, City of Vaughan.	An East Don River tributary.	Within larger study corridor.
8.	BHR	Residential	1889 Highway 7 to east of railway bridge, City of Vaughan.	Former Residence Now a commercial site, date undetermined, this building is 1 _ storeys with a side gable roof, and modern siding; much altered. Associated with former community of Concord.	Within larger study corridor.
9.	BHR	Residential	1841 Highway 7, south side, to east of railway bridge, City of Vaughan.	Former Residence: Now in commercial use, this mid 20th century residence is 1 _ storeys, with a side gable roof and gable dormers and clad in modern siding; much altered. Associated with former community of Concord.	Adjacent to preferred transitway route
10.	BHR	Commercial	1890 Highway 7, north side immediately east of railway bridge, west of Centre Street, City of Vaughan.	Concord Floral Company Limited: Comprises a 20th century residence and several greenhouses to north. Fred Miller established the Concord Greenhouses, in the early 20th C. that became the Concord Floral Company. Associated with former community of Concord. Included on the Vaughan Heritage Inventory.	Within larger study area.
11.	CHL	Transportation	Former Highway 7 alignment Southwest quadrant of Highway 407 and Centre Street, City of Vaughan.	Highway 7 ROW: Abandoned alignment off Centre Street that was severed during construction of Highway 407 in the 1990s.	Within larger study area.
12.	BHR	Public	7894 Dufferin Street, west side, City of Vaughan.	Patricia Kemp Community Centre: Built in 1931 as a schoolhouse, this one storey brick building has a flat roof, centre projecting bay with main entrance flanked by sidelights and four windows to either side of entrance; decorative semi-circle panel and transom over main entrance; date stone above main entrance, indicating construction date of 1931; little altered. Included on the Vaughan Heritage Inventory and on the Register.	Within larger study area.
13.	BHR	Residential	No municipal address on-site, it is located immediately east of No. 8090 Dufferin Street (Vaughan Parks Department), City of Vaughan.	Residence: 19th century, 1 _ storey frame residence with side gable roof and front verandah; a frame shed to rear; little altered. Property backs onto Highway 407 and appears to be abandoned. Included on the Vaughan Heritage Inventory.	Within larger study corridor.
14.	CHL	Recreational	Thornhill Woods, located at the northwest corner of Highway 7 and Bathurst Street, City of Vaughan.	Park Land/Baker Farm: The park includes the Jonathan Baker Farmhouse, built 1853, at 91 Thornhill Woods, which is also of historical significance: The Baker family produced maple sugar from the 1820s until 1999. Included on the Vaughan Heritage Inventory and on the Register as a Class A building.	Within larger study corridor.
15.	BHR	Residential	Old Langstaff Road, Richmond Hill Golf & Country Club. Town of Richmond Hill.	Residence: Isaac Reaman Residence, built in 1905, two storey, brick residence with cross gable roof and verandah in ell; little altered. Included on the Town of Richmond Hill Inventory Register.	Within the larger study corridor.
16.	BHR	Transportation	Old Langstaff Road, Town of Richmond Hill.	Road Bridge: Concrete road bridge with concrete posts and metal railing over Don River. MTO has commented that the bridge over the Don River of Old Langstaff Road is a MTO structure, as this was the former alignment of Highway 7.	Within the larger study corridor.

Table 4-2: Identified Cultural Heritage Landscapes (CHL) and Built Heritage Resources (BHR) within the 407 Transitway Study Corridor

Site #	Resource	Type	Location	Description	Within or Adjacent the Preferred Transitway Route
17.	BHR	Transportation	Under Highway 7 at Old Langstaff Road bridge, Town of Richmond Hill.	Culvert: Double, rectangular concrete box culvert under Highway 7, date unknown.	Within the larger study corridor.
18.	BHR	Religious	28 Langstaff Road, west side, Town of Markham.	Church: A 1 storey, 20th Century church building with a front gable roof and a vestibule set on a raised concrete block foundation.	Within the larger study corridor.
19.	CHL	Residential	Ruggles Street, Town of Markham.	Streetscape: A small grouping of an early 19th Century (No. 20) and some early 20th century houses on the west side of street (Nos. 10, 20, 24, 26 and 32). Nos. 10, 20 and 24 are listed on the Markham Register of Property of Cultural Heritage Value or Interest. Markham.	Within the larger study corridor.
20.	CHL	Funerary	8361 Yonge Street (Thornhill) Town of Markham.	Cemetery: The Archdiocese of Toronto established Holy Cross cemetery in 1954 as an alternate burial ground for Catholics in Toronto.	Within the larger study corridor.
21.	BHR	Residential	75 Langstaff Road, south side, Town of Markham.	Residence: LeMasurier House, built in 1931, a one storey brick cottage with hip roof and stucco cladding, little altered. Listed on the Markham Register of Property of Cultural Heritage Value or Interest.	Within the larger study corridor.
22.	BHR	Residential	79 Langstaff Road, south side, Town of Markham.	Residence: A 20th Century. 2 storey brick house with hip roof, front bay window, exhibits Four Square details; altered.	Within the larger study corridor.
23.	CHL	Transportation	Langstaff GO Transit Station, under Highway 407 to east of Yonge Street, Town of Markham.	CN Railway Line. Former early 20th Century. Northern Railway, later CN.	Within the preferred transitway route.
24.	BHR	Residential	89 Langstaff Road, south side, Matthews Bros., Town of Markham.	Residence Much altered, built c1900.	Within the larger study corridor.
25.	BHR	Residential	139 Langstaff Road East, south side. Town of Markham.	Residence: Armand Robineau, a one storey frame bungalow, built c. 1928. Listed on the Markham Register of Property of Cultural Heritage Value or Interest.	Within the larger study corridor.
26.	CHL	Funerary	8050 Warden Avenue, northwest quadrant of Highway 407 and Warden Avenue (Part of N.E. Lot 8, Concession 4). Town of Markham.	Bethel/Lunau Cemetery: Former site of a Primitive Methodist Church, the earliest cemetery marker is dated to 1862. Listed on the Markham Register of Property of Cultural Heritage Value or Interest.	Within the larger study corridor.
27.	BHR	Residential	Located on blocks, north side of Enterprise Road, Town of Markham.	Residence: 19th century, 2 storey brick residence that has been relocated to this site. Municipally designated under Part IV of the *Ontario Heritage Act*.	Within the larger study corridor.
28.	BHR	Residential	99 YMCA Boulevard, Town of Markham (Formerly No. 7996 Kennedy Road.	Residence: Rivis-Wolfe Residence, a mid 19th century brick residence of Regency-influenced Georgian architecture with a side gable roof, eave returns, cornice, 6/6 pane upper windows and Flemish bond brick pattern on front. It is now used as a meeting centre for the YMCA.	Adjacent to the preferred transitway route.
				Municipally designated under Part IV of the *Ontario Heritage Act*: Municipal Heritage Conservation Easement.	
29.	BHR	Residential	31 Helen Street, Town of Markham.	Residence: Helmke-Whiteoak House, a 19th century, 2 storey, brick residence. Municipally designated under Part IV of the *Ontario Heritage Act*.	Adjacent to the preferred transitway route.
30.	BHR	Transportation	Kennedy Road south of Highway 407.	Railway Bridge: Datestone indicates construction in 1963, crosses over Kennedy Road.	Within the larger study corridor.
31.	BHR	Residential	7931 Kennedy Road, east side, southeast quadrant Highway 407.	Residence: Abandoned farmhouse, 1-storey, centre gable roof, frame construction with vertical beaded boards. Set back from the road. Documented in Highway 407 Central Section, Cultural Resource Documentation Report, Volume 1, Indirect Impacts, Built Heritage Features ad Cultural Landscapes [March 2001]. Listed on the Markham Register of Property of Cultural Heritage Value or Interest.	Within the larger study corridor

A Stage 2 Archaeological Assessment is recommended for all undisturbed lands located outside the existing Highway 407 ROW which are considered to have archaeological site potential and are to be disturbed by the proposed 407 Transitway construction.

Undisturbed areas suggested for a Stage 2 Archaeological Assessment within the study area to be likely disturbed by the implementation of the 407 Transitway alignment and stations are:

- from Highway 400 to east of Jane Street;
- southeast quadrant of Highway 407 and Keele Street;
- location of the proposed GO Barrie (Concord) Station;
- southwest quadrant of Highway 407 and Leslie Street; and,
- east of Rodick Road.

Additional areas requiring further assessment are:

- west and east of Dufferin Street;
- east of Yonge Street, north of Highway 7;
- southwest quadrant of Highway 400 and Highway 407 interchange;
- east of Warden Avenue; and,
- west of Kennedy Road.

4.3 Transportation

The following section outlines the existing transportation systems and networks as they pertain to the 407 Transitway study area. All existing transportation conditions 500 metres north and south of the Highway 407 Corridor within the Regional Municipality of York, City of Vaughan, Town of Richmond Hill and Town of Markham are described.

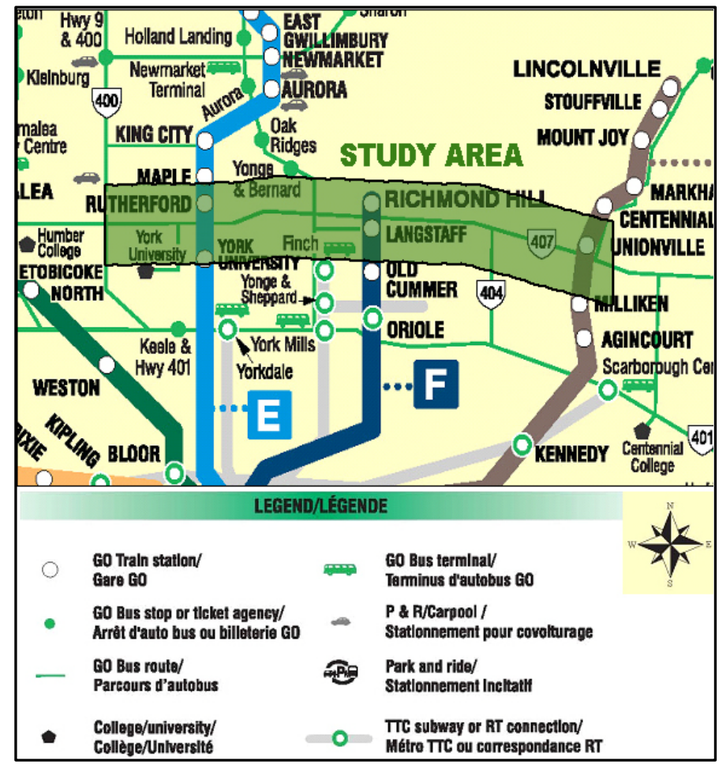
4.3.1 Transit Services within the Study Area

Currently within the Highway 407 Corridor, there exist four transit operators including GO Transit, YRT/Viva, Brampton Transit and the TTC. These transit operators are providing service within the Highway 407 Corridor and adjacent areas. The interconnectivity of these services occurs with other rapid transit systems such as the TTC Subway lines, GO Rail lines and YRT/Viva services. The connectivity characteristic of the existing transit networks facilitates accessibility by individuals to major UGC and activity hubs, such as employment areas, commercial centers, and post-secondary schools within the GTA.

The following figures illustrate the existing transit service within the transitway study area. Specifically **Figure 4-4** depicts the YRT/Viva as of September 5, 2010. These services consist of major station terminals where transfers are made easier between the different transit service providers. The major terminal stations are: Promenade Terminal, Richmond Hill Centre Terminal, Vaughan Mills Terminal, York University Terminal, and Finch GO Bus Terminal.

Figure 4-3 illustrates the existing GO Transit services within the central section of the transitway with bus and rail service. As well, the indication of TTC subway station transfer points is also illustrated. The system of rail and bus lines connects key metropolitan nodes and UGCs within the City of Vaughan, the Town of Richmond Hill, and the Town of Markham. The UGCs of significance are the Vaughan Metropolitan Centre, Richmond Hill/ Langstaff Centre, and Markham Centre. As well, the GO transit services assist in the connectivity to existing subway and LRT lines as well as the proposed 407 Transitway.

Figure 4-3: Existing GO Transit Services within the 407 Transitway Central Section



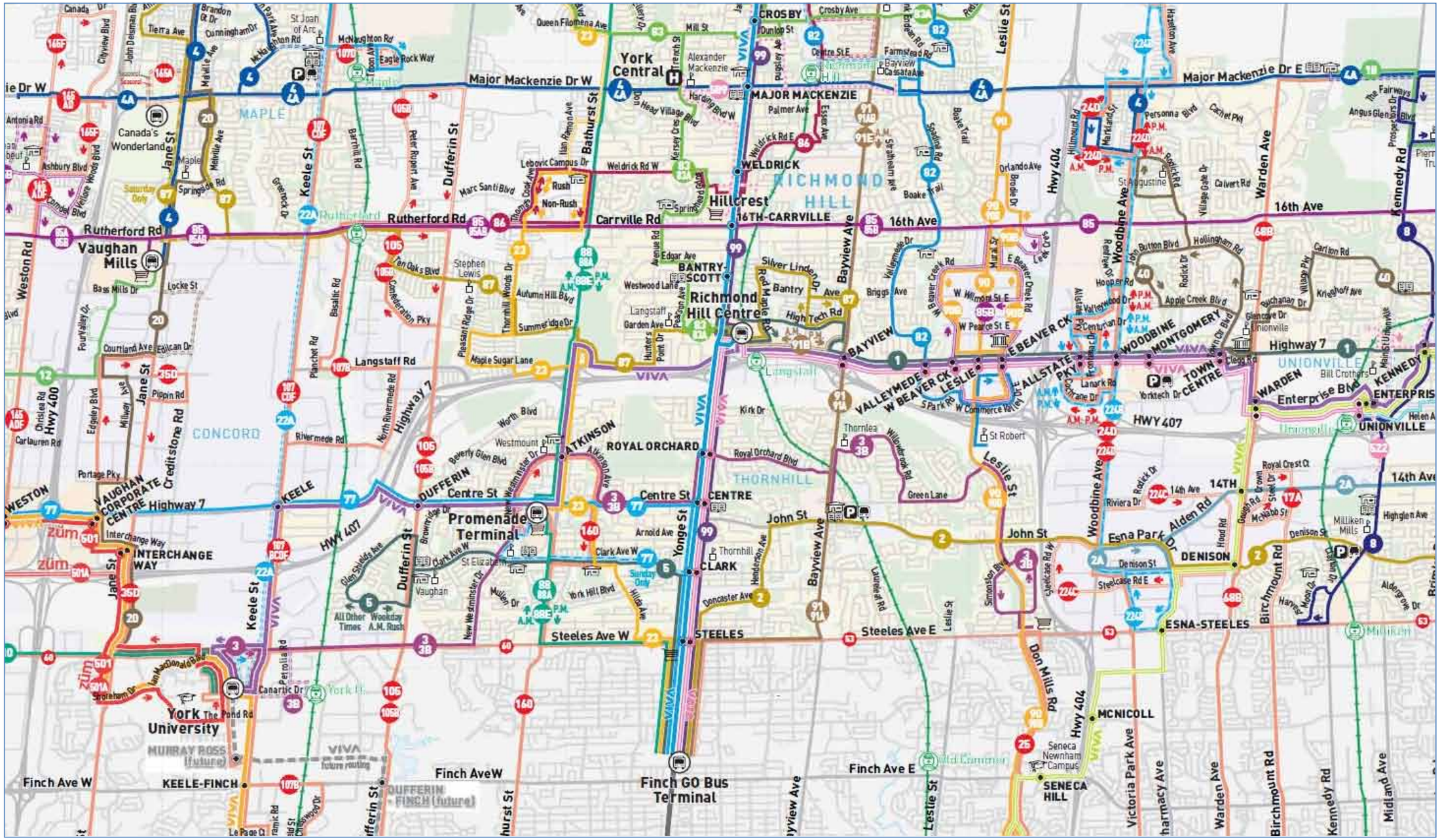
Three GO Rail Stations are located within or adjacent to the study area, consisting of:

1. York University GO Station: On the GO Barrie Line and located on Canarctic Drive near Keele Street and Steeles Avenue;

2. Langstaff GO Station is located on Langstaff Road, south of Highway 7 and Highway 407, in the Yonge Corridor just east of Yonge Street, in Markham; and,

3. Unionville GO Station: is located at the intersection of Kennedy Road and YMCA Boulevard in Markham, on the GO Stouffville Line with primary access via Kennedy Road.

Figure 4-4: Existing YRT/Viva System Map (Effective September 5, 2010)



4.3.1.1 GO Transit Bus Services

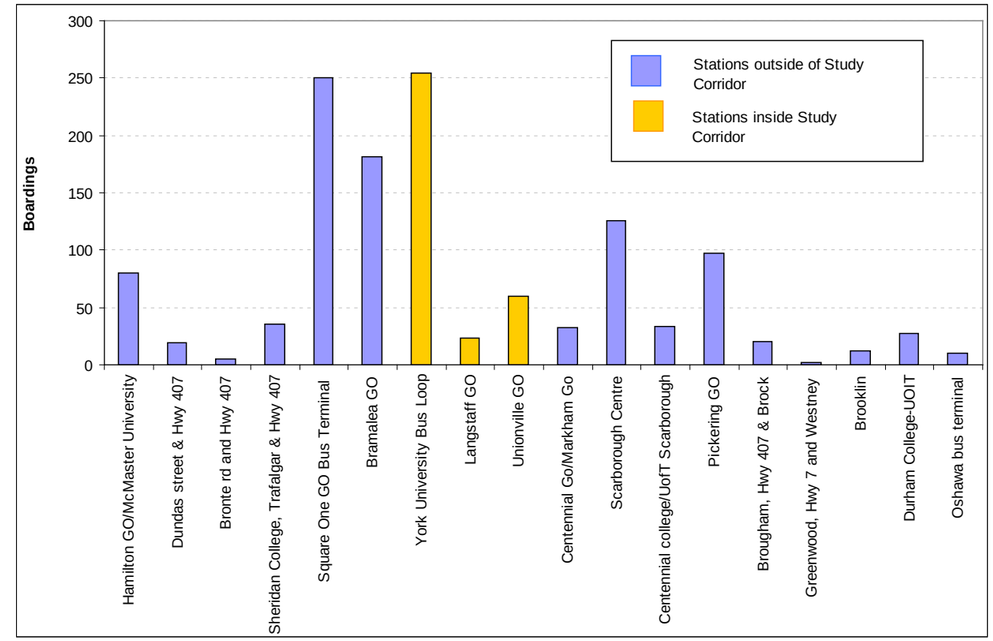
GO Bus routes serve five main branches either along the Highway 407 Corridor or perpendicular to the corridor.

The major stations served by each of these main branches are as follows:

- GO Bus Services Along Highway 407 Corridor: Highway 407 West GO Bus;
  - Hamilton GO Centre;
  - Oakville GO Station;
  - Streetsville GO Station and University of Guelph to York University: the service includes four branches (45, 46, 47 and 48) with connections in Hamilton (McMaster University);
  - Wellington Co. (Aberfoyle GO Park and Ride);
  - Burlington (407/Dundas Park and Ride);
  - Oakville (Sheridan College, 407/Trafalgar Park and Ride, 407/Bronte Park and Ride);
  - Mississauga (Square One, Meadowvale TC, Meadowvale GO); and,
  - Brampton (Bramalea GO, 407/Hurontario Park and Ride) connections to GO Transit Stations, carpool lots and postsecondary institutions.
- GO Bus Services Along Highway 407 Corridor: Highway 407 East GO Bus;
  - Oshawa Bus Terminal;
  - Pickering GO Station;
  - Mount Joy GO Station to York University (three branches: 51, 52 and 54);
  - Connections to postsecondary institutions and other activity centres:
    - Oshawa (Durham College-University of Ontario Institute of Technology);
    - Whitby (Brooklin);
    - Toronto (Centennial College, UT Scarborough);
    - Scarborough Town Centre;
    - Markham (Markham GO Station);
    - Centennial GO Station;
    - Unionville GO Station; and,
    - Langstaff GO Station).
- GO Bus Services Perpendicular to Highway 407 Corridor: Richmond Hill GO Bus (Route 61)
  - Richmond Hill GO Station; and,
  - Toronto Union Station Bus Terminal.
- GO Bus Services Perpendicular to Highway 407 Corridor: Newmarket Highway 400 GO Bus (Route 66)
  - Newmarket Bus Terminal; and,
  - Yorkdale Bus Terminal.
- GO Bus Services Perpendicular to Highway 407 Corridor: Sutton GO Bus (Route 69)
  - Beaverton;
  - Sutton; and,
  - Newmarket Bus Terminal.

Figure 4-5 illustrates the 2006 peak hour peak direction boardings at 18 stations along the GO Bus 407 East and West bus routes. Three of these stations, York University, GO Langstaff Station, and GO Unionville Station, fall within the Highway 407 Corridor. It is evident that the highest boarding rates occur at the York University stop and the two stations to the west of the transitway central section. On the other hand, boardings recorded for the GO Langstaff Station, which is one of the proposed station locations for the 407 servicing the Richmond Hill Centre, are currently relatively small.

Figure 4-5: 2006 Highway 407 East & West GO Bus Peak Hour Peak Direction Boardings



Source: GO Transit

4.3.1.2 York Region Transit (YRT)

The YRT provides transit services throughout York Region including four express routes operating along the Highway 407 Corridor between Yonge Street and Ninth Line. These routes are only operational during peak periods. These transit services, utilizing the Highway 407 Corridor, connect the major residential areas in York Region to the Finch GO Bus Terminal. Based on October 2010 passenger counts, these YRT/Viva express service routes carry 1,026 passenger trips on a typical weekday.

In addition, YRT also operates a number of routes on the major north-south roads intersecting Highway 407 as well as major east-west roads parallel to Highway 407 within the study area including its BRT services (YRT/Viva) on Yonge Street and 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 including:

1. Viva Blue:
   - Northbound-Southbound directional service;
   - Service between Finch GO Bus Terminal and Newmarket GO Terminal; and,
   - Service along Yonge Street.
2. Viva Blue-A:
   - Northbound-Southbound directional service;
   - Terminus stations of Finch GO Bus Station and Newmarket GO Terminal; and,
   - Service exclusively along Yonge Street between the terminus stations.
3. Viva Purple:
   - Eastbound-Westbound directional service;
   - Terminus station of York University and Markham Stouffville Hospital; and,
   - Service along Highway 7.
4. Viva Orange:
   - Northbound-Southbound directional service;
   - Terminus stations of Downsview Station and Highway 7/Martin Grove; and,
   - Service along Keele Street and Highway 7.
5. Viva Green:
   - Northbound-Southbound directional service;
   - Terminus stations of Don Mills Station and Highway 7/McCowan; and,
   - Service along McCowan Road during peak periods.
6. Viva Pink:
   - Northbound-Southbound directional service;
   - Terminus stations of Finch GO Bus Terminal and Unionville GO Station;
   - Service along Yonge Street and Highway 7; and,
   - Peak period service.

The 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) connectivity, connect to the existing Highway 407 GO Bus at York University, Langstaff GO Station and Unionville GO Station. As well, connections to the TTC's Yonge, Spadina, and Sheppard subway lines and to a number of TTC bus routes is in place.

4.3.1.3 Toronto Transit Commission (TTC)

The TTC is responsible for services in the City of Toronto (i.e. south of Steeles Avenue). 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.

There are currently no east-west TTC routes that operate within the Highway 407 Corridor. However, the TTC operates a number of routes on the major north-south roads intersecting Highway 407 as well as serving York University connecting to its subway system. Through the following planned TTC subway extensions, direct connections between the subway system in Toronto with the Highway 407 Corridor will be facilitated:

- TTC Spadina Subway – the line currently terminates at Downsview Station, southeast of York University at Sheppard Avenue and Allen Road. Through a subway extension, the route will be extended to Highway 7 at the Vaughan Metropolitan Centre.
- TTC Yonge subway – the line currently terminates at Finch Avenue. This subway route will be extended to Highway 7 at Langstaff GO Station/RHC Terminal.

4.3.1.4 Brampton Transit

Brampton Transit consists of the local bus services as well as the Brampton Züm BRT services. The transit service is comprised of 35 regular routes as well as a Canada's Wonderland express route and a GO shuttle route. Incentives for Brampton Transit passengers connecting to GO Stations within Brampton are provisioned for with reduced fare passes when connecting to the following GO Transit Stations: Malton, Bramalea, Mount Pleasant, Brampton GO Stations, and Downtown Brampton's Bus Terminal. Proof of GO Transit ticket purchased from GO Transit's York University Highway 407 Bus service also give passengers the opportunity to transfer onto Brampton Transit at a reduced fare.

Another transit service offered by Brampton Transit is the Brampton Züm. Introduced by the City of Brampton to provide connectivity along the city's major north-south and east-west corridors, the system was implemented as a BRT to meet the demands of high-route capacities within the City of Brampton.

4.3.2 Existing Road Network

A grid network of arterial roads as well as minor provincial and major 400-series highways make up the road-based transportation system within the Highway 407 Corridor. There are three major provincial 400-series highway facilities within the corridor, including:

1. Highway 407
   - East-west facility that defines the corridor alignment
   - Lane width varies between six and eight lanes, with interchanges at all major north-south facilities within the study area;
   - Currently, the highway extends from the junction of the Queen Elizabeth Way and Highway 403 in the west to Brock Road in the east; and,
   - Plans for extension farther eastward to Highway 35/115.

2. Highway 400
   - North-south facility in the western portion of the proposed 407 Transitway Central Section;
   - Eight lane wide across the study area with a major interchange with Highway 407; and,
   - Extends from Highway 401 in the south, within the City of Toronto, to the City of Sudbury in the north.

3. Highway 404/Don Valley Parkway
   - North-south facility;
   - Eight lanes wide across the study area;
   - Has a major interchange with Highway 407; and,
   - Extends from the Gardiner Expressway in the south (City of Toronto) to Green Lane in the north (Town of Newmarket).

The most important minor highway/arterial road facility within the corridor is Highway 7. This highway runs parallel Highway 407 and parallel to the 407 Transitway. The section of Highway 7 that is contained within York Region is a regional road as opposed to a provincial facility. Within the study area, the six-lane facility offers both signalized urban sections, such as Bayview Avenue to Commerce Valley Drive East, and at-grade highway sections from east of Keele Street to Bayview Avenue. The more urban sections facilitate greater pedestrian activity through the provision of sidewalks and access to adjacent development areas. Highway 7 also serves as a major component of the YRT/Viva network.

The proposed 407 Transitway is intersected by numerous north-south arterial roads and local connector road in York Region as listed from west to east in **Table 4-3**.

Table 4-3 Existing North-South Arterial Roads in the 407 Transitway Corridor

Road	Classification	Posted Speed (km/h)	Lanes	Jurisdiction
Jane Street	Arterial	70	2N/2S	York Region
Keele Street	Arterial	60	3N/3S	York Region
Centre Street	Arterial	60	2N/2S	York Region
Dufferin Street	Arterial	60	3N/3S	York Region
Bathurst Street	Arterial	60	3N/3S	York Region
Yonge Street	Arterial	60	3N/3S	York Region
Bayview Avenue	Arterial	60	3N/3S	York Region
Leslie Street	Arterial	70/60*	2N/2S	York Region
Woodbine Avenue	Arterial	60	3N/3S	York Region
Rodick Road	Collector	50	2N/2S	Town of Markham
Warden Avenue	Arterial	60	3N/3S	York Region

*70 km/h north of 407 eastbound off-ramp, 60 km/h south of Highway 407 eastbound off-ramp.

4.4 Utilities

4.4.1 Services and Utilities

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

- Enbridge;
- Power Stream;
- Allstream;
- Rogers;
- Bell Canada;
- 407 ETR;
- Hydro One;
- Town of Richmond Hill; and,
- York Region.

The aforementioned were provided with the transitway's technically preferred route alignment plans and profiles. They were then able to indicate their existing and future, if available, utility plans. Identification of utilities and municipal services along the runningway are illustrated on the horizontal and vertical alignment plates (**Section 6**). **Section 7** of this report addresses the potential conflicts and proposed mitigation measures.