

## 4 EXISTING CONDITIONS

The following sections provide an overview of the existing features within the study area, including the Natural Environment (**Section 4.1**), Socio-Economic Environment (**Section 4.2**), Cultural Environment (**Section 4.3**), and Technical Considerations (**Section 4.4**). Information presented in this chapter was developed based on secondary source information, correspondence with regulatory agencies (including but not limited to the Ministry of Natural Resources and Forestry (MNRF), the Ministry of the Environment Conservation and Parks, (MECP) and Conservation Halton (CH) and the Study Team's own field investigations.

### 4.1 NATURAL ENVIRONMENT

The existing environmental features located within the study area, as described in the following sections, are illustrated in **Exhibits 4-1A-D**.

The *Environmental Reference for Highway Design* (2013) outlines the protocols followed by the environmental specialists. Generally, the study area for most environmental specialities is defined as within the existing and proposed right-of-way (ROW), and adjacent lands are measured 120 m outwards from proposed highway improvements. Where an environmental speciality defined the study area differently, it is outlined in the appropriate sub-sections.

#### 4.1.1 DESIGNATED AREAS

“Designated Natural Areas” include evaluated wetlands (including both Locally Significant [LSW] and Provincially Significant Wetlands [PSW]), Environmentally Sensitive Areas (ESA), Provincial Parks, Conservation Reserves, and Areas of Natural and Scientific Interest (ANSI).

The Sassafras –Waterdown Woods is considered a Life Science ANSI, designated ESA #4 by the Region of Halton, protected countryside under the Greenbelt Plan (2017) and part of the Natural Heritage System. Vegetation units 1A to 1C (refer to **Appendix C**) are considered protected countryside under the Greenbelt Plan (2017). Vegetation units 1A, C, E, and 6A are listed as part of the Natural Heritage System.

The Natural Heritage Information Centre (NHIC) database identified the presence of Colonially Nesting Bird Breeding Habitat near the south limits of the study area. No other provincially or locally designated significant wildlife habitat (SWH) features were identified by NHIC or Land Information Ontario (LIO) as occurring within the study area; however, the Project Team completed an assessment of SWH based on review of the existing natural environment features within the study area.

There are ten distinct woodlands over 2 ha in size that are considered significant within the study area. At 144 ha in size, Sassafras Woods is considered to be the largest significant woodland and includes interior habitat (>100 m from woodland edge).

Designated natural areas occur beyond the study area and will not be impacted by the proposed works, and therefore are not considered further in this report.

#### 4.1.2 VEGETATION COMMUNITIES

The existing vegetation communities within the study area were documented through several methods including a review of the MNRF NHIC online database and provincial, regional, and municipal legislation, and consultation with the MNRF Aurora District and CH.

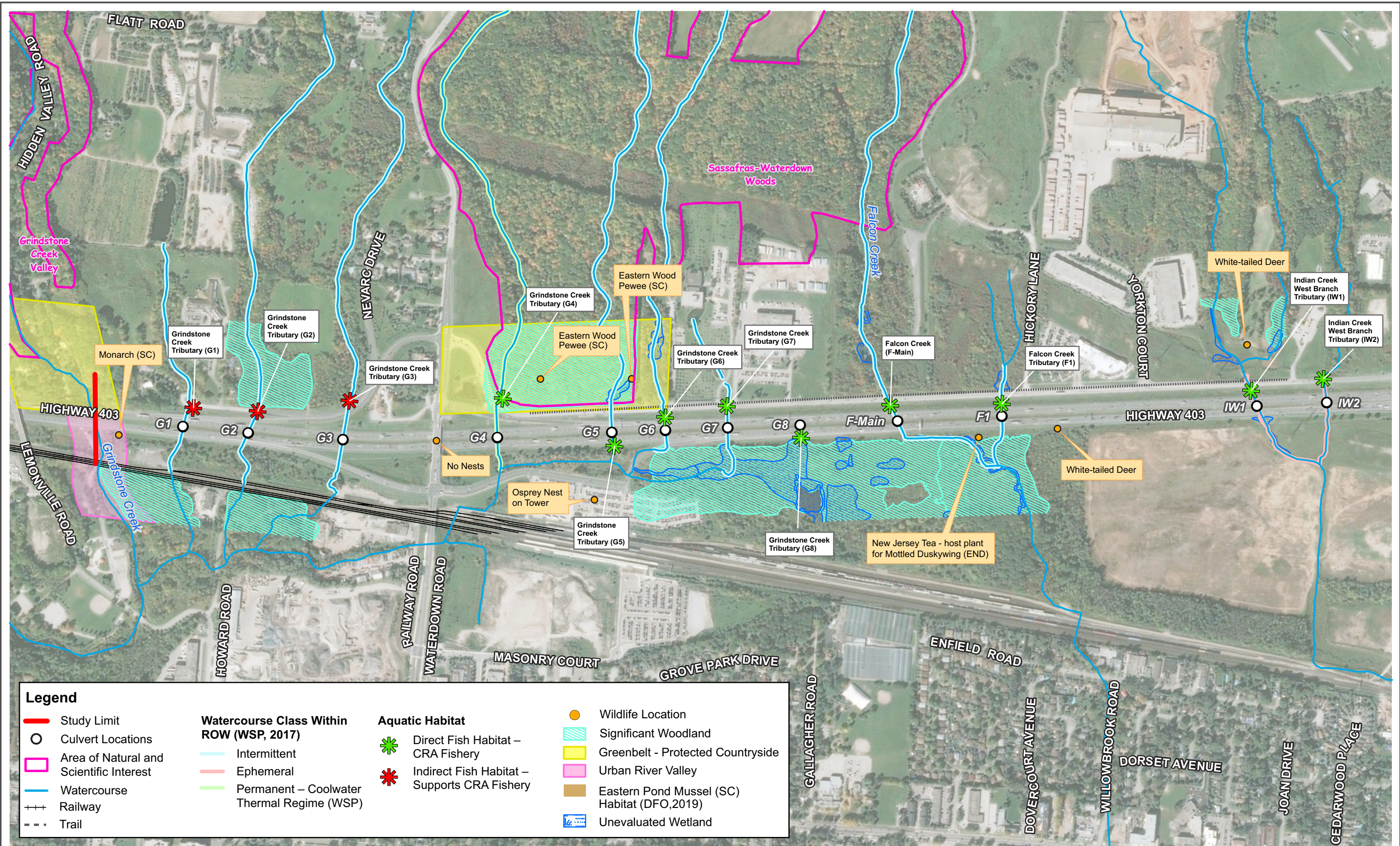
Terrestrial ecosystem field investigations were conducted from June 20 to 22 and from July 18 to 20, 2017 to verify the existing terrestrial environment and vegetation communities using the *Ecological Land Classification (ELC) System for Southern Ontario* (Lee et al., 1998) and to gather wildlife conditions along the study area.

Vegetation communities within the study area are comprised of upland forests, wetlands and cultural communities. Wetland communities are comprised of marsh and swamp types. Cultural communities dominate the study area and are comprised of meadow, thicket, and woodland.

Fourteen (14) distinct vegetation community types have been delineated within the study area.

- ▶ Dry-Moist Old Field Meadow / Cultural Meadow (CUM 1-1);
- ▶ Mineral Cultural Thicket (CUT1-1);
- ▶ Mineral Cultural Woodland (CUW1);
- ▶ Dry-Fresh Oak-Hardwood Deciduous Forest (FOD2-4);
- ▶ Dry-Fresh Sugar Maple-Oak Deciduous Forest (FOD5-3);
- ▶ Fresh-Moist Lowland Deciduous Forest Ecosite (FOD7);
- ▶ Cattail Mineral Shallow Marsh (MAS2-1);
- ▶ Reed-canary Grass Mineral Meadow Marsh (MAM2-2);
- ▶ Broad-leaved Sedge Mineral Meadow Marsh (MAM2-6);
- ▶ Forb Mineral Meadow Marsh (MAM2-10);

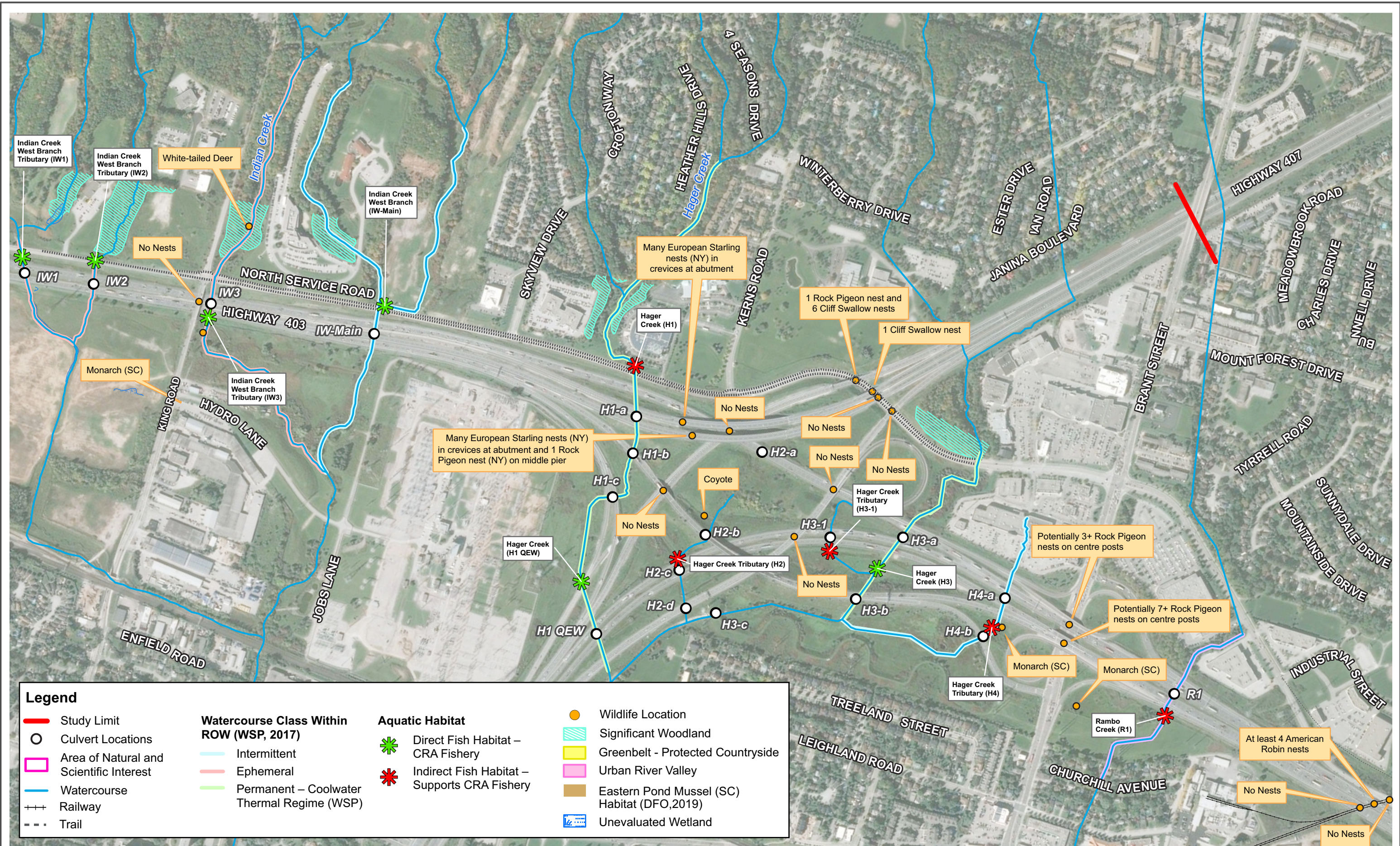




**Legend**

- |   |   |  |                                   |
|---|---|--|-----------------------------------|
| Study Limit                             | <b>Watercourse Class Within ROW (WSP, 2017)</b> | <b>Aquatic Habitat</b>                       | Wildlife Location                 |
| Culvert Locations                       | Intermittent                                    | Direct Fish Habitat – CRA Fishery            | Significant Woodland              |
| Area of Natural and Scientific Interest | Ephemeral                                       | Indirect Fish Habitat – Supports CRA Fishery | Greenbelt - Protected Countryside |
| Watercourse                             | Permanent – Coolwater Thermal Regime (WSP)      | Eastern Pond Mussel (SC) Habitat (DFO,2019)  | Urban River Valley                |
| Railway                                 |   | Unevaluated Wetland                          |                                   |
| Trail                                   |   |  |                                   |















- ▶ European Common Reed Mineral Meadow Marsh (MAMM1-12);
- ▶ Mineral Thicket Swamp (SWT2);
- ▶ Green Ash Mineral Deciduous Swamp (SWD2-2); and
- ▶ Mineral Deciduous Swamp Ecosite (SWD4).

A description of each of these communities and their location is located in the *Terrestrial Ecosystems Impacts Assessment Report* in **Appendix C**.

#### 4.1.3 FLORA

Two-hundred sixty-five (265) vascular plant species were recorded within the study area (including 21 species identified to genus level only).

Of the identified species, 134 (55 %) are native and 110 (45 %) are non-native.

Of the native species recorded, for which Coefficient of Conservatism (CC) values are provided, CC values range from 0 to 10. The majority of CC values range from between 4 and 6 (58%), which is taxa typically associated with a specific plant community but tolerate moderate disturbance. One species, Drooping Sedge, had a CC value of 10, which includes taxa with a high fidelity to a narrow range of ecological parameters.

No Species at Risk were recorded within the study area during the 2017 field observations.

One (1) Provincially Rare species was recorded:

- ▶ Honey Locust (*Gleditsia triacanthos*; S2) – was planted along the edge of the deciduous forest in Unit 9A near the COSTCO parking lot. This tree species is not considered to be naturally occurring in the study area;

Twenty (20) Regionally Uncommon species (Halton Region) were recorded.

In addition to species observed by the Project Team, another 86 species were noted as being present within the study area from background sources, such as CH data, NHIC, and Inaturalist. Of the species that came up during background research, there were eighteen (18) Regionally Uncommon species, five (5) Regional Rare species and five (5) Species at Risk (SAR).

A full vascular plant list of species observed during the 2017 field surveys is provided **Appendix C**.

#### 4.1.4 WILDLIFE AND WILDLIFE HABITAT

The study area provides habitat for a variety of forest, grassland, shrubland, aquatic and urban-adapted species. During the 2017 field investigations a total of 61 wildlife species were recorded.

##### Avifauna (Birds)

Forty-six (46) species of birds were recorded within the study area during the field investigations in 2017 and fifty-eight (58) additional bird species have been confirmed within the study area through the background information review.

Of all 104 bird species confirmed within the study area through 2017 field surveys and the background information review, a summary of key results is highlighted below:

The majority of the species recorded within the study area were predominantly common, generalist and urban-adapted species;

Fifty (50) Species of Conservation Concern (SCC) have been recorded within the study area, including:

- ▶ Thirteen (13) designated SAR: Bald Eagle (Special Concern), Bank Swallow (Threatened), Barn Swallow (Threatened), Bobolink (Threatened), Cerulean Warbler (Threatened), Chimney Swift (Threatened), Eastern Meadowlark (Threatened), Eastern Whip-poor-will (Threatened), Eastern Wood-pewee (Special Concern), Northern Bobwhite (Endangered), Red-headed Woodpecker (Special Concern), Wood Thrush (Special Concern), and Yellow-breasted Chat (Endangered).
- ▶ Twenty-one (21) “Area-sensitive” species (i.e. species require large areas of unfragmented habitat in order to meet their life cycle requirements [MNR 2000]) were recorded within the study area.
- ▶ Ten (10) Regional Rare Species, twenty-one (21) Regionally Uncommon Species,

During the 2017 field surveys, all bridges and culverts within the highway right-of-way of the study area were examined for potential nesting habitat for birds. Evidence of bird nests on structures was observed at the following locations:

- ▶ Indian Creek Culvert at North Shore Boulevard East – 1 Barn Swallow nest;
- ▶ Brant Street Bridges – >10 Rock Pigeon nests;
- ▶ Guelph Line Bridge – 1 Rock Pigeon nest;
- ▶ 407 ETR to Hwy 403 ramp – many European Starling nests and 1 Rock Pigeon nest;
- ▶ Hwy 403 to 407 ETR Bridge – many European Starling nests and 1 Rock Pigeon nest;



- ▶ 407 ETR to QEW / Fairview Street ramp structure, over North Service Road – 1 Rock Pigeon nest and 6 Cliff Swallow Nests;
- ▶ 407 ETR to Hwy 403 ramp, over North Service Road – 1 Cliff Swallow nest;
- ▶ CN Rail Overhead, QEW Niagara-bound structure – 4 American Robin nests;
- ▶ GO Aldershot carpool lot – 1 Osprey nest on top of tower in lot.

American Robin, Barn Swallow and Cliff Swallow nests are protected under the Migratory Birds Convention Act (MBCA). Barn Swallow is also a protected SAR (see **Section 4.1.7** for further discussion). See the **Exhibit 4-1** for locations of bird nest observations.

### Mammals

Five (5) mammal species were confirmed within the study area during 2017 field investigations, including: Coyote (*Canis latrans*), Eastern Chipmunk (*Tamias striatus*), Grey Squirrel (*Sciurus carolinensis*), Raccoon (*Procyon lotor*) and White-tailed Deer (*Odocoileus virginianus*).

Fourteen (14) additional mammal species have been confirmed within the study area through the background information review, including the following: American Mink (*Mustela vison*), Beaver (*Castor canadensis*), Big Brown Bat (*Eptesicus fuscus*), Deer Mouse (*Peromyscus maniculatus*), Eastern Cottontail (*Sylvilagus floridanus*), Masked Shrew (*Sorex cinereus*), Meadow Vole (*Microtus pennsylvanicus*), Meadow Jumping Mouse (*Zapus hudsonius*), Muskrat (*Ondatra zibethicus*), Short-tailed Shrew (*Blarina brevicauda*), Short- or Long-tailed Weasel (*Mustela ermine*/*Mustela frenata*), Smoky Shrew (*Sorex fumeus*), Striped Skunk (*Mephitis mephitis*) and White-footed Mouse (*Peromyscus leucopus*).

Of the 19 mammal species recorded in the study area, one (1) is considered a SCC:

- ▶ Short-tailed Weasel (Rare to Uncommon in Halton Region)

Although not confirmed through the background information sources or field investigations, additional mammal species which likely occur within the study area include: Groundhog (*Marmota monax*), Red Fox (*Vulpes vulpes*), Red Squirrel (*Tamiasciurus hudsonicus*), Virginia Opossum (*Didelphis virginiana*), and additional small mammal species that often go undetected (e.g., shrews, moles, voles, rats, mice, bats).

### Herpetofauna (Reptiles and Amphibians)

One (1) herpetofauna species was confirmed within the study area during the 2017 field investigations: American Toad (*Anaxyrus americanus*).

Twenty (20) additional herpetofauna species have been confirmed within the study area through the background information review, including the following: Blanding’s Turtle (*Emydoidea blandingii*), Dekay’s Brownsnake (*Storeria dekayi*), Eastern Gartersnake (*Thamnophis s. sirtalis*), Eastern Red-backed Salamander (*Plethodon cinereus*), Eastern Ribbonsnake (*Thamnophis sauritus septentrionalis*), Gray Treefrog (*Hyla versicolor*), Green Frog (*Lithobates clamitans*), Midland Painted Turtle (*Chrysemys picta marginata*), Milksnake (*Lampropeltis triangulum*), Northern Leopard Frog (*Lithobates pipens*), Northern Red-bellied Snake (*Storeria o. occipitamaculata*), Northern Ring-necked Snake (*Diadophis punctatus*), Red-spotted Newt (*Notophthalmus v. viridescens*), Snapping Turtle (*Chelydra s. serpentina*), Spiny Softshell (*Apalone spinifera*), Spotted Salamander (*Ambystoma maculatum*), Spring Peeper (*Pseudacris crucifer*), Unisexual Ambystoma (Jefferson Salamander dependent population; *Ambystoma laterale-jeffersonianum*), Western Chorus Frog (*Pseudacris triseriata*) and Wood Frog (*Lithobates sylvaticus*).

Of the 21 herpetofauna species confirmed within the study area through field investigations and the background information review, seven (7) species are considered SCC, including:

Five (5) designated SAR (see Section 4.1.5 for further discussion): Blanding’s Turtle (Threatened), Eastern Ribbonsnake (Special Concern), Snapping Turtle (Special Concern), Spiny Softshell (Endangered), and Unisexual Ambystoma (Jefferson Salamander dependent population; Endangered).

Five (5) Regionally Rare species: Blanding’s Turtle, Eastern Ribbonsnake, Northern Ring-necked Snake, Spiny Softshell, Spotted Salamander.

Although not confirmed through the background information sources or field investigations, additional species which likely occur within the study area include: Blue-spotted Salamander (*Ambystoma laterale*), Jefferson Salamander (*Ambystoma jeffersonianum*) and Northern Watersnake (*Nerodia s. sipedon*).

### Insects

Nine (9) lepidoptera and odonata insect species were confirmed within the study area during the 2017 field investigations, including: Cabbage White (*Pieris rapae*), Clouded Sulphur (*Colias philodice*), Common Green Darner (*Anax junius*), Ebony Jewelwing (*Calopteryx maculata*), Monarch (*Danaus plexippus*), Red Admiral (*Vanessa atalanta*), Twelve-spotted Skimmer (*Libellula pulchella*), White-faced Meadowhawk (*Sympetrum obtrusum*) and Widow Skimmer (*Libellula luctuosa*).

An additional 79 lepidoptera and odonata species have been confirmed within the study area through the background information review.



Of the 88 lepidoptera and odonata confirmed in the study area, 22 are considered SCC, including:

Two (2) SAR butterflies (see Section 4.1.5 for further discussion): Monarch (Special Concern) and Mottled Duskywing (Endangered).

Eleven (11) Regionally Uncommon species: Arrowhead Spiketail, Band-winged Meadowhawk, Canada Darner, Common Baskettail, Eastern Amberwing, Eastern Comma, Lyre-tipped Spreadwing, Milbert's Tortoiseshell, Pearl Crescent, Unicorn Clubtail, Yellow-legged Meadowhawk.

Ten (10) Regionally Rare species: Black Swallowtail, Common Sootywin, Eyed Brown, Fragile Forktail, Hickory Hairstreak, Hobomok Skipper, Mottled Duskywing, Mourning Cloak, Peck's Skipper, Red-spotted Purple, and Wild Indigo Duskywing.

#### 4.1.5 SIGNIFICANT WILDLIFE HABITAT

Significant Wildlife Habitat (SWH) is broadly categorized as:

- ▶ Seasonal Concentration Areas;
- ▶ Rare Vegetation Communities or Specialized Habitats for Wildlife;
- ▶ Habitats of Species of Conservation Concern (excluding the habitats of Endangered and Threatened species); and
- ▶ Animal Movement Corridors.

An assessment of SWH features within the study area has been completed. Several confirmed and candidate SWH features have been identified within the study area through this assessment. The majority of these SWH features are associated with the grassland, forest and wetland communities, and the lakeshore, beyond the highway ROW. A summary of the results of the SWH Assessment is outlined below.

Based on the background information review, SWH has been confirmed in the study area for three (3) of the broad habitat category types as follows:

#### Confirmed Significant Wildlife Habitat

##### SEASONAL CONCENTRATION AREAS

*Colonially Nesting Bird Breeding Habitat* (Trees/shrubs) – NHIC record of a 'Mixed Wader Nesting Colony' near the south limits of the study area. Potential features in this area which may support this type of SWH include the woodland and forest communities along Indian Creek and Lake Ontario;

*Colonially Nesting Bird Breeding Habitat* (Ground) – NHIC record of a 'Colonial Waterbird Nesting Area' near the south limits of the study area. Potential features in this area which may support this type of SWH include the rocky peninsula and islands within Lake Ontario;

*Turtle Wintering Areas* – 54 Midland Painted Turtles and four (4) Snapping Turtles observed basking in the isolated pond feature within 1200 King Road Property (WSP 2018).

#### RARE VEGETATION COMMUNITIES OR SPECIALIZED HABITATS FOR WILDLIFE

*Other Rare Vegetation Communities* – Buttonbush Mineral Thicket Swamp (SWD2-2) recorded within 1200 King Road Property (WSP 2018);

*Woodland Area-Sensitive Bird Breeding Habitat* - Sassafras Woods (144 ha) includes some interior habitat >200 m from woodland edge and five (5) of the 14 listed species have been recorded in this woodland during the breeding season (including Blackburnian Warbler, Black-throated Blue Warbler, Cerulean Warbler, Ovenbird, Scarlet Tanager).

#### HABITATS OF SPECIES OF CONSERVATION CONCERN

*Marsh Breeding Bird Habitat* – Green Heron confirmed breeding within 1200 King Road Property (WSP 2018);

Habitat for Special Concern and Rare Wildlife Species – Arrowhead Spiketail (S1) – within Sassafras Woods; Eastern Ribbonsnake (SC, S3) – within Sassafras Woods; Eastern Wood Pewee (SC) – within Sassafras Woods and 1200 King Road Property; Hickory Hairstreak (S3) – within 1200 King Road Property; Milksnake (S3) – within Grindstone Creek Valley, Sassafras Woods, 1200 King Road Property and various other locations within and along the highway ROW; Monarch (SC) – within 1200 King Road Property, Indian Creek woodland and various other locations within and along the highway ROW; Red-headed Woodpecker (SC) – within Sassafras Woods; Snapping Turtle (SC, S3) – within Grindstone Creek Valley and 1200 King Road Property; Unicorn Clubtail (S2/S3) – within 1200 King Road Property; and Wood Thrush (SC) – within 1200 King Road Property.

#### Candidate Significant Wildlife Habitat

Based on the background information review and assessment of the 2017 field survey results, Candidate SWH is also present within the study area as follows:



## SEASONAL CONCENTRATION AREAS

*Raptor Wintering Areas* – study area maintains combinations of forest and upland habitats >20 ha in size (with >15 ha of field meadow) for Hawks/Owls. study area also maintains forest habitat adjacent to a large lake (at the south study limits) for Bald Eagle.

*Bat Maternity Colonies* – study area maintains 10 forest communities >2 ha in size which may provide >10/ha large diameter (>25cm dbh) trees with cavities/crevices for bats.

*Turtle Wintering Areas* – Candidate habitat occurs in all permanent waterbodies and watercourses within the study area and two (2) of the three (3) listed species have been documented within the study area.

*Reptile Hibernaculum* – Candidate habitat occurs in all natural ecosites within the study area and six (6) of the eight (8) listed species have been documented within the study area.

*Migratory Butterfly Stopover Areas* - study area occurs within 5 km of Lake Ontario and maintains Cultural Meadow / Cultural Savannah habitats >10 ha. Furthermore, two (2) of the three (3) listed species have been documented within the study area (including Monarch and Red Admiral).

*Landbird Migratory Stopover Areas* - study area occurs within 5 km of Lake Ontario and maintains woodlands >5 ha.

## RARE VEGETATION COMMUNITIES OR SPECIALIZED HABITATS FOR WILDLIFE

*Bald Eagle and Osprey Nesting, Foraging and Perching Habitat* – study area maintains forest communities adjacent to a lake at the south study limits, and both species have been documented within the study area.

*Woodland Raptor Nesting Habitat* – Candidate habitat occurs in Sassafras Woods (144 ha) which includes some interior habitat >200 m from woodland edge and three (3) of the six (6) listed species have been documented within the study area during the breeding season (including Broad-winged Hawk, Cooper’s Hawk and Sharp-shinned Hawk).

*Turtle Nesting Areas* – Candidate habitat occurs within the 1200 King Road property where a five (5) Snapping Turtles were recorded. Candidate habitat also occurs in fields and meadows adjacent to permanent watercourses and the lake.

*Amphibian Breeding Habitat (Woodland)* – Candidate habitat occurs in all forested ecosites and six (6) of the seven (7) listed species have been documented within the study area.

*Amphibian Breeding Habitat (Wetland)* – Candidate habitat occurs in all wetland ecosites and seven (7) of the 12 listed species have been documented within the study area.

## HABITAT FOR SPECIES OF CONSERVATION CONCERN

*Shrub/Early Successional Bird Breeding Habitat* – Candidate habitat occurs within the 1200 King Road Property which maintains a large Cultural Meadow habitat (~30 ha) and patches of shrub/early successional habitat and three (3) of the eight (8) listed species have been documented (including Field Sparrow, Eastern Towhee and Willow Flycatcher).

*Terrestrial Crayfish* – Candidate habitat occurs along all wetland ecosites within the study area.

*Special Concern and Rare Wildlife Species* – Candidate habitat for several additional Special Concern species occurs within the study area (see **Section 4.1.7** for further information.)

## ANIMAL MOVEMENT CORRIDORS

Based on field observations and wildlife collision data it appears as though large mammals (e.g., White-tailed Deer) move with regularity throughout the entire study area. The riparian zones along the various creeks and the hydro corridors passing through the study area likely function as local wildlife movement corridors.

In the west section of the study area, where forest and meadow communities occur on either side of the highway, three (3) White-tailed Deer were observed along the Indian Creek and Falcon Creek corridors during the 2017 field surveys and six (6) wildlife collisions have been reported along Highway 403 between the Freeman Interchange and Waterdown Road (MTO 2010-2014).

In the east section of the study area, where cultural habitats/urban areas occur on either side of the highway, one (1) Coyote was observed during the 2017 field surveys and 12 wildlife collisions have been reported along the QEW between the Freeman Interchange and Guelph Line (MTO 2010-2014).

In the south section of the study area, where cultural habitats/urban areas occur on either side of the highway, seven (7) wildlife collisions have been reported along the QEW between the Freeman Interchange and Eastport Drive (MTO 2010-2014).

See **Section 8.1.2** for further discussion of road ecology recommendations to mitigate impacts to wildlife during the Detail Design phase.



#### 4.1.6 FISH AND FISH HABITAT

A *Fish and Fish Habitat Existing Conditions and Impact Assessment Report* was completed to document the existing aquatic ecosystem conditions, assess the impacts of the proposed works on fish and fish habitat within the study area, and provide preliminary mitigation measures to minimize the potential for impacts, in accordance with the Department of Fisheries and Oceans Fisheries Act (2013). Background information was gathered by reviewing the Ministry of Natural Resources and Forestry (MNRF) Natural Heritage Information Centre (NHIC) on-line database, agency consultation, including the MNRF Aurora District, Conservation Halton (CH) and conducting field investigations.

Field surveys were conducted by the Project Team ecologists over thirteen days between August 11, 2017 and October 20, 2017. To document the existing conditions of the fish and fish habitat within the study area, the field investigations were conducted in general accordance with “Section 4 – Field Investigations” of MTO’s Fish Guide.

Fish community sampling was undertaken during field work to confirm fish use and associated sensitivities at each watercourse. Community sampling was conducted using a backpack electrofisher and/or dip net, depending on habitat conditions at the time of field investigations.

##### 4.1.6.1 FISH HABITAT CONDITIONS AND FISH COMMUNITIES FOR DIRECT HABITAT

Based on the combination of background and field information, a total of sixteen (16) watercourses within the study area support direct fish use in the vicinity of the ROW and are shown on **Exhibit 4-1**, including: Grindstone Creek Tributaries (G4, G5, G6, G7 and G8), Falcon Creek (F-Main), Falcon Creek Tributary (F1), Indian Creek West Branch Tributaries (IW1, IW2 and IW3), Indian Creek West Branch (IW-Main), Hager Creek (crossings H1 QEW and H3), Indian Creek East Branch (IE) and Indian Creek (QEW and North Shore Boulevard).

Five of these watercourses function as seasonal fish habitat (crossings G6, G7, IW1, IW2 and IW3). No fish were captured at these locations (with the exception of IW1 where a single Creek Chub was observed trapped in the rip-rap beneath a gabion basket upstream of North Service Road) which were all either dry or contained a nominal amount of water at the time of assessment. However, a lack of observed barriers downstream of the crossing and/or background fisheries information downstream or at the crossing suggests seasonal use by fish.

Two watercourses (G8 and IE) did not have background information associated with the crossing and no fish were captured at the time of assessment (IE was not fished due to property access restrictions). However, the presence of fish within online ponds associated with each crossing (stormwater

management upstream at IE and an online pond downstream of G8) is anticipated, and both crossings have been classified as commercial, recreational or Aboriginal (CRA) Fishery.

Hager Creek (H1 QEW) has been classified as a CRA Fishery based on background information and the capture of Brook Stickleback downstream of the crossing (identified as reach H3). However, no fish were captured within Hager Creek (H1) upstream of the QEW crossing and multiple barriers to migration prevents the movement of fish upstream. Therefore, all crossings associated with Hager Creek H1 are considered supporting (indirect) habitat, as outlined in **Section 4.1.6.2** below.

The remaining eight watercourses are well defined systems within the ROW reaches where fish were captured during the field assessments in 2017.

##### Fish Community

Of the eight watercourses where fish were captured (G4, G5, F-Main, F1, IW-Main, H3, Indian Creek QEW and Indian Creek North Shore Boulevard), all supported simple forage / baitfish communities consisting of a combination of Creek Chub, Blacknose Dace and/or Brook Stickleback, with the exception of Indian Creek downstream of the QEW crossing. This reach supports a mix of forage/baitfish, pan fish and sportfish, including: Largemouth Bass, Longnose Dace, White Sucker, Blacknose Dace, Fathead Minnow, Creek Chub, Brook Stickleback, Bluntnose Minnow, Brown Bullhead (*Ameiurus nebulosus*) and Green Sunfish (*Lepomis cyanellus*). Round Goby (*Neogobius melanostomus*) was also captured at the North Shore Boulevard crossing, downstream closer to Hamilton Harbour.

Detailed results of fish community sampling and background information review can be found for each watercourse crossing / reach in the *Aquatic Existing Conditions and Impact Assessment Report* in **Appendix D**.

##### 4.1.6.2 FISH HABITAT CONDITIONS FOR INDIRECT HABITAT

The remainder of the watercourses / reaches assessed within the study area were identified as having no direct fish use or only limited potential for fish use. Specifically, these nine include: Grindstone Creek Tributaries (G1, G2, G3), Hager Creek (H1, H2, H3-1, H4), Rambo Creek (R1), and Roseland Creek (RL1).



At watercourses G1, G2, H2, H3-1 and H4, direct fish use appears to be limited by a combination of flow conditions (intermittent, ephemeral or very low flow seasonally), channel definition and/or lack of refuge habitat that prevents or minimizes the potential for direct fish use within these features. Permanent flow and/or refuge habitat was identified at the remaining four watercourses (G3, H1, R1 and RL1), however, direct fish use in these reaches are limited primarily by barriers to movement downstream.

#### 4.1.7 SPECIES OF CONSERVATION CONCERN

The MNRFS correspondence and additional background information review generated a 'long list' of 48 potential terrestrial SAR for the general region. This list included SAR known to occur within the region generally as well as those with records reported in the vicinity of the study area specifically. Those species that were considered to have at least some potential to occur in the vicinity of the study area were generally surveyed for during the field investigations. Habitat conditions were also assessed in terms of potential suitability for the various SAR.

Of the 48 regionally occurring SAR, three (3) species were confirmed within the study area during the 2017 field investigations:

**Barn Swallow** (Threatened) – The agricultural lands and wetlands within the study area provide suitable foraging habitat for this species while bridges and culverts within the highway ROW provide potential nesting habitat. During 2017 field investigations, one (1) Barn Swallow was observed foraging over a stormwater pond and one (1) Barn Swallow nest was observed within the Indian Creek culvert along North Shore Boulevard East (at the south study limits). Large numbers of foraging individuals (48) were also recorded foraging over fields and wetlands on the 1200 King Road Property during 2016 field investigations (WSP 2018). The structures in the study area are suitable habitat for Barn Swallow.

**Eastern Wood-pewee** (Special Concern) – Two (2) individuals were heard calling within Sassafras Woods during 2017 field investigations. Furthermore, four (4) individuals were recorded with Probable breeding evidence on the 1200 King Road property during 2016 field investigations (WSP 2018). Suitable breeding habitat occurs within deciduous and mixed forest communities throughout the study area.

**Monarch (Special Concern)** – Nine (9) individuals were observed throughout the study area during 2017 field investigations and four (4) were recorded on the 1200 King Road Property during 2016 field investigations. The study area maintains occasional Milkweed for Monarch breeding and provides candidate SWH for Migratory Butterfly Stopover Areas.

An additional 24 SAR have been confirmed in the study area through the background information review, including: American Chestnut (Endangered), American Columbo (Endangered); Bald Eagle (Special

Concern); Bank Swallow (Threatened); Bobolink (Threatened); Butternut (Endangered); Cerulean Warbler (Threatened); Chimney Swift (Threatened); Eastern Flowering Dogwood (Endangered); Eastern Meadowlark (Threatened); Eastern Ribbonsnake (Special Concern); Eastern Whip-poor-will (Threatened); — Golden-winged Warbler (Special Concern); Little Brown Myotis (Endangered); Mottled Duskywing (Endangered); Northern Bobwhite (Endangered); Peregrine Falcon (Special Concern); and Red-headed Woodpecker (Special Concern).

Although not confirmed through the background information sources or field investigations, an additional 10 species have reasonable potential to occur within the study area based on the presence of suitable habitat features. These potential SAR include the following: Broad Beech Fern (Special Concern); Common Nighthawk (Special Concern); Grasshopper Sparrow (Special Concern); Jefferson Salamander (Endangered); Northern Long-eared Bat (Endangered); Northern Map Turtle (Special Concern); Red Mulberry (Endangered); Small-footed Bat (Endangered); Tri-colored Bat (Endangered); and Woodland Vole (Special Concern).

See **Appendix C** for a full terrestrial SAR screening summary table.

The MNRFS does not have any records of aquatic SAR within the study area. However, based on a review of the Halton Region SAR list provided on the MNRFS website, there are three aquatic SAR species that have the potential to be in the area generally. These include: Lake Sturgeon (*Acipenser fulvescens*), Redside Dace (*Clinostomus elongates*) and Silver Shiner (*Notropis photogenis*). In addition, DFO's aquatic species at risk map website lists Eastern Pondmussel (*Ligumia nasuta*) as potentially being present in Indian Creek from downstream of North Shore Boulevard to its confluence with Lake Ontario.

See **Appendix D** for a full aquatic SAR screening summary table.

#### 4.1.8 GROUNDWATER

A Groundwater Assessment was conducted as part of this study. For the purposes of this assessment, a 500 m evaluation zone was added to either side of the centrelines of QEW and Highway 403, including the Freeman Interchange, to focus the investigation on areas with high potential groundwater sensitivity.



Current land uses in the study area are a mix of residential, commercial, industrial, and some parkland. The topography within the study area ranges between 90 and 120 metres above sea level (masl) in the south, north and east portions of the study area; elevations in the west portion of the study area range from 120 and 160 masl. The Hidden Valley trail is located in this area.

The study area is located within the jurisdiction of Conservation Halton (CH). Major watersheds in CH include: Grindstone Creek (located west of Waterdown Road, Burlington), Bronte Creek (present west of Bronte Road, Oakville), and Sixteen Mile Creek (present east of Dorval Drive, Oakville). There are also 18 smaller watersheds (urban creeks), including Joshua Creek. The study area is present within the Halton Region Source Protection Area (Halton Region SPA). The Halton Region SPA comprises an area of 907 square kilometers within CH.

The central, northern and eastern portions of the study area are underlain by the silty to silty clay till (Halton Till), located on and north of the QEW and Highway 403. The western portion of the study area around Waterdown Road has several deposit types: Halton Till, exposed sedimentary rock of Paleozoic age, and sand, gravelly sand and gravel beach deposits (glaciomarine deposits). The glaciomarine deposits occupy substantial portions of the southern half of the study area, south of Fairview Street into Hamilton. Alluvial deposits are present within the valley of Grindstone Creek.

A search of the Ministry of the Environment Conservation and Parks Water Well Information System identified 213 water well records present within the study area. According to the records, 30 wells were installed for domestic water use purposes, 126 wells were installed for monitoring and test hole purposes, 2 wells for industrial purposes, 16 abandoned wells and 39 wells with no information. One Environmental Activity and Sector Registry (EASR) was issued for construction dewatering purposes within the study area.

The Queenston Formation is characterized as regionally significant aquitard, however, as it is usually weathered in the upper layers, the fractures can transmit water at a sufficient rate for individual domestic use. The bedrock wells within the study area range in depth, but majority (57%) are 10 meters or less in depth below ground surface.

Based on the results of the study area inspection and desktop study, it appears that localized groundwater areas of concern may exist in the study area. This includes groundwater seepage areas and wetlands, which are potentially groundwater-fed. It appears that the small community in the northwestern portion of the study area relies on private water wells for water supply.

**Section 8.1.6** outlines the mitigation measures that will be implemented during construction to address the findings of the Groundwater Assessment Report.

#### 4.1.9 AIR QUALITY

An Air Quality Assessment was completed to assess potential air quality impacts of the Recommended Plan. The assessment followed the methodology described in the MTO Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects (June 2012) and investigated how changes in road configuration and vehicle volumes of the preferred alternative will impact critical receptors (hospitals, retirement facilities, etc.) and sensitive receptors (residences) in the vicinity of the Study.

The contaminants of interest for this study have been chosen based on the regularly assessed contaminants of interest for transportation assessments in Ontario, as determined by the Ministry of Transportation Ontario (MTO) and Ministry of the Environment, Conservation and Parks (MECP). Motor vehicle emissions have largely been determined by scientists and engineers with United States and Canadian government agencies such as the U.S. Environmental Protection Agency (EPA), the MECP, Environment Canada (EC), Health Canada (HC), and the MTO.

These contaminants are emitted due to fuel combustion, brake wear, tire wear, the breakdown of dust on the roadway, fuel leaks, evaporation and permeation, and refuelling leaks and spills. Note that emissions related to refuelling leaks and spills are not applicable to motor vehicle emissions from roadway travel. Instead, these emissions contribute to the overall background levels of the applicable contaminants.

All selected contaminants are emitted during fuel combustion, and the contaminants emitted from brake wear, tire wear, and breakdown of road dust are emitted as particulates. A list of these contaminants is provided below:

- ▶ Nitrogen Dioxide (NO<sub>2</sub>)
- ▶ Carbon Monoxide (CO)
- ▶ Fine Particulate Matter (<2.5 microns in diameter) (PM<sub>2.5</sub>)
- ▶ Coarse Particulate Matter (<10 microns in diameter) (PM<sub>10</sub>)
- ▶ Total Suspended Particulate Matter (TSP)
- ▶ Acetaldehyde (C<sub>2</sub>H<sub>4</sub>O)
- ▶ Acrolein (C<sub>3</sub>H<sub>4</sub>O)
- ▶ Benzene (C<sub>6</sub>H<sub>6</sub>)
- ▶ 1,3-Butadiene (C<sub>4</sub>H<sub>6</sub>)
- ▶ Formaldehyde (CH<sub>2</sub>O)

Based on a review of ambient monitoring data from 2013-2017, all background concentrations were below their respective guidelines, except benzene and particulate matter (fine, coarse and total suspended).



Refer to **Section 8.1.9** to review the findings from the Air Quality Assessment completed to assess the proposed preferred alternative and refer to **Appendix E** which includes the full Air Quality Report.

## 4.2 SOCIO-ECONOMIC ENVIRONMENT

### 4.2.1 PROVINCIAL PLANNING CONTEXT

Provincial policy documents provide direction on land use, growth, infrastructure planning, trade, tourism and recreation, and environmental protection, and help dictate municipal planning policy. The following Provincial Plans are applicable to the Study.

#### 4.2.1.1 GROWTH PLAN FOR THE GREATER GOLDEN HORSESHOE

In July 2006, the Province released the Growth Plan for the Greater Golden Horseshoe (GGH). The Growth Plan outlined a set of policies for managing growth, development and guiding planning decisions in the Greater Golden Horseshoe to 2031. This broad-based plan represents a planning vision for the Province of Ontario. The plan outlines a strategy for “Where and How to Grow”, “Infrastructure to Support Growth”, “Protecting What is Valuable”, “Sub-Area Growth Strategies” and “Implementation”.

Since the introduction of the Growth Plan for the Greater Golden Horseshoe in 2006, the region has seen a shift to more compact development patterns, a greater variety of housing options, more mixed-use development in urban growth centres and other strategic growth areas, and greater integration of transit and land use planning.

The Growth Plan for the Greater Golden Horseshoe, 2017, builds upon the success of the initial Growth Plan, 2006 and responds to the key challenges that the region continues to face over the coming decades with enhanced policy directions.

The Growth Plan requires that planning decisions made by the Province, municipalities, and other authorities conform to the policies contained in the Plan. MTO is working to provide for the efficient movement of people and goods within the context of the province’s Growth Plan. This project supports and aligns with the Growth Plan as per Section 3.2.5 (1):

In planning for the development, optimization, or expansion of existing and *planned corridors* and supporting facilities, the Province, other public agencies and upper- and single-tier municipalities will:

- a) encourage the co-location of linear *infrastructure* where appropriate;

- b) ensure that existing and *planned corridors* are protected to meet current and projected needs in accordance with the transportation and *infrastructure* corridor protection policies in the PPS;

- c) where applicable, demonstrate through an *agricultural impact assessment* or equivalent analysis as part of an environmental assessment, that any impacts on the *Agricultural System* have been avoided or, if avoidance is not possible, minimized and to the extent feasible mitigated;

- d) where applicable, demonstrate through an environmental assessment, that any impacts on *key natural heritage features* in the *Natural Heritage System*, *key hydrologic features* and *key hydrologic areas* have been avoided or, if avoidance is not possible, minimized and to the extent feasible mitigated; and,

- e) for existing or *planned corridors* for transportation:

- i. consider increased opportunities for moving people and goods by rail;
- ii. consider separation of modes within corridors; and
- iii. provide opportunities for inter-modal linkages.

#### 4.2.1.2 ONTARIO CYCLING STRATEGY

To promote cycling and cycling safety in Ontario, the provincial government released the Ontario Cycling Strategy in 2013. The Strategy is a 20-year vision to have cycling recognized as a respected and valued mode of transportation within Ontario. Ontario's Cycling Strategy is designed to encourage the growth of cycling and improve the safety of people who cycle across the province.

Action Plan 1.0 released in 2014, was the first in the series. Action Plan 2.0 will be implemented between 2018 and 2023. Action Plan 2.0 outlines actions across all five of #CycleON's Strategic Direction, ensuring that MTO continues to take the comprehensive approach needed to advance cycling in Ontario. The Action Plan also guides efforts across ministries, strategies and initiatives to ensure the Ministry is collaboratively working toward the vision and goals of #CycleON and that their actions are coordinated and complementary. Through this Action Plan, it will help promote cycling as a great choice for commuting, active living, recreation and tourism, help people learn how to cycle and share the road, and help to plan and build communities, routes and dedicated infrastructure that support cycling.

All existing active transportation facilities in the study area are anticipated to be retained and not impacted by the proposed improvements.



## 4.2.2 MUNICIPAL PLANNING CONTEXT AND EXISTING AND FUTURE LAND USE

### 4.2.2.1 CURRENT AND FUTURE LAND USE

Existing land uses within the study area, as per the City of Burlington's Official Plan, consist of: residential areas, mixed use, commercial, employment, parks and open space, and business corridors. Since most lands surrounding the QEW are generally 'built out', it is anticipated that future land use designations will remain similar to the present use with minor infill where possible.

General current land uses next to the QEW and Highway 403 corridors are described in detail below:

- ▶ North of Highway 403 between Hidden Valley Road and Waterdown Road, land uses are predominately rural forested lands, with strips of residential development along Hidden Valley Road, Waterdown Road, and Skyview Drive. Between Waterdown Road and the Freeman interchange, institutional, office and industrial uses are present, such as Ippolito Transportation and CUMIS Services Incorporated, Mercedes-Benz Burlington, Burlington Christian Academy, Wescam, Fern Hill School and Deloitte. Adjacent to the Freeman interchange are two large religious developments, the Crossroads Family of Ministry and Crossroads media centre, and the Compass Point Bible Church.
- ▶ South of Highway 403 between Hidden Valley Road and King Road, is predominantly forest or meadow lands. The Aldershot GO Train Station is located at Waterdown Road, with the railway corridor (GO Transit and CN) running generally parallel to and south of Highway 403, crossing the QEW south of the Freeman interchange. East of the Aldershot GO Station is a small CN storage yard. East of King Road, there is an industrial complex south of Hydro Lane, and adjacent to the interchange, a Hydro facility.
- ▶ South of the Freeman interchange, on the west side of the QEW, there is a commercial complex north of Plains Road, including an IKEA, Loblaws, Fortinos and Jysk. Residential development dominates the land uses on the west side of the QEW between Plains Road and the south project limit. On the south side of the Freeman interchange east of the QEW is a residential area and Leighland Park. Further to the south around Fairview Street and Plains Road East is a mixed-use area with industrial and commercial uses, including the Mapleview Shopping Centre. South of the shopping centre to North Shore Boulevard East, land uses are mainly residential. South of North Shore Boulevard East is predominantly institutional land uses to the lakeshore, including the Joseph Brant Hospital Cancer Clinic, Chartwell Brant Centre Long Term Care Residence and Ontario Provincial Police station.
- ▶ East of the Freeman interchange and north of the QEW, land uses are mainly commercial and industrial with residential neighbourhoods further to the north. A CN railway line crosses the

QEW approximately 0.7km east of Brant Street and then generally parallels the QEW on the north side to beyond the study limit at Guelph Line. Between the railway and highway are stormwater management ponds and a carpool parking lot.

- ▶ East of the Freeman interchange and south of the QEW is a hydro corridor, the Freeman Pond (a stormwater dry pond) and open space, with residential development further to the south. Industrial facilities are located on both sides of the CN railway corridor. Where Plains Road East becomes Queensway Drive, the land uses transition to lower density residential and then higher density residential. Adjacent to the interchange both east and west of Guelph Line, mixed use commercial and employment uses are found including hotels, household stores, restaurants, and an office and medical lab.

### 4.2.2.2 HALTON REGION OFFICIAL PLAN

The Halton Regional Official Plan (ROP) has policies that guide how Halton grows and develops. It includes goals and objectives for new development that reflect the vision of residents and regional council. The ROP addresses region-wide issues and provides a consistent vision for land use in Burlington, Halton Hills, Milton and Oakville.

Policy 173 in the ROP notes it is the policy of the Region to adopt a functional plan of major transportation facilities for the purpose of meeting travel demands for year 2021 as well as protecting key components of the future transportation system to meet travel demands beyond year 2021. It also notes the Region will work with the Province and Local Municipalities to plan for and protect planned corridors and rights-of-way for transportation and transport facilities to meet current and projected needs. Development shall not preclude or negatively affect the use of the planned corridor for the purpose(s) for which it was identified or being actively planned.

### 4.2.2.3 CITY OF BURLINGTON OFFICIAL PLAN

The City of Burlington Official Plan is a document that sets out a long-term vision for the future of Burlington's land use Strategy over the next 20 years. It contains goals and policies to guide the City's decisions on growth, land use and good design.

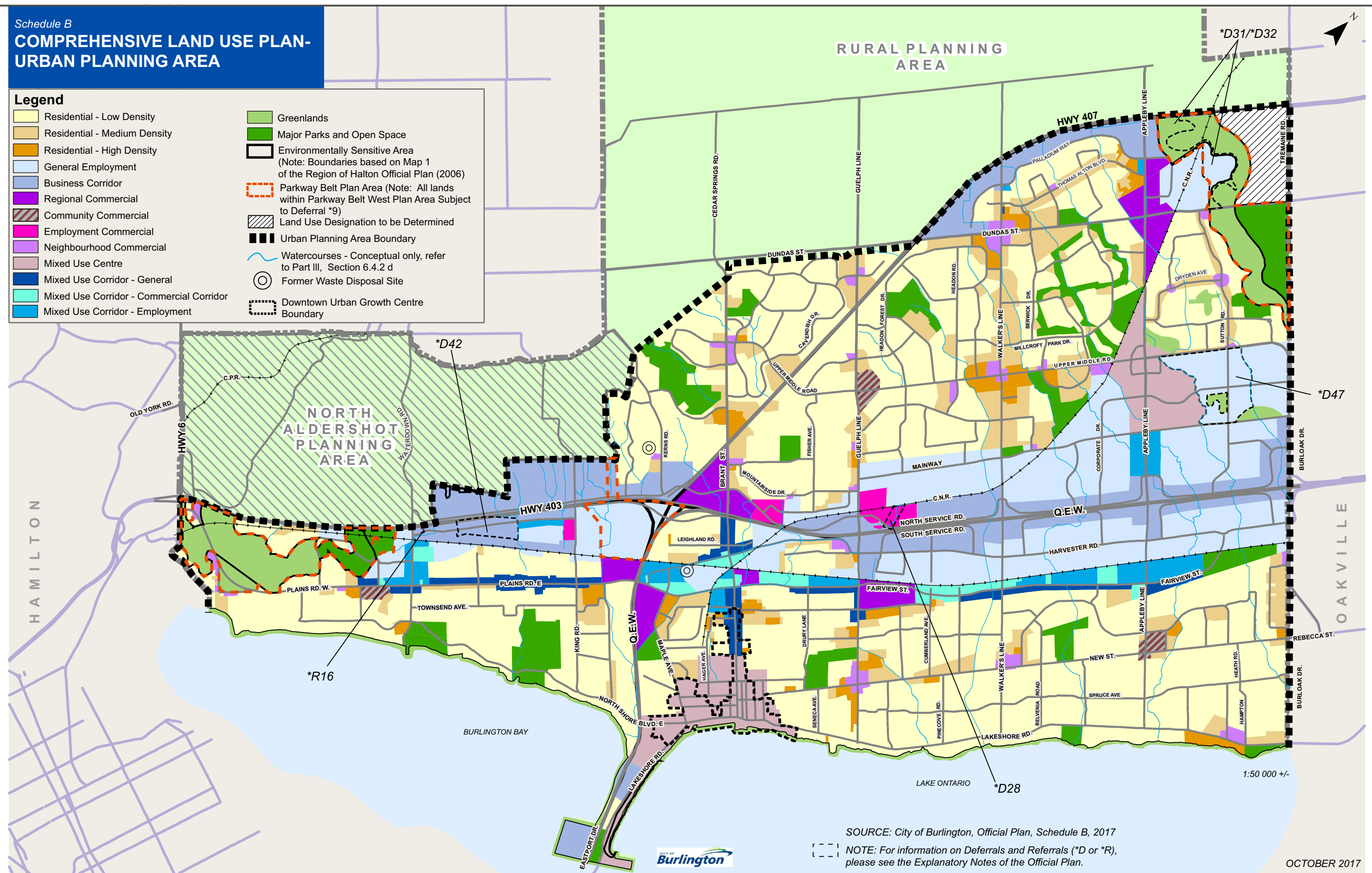
The City's Official Plan for "Comprehensive Land Use Plan for Urban Planning Areas" is shown in **Exhibit 4-2**.



Schedule B  
**COMPREHENSIVE LAND USE PLAN-  
 URBAN PLANNING AREA**

**Legend**

Residential - Low Density	Greenlands
Residential - Medium Density	Major Parks and Open Space
Residential - High Density	Environmentally Sensitive Area (Note: Boundaries based on Map 1 of the Region of Halton Official Plan (2006))
General Employment	Parkway Belt Plan Area (Note: All lands within Parkway Belt West Plan Area Subject to Deferral *9)
Business Corridor	Land Use Designation to be Determined
Regional Commercial	Urban Planning Area Boundary
Community Commercial	Watercourses - Conceptual only, refer to Part III, Section 6.4.2 d
Employment Commercial	Former Waste Disposal Site
Neighbourhood Commercial	Downtown Urban Growth Centre Boundary
Mixed Use Centre	
Mixed Use Corridor - General	
Mixed Use Corridor - Commercial Corridor	
Mixed Use Corridor - Employment	



SOURCE: City of Burlington, Official Plan, Schedule B, 2017  
 NOTE: For information on Deferrals and Referrals (\*D or \*R), please see the Explanatory Notes of the Official Plan.  
 OCTOBER 2017





### 4.2.3 CYCLING FACILITIES AND RECREATIONAL TRAILS

There are existing Active Transportation (AT) facilities within the study area and both the City of Burlington and Halton Region have plans to develop the AT network further.

#### 4.2.3.1 CITY OF BURLINGTON'S CYCLING MASTER PLAN

Burlington City Council approved the Cycling Master Plan in July 2009 and a draft Cycling Plan was prepared in August 2019. The Burlington Cycling Master Plan is intended to guide the City in creating a network of on-road bikeways and multi-use pathways throughout Burlington, along with supportive policies, practices and programs to encourage more people to cycle.

The plan presents a vision of a connected city, with a Spine Network consisting of almost 130 km of facilities appropriate for people of all ages and abilities. It sets the stage for the City to move forward on building grade separated crossings over the QEW, to overcome stressful barriers for people cycling now, and to make cycling a viable option for more people who are interested in cycling for some of their trips.

Within the study area, the City is focusing on improving trails as part of the network, moving forward with the construction of separated highway crossings, intersection improvements and local street bikeways that calm streets, and connect to accessways that provide shortcuts to destinations and between neighbourhoods. This Class EA study will not preclude the City's improvements. Further details on existing cycling facilities within the study area are outlined in **Section 4.4.3**.

More details on the City of Burlington's Cycling Master Plan can be found here: [https://www.burlington.ca/en/live-and-play/resources/Getting\\_Around/Cycling/cycling-plan/Burlington\\_Cycling-Plan\\_Draft-July-2019\\_full-minus-appendices---reduced.pdf](https://www.burlington.ca/en/live-and-play/resources/Getting_Around/Cycling/cycling-plan/Burlington_Cycling-Plan_Draft-July-2019_full-minus-appendices---reduced.pdf)

#### 4.2.3.2 HALTON REGION ACTIVE TRANSPORTATION PLAN

The Active Transportation Master Plan Study was completed in May 2015. The Halton Region Active Transportation Master Plan Study is planning to the year 2031 to develop the strategy, infrastructure, initiatives and programs to promote non-motorized travel throughout the Region, as recommended in the Region's Transportation Master Plan (2031) – The Road to Change.

The Active Transportation Master Plan must guide the Region to meet the mode share target for active transportation of 5% of all PM peak hour trips by 2031 from a less than 2% in 2011. This represents a seven-fold increase over the 1,600 PM peak hour trips made by cycling and walking in 2011 to 11,500 trips by 2031.

Within the study limits it is intended that Halton Region's Active Transportation Plan will complement the network as identified in the City of Burlington's Cycling Master Plan. Brant Street and Guelph Line regional roads are included in the study area and the proposed improvements of this EA study will not preclude Halton Region's plans. Further details on existing cycling facilities within the study area are outlined in **Section 4.4.3**.

More details on the Halton Region Active Transportation Plan can be found here: <https://www.halton.ca/For-Residents/Roads-Construction/Infrastructure-Master-Plans/Active-Transportation-Master-Plan/Active-Transportation-Master-Plan-Study-Report>

### 4.2.4 LANDSCAPE COMPOSITION

A field investigation was conducted to assess the landscape conditions, the existing vegetation communities and trees in the study area.

The general character of the study area varies along its course. At the west end, the existing wooded areas northwest of the study area (part of the Greenbelt Protected Countryside) dominate, with young to semi-mature woodlots of predominantly deciduous trees. Woodlots on the south side block views to the Aldershot GO Station and railway.

The character of the landscape shifts to more rural / cultural meadows with pockets of commercial and industrial development approaching the Freeman interchange. This freeway-to-freeway interchange is generally cultural meadows with small groupings of medium to large shrubs, which is similar to the arm of the Highway 403/QEW east of the interchange, to the eastern limit of the study area.

South from the Freeman interchange, the QEW corridor is generally bordered by strips of semi-mature deciduous woodlots, shielding views of commercial and industrial lands to the northeast, as well as nearby residential areas.

### 4.2.5 NOISE

The QEW and Highway 403 freeways within the study area are high-volume facilities that are surrounded by both residential and commercial/development land use. As expected, noise is an existing issue and was the subject of most comments received at both Public Information Centres (PICs). A Noise Assessment was carried out as part of this study to identify the impacts and mitigations of any recommended improvements and is further detailed in **Section 8.2.2**. In preparation for the noise assessment to be carried out for the proposed undertaking, a review of the study area was undertaken to identify noise sources, Noise Sensitive Areas (NSA) and existing noise barriers.



Noise sources within the study area include freeways (QEW, Highway 403 and 407 ETR), arterial roads (including King Road, Waterdown Road, North Service Road, Plains/Fairview Street, Brant Street and Guelph Line) and their associated interchange ramps and surrounding service roads.

To identify the Noise Sensitive Areas (NSAs), a review of land uses was undertaken. In total, two hundred and four (204) receptors were identified to represent the NSAs. All identified NSAs were residential houses, with an exception of a nursing home located in the southeast quadrant of the QEW and North Shore Boulevard East interchange.

There are existing noise barriers at the following locations are listed in **Table 4-1** and shown on **Exhibit 4-3**.

**Table 4-1: Existing Noise Barrier Locations**

Existing Noise Barrier #	Height (m)	Location
1	2.1 – 4.4 <sup>(1)</sup>	Along the QEW Niagara-bound lanes from the QEW-North Shore Boulevard exit ramp (N-E/W ramp) to the QEW-Fairview Street entrance ramp (W-S ramp). The noise barrier is placed on top of an existing earth berm. The height of the existing berm ranges between 2 and 4 metres. This barrier was built as part of the MTO barrier retrofit policy.
2	1.4 – 4.5 <sup>(1)</sup>	Along the QEW Toronto-bound lanes from Bellview Street to Augustus Drive. The noise barrier is placed on top of an existing earth berm, which range between 2 and 3 metres in height. This barrier was built by the developer of the adjacent residential subdivision as part of Subdivision Agreement.
3	1.8 – 2.0	Along the south side of Plains Road between Francis Road and Fairview Street entrance ramp to QEW Niagara-bound (W-S ramp). This barrier was built by the developer of the adjacent residential subdivision as part of Subdivision Agreement.
4	1.2 – 4.1 <sup>(1)</sup>	Along the 407 ETR southbound lanes from north of the Freeman Interchange to Brant Street. The noise barrier is placed on top of an existing earth berm. The height of the existing berm varies up to 10 metres. This barrier was built under the 407 ETR project and is owned by 407 ETR.
5	3.0	Along the QEW Niagara-bound lanes from the North Shore Boulevard entrance ramp (E/W-S ramp) to south of the mouth of Indian Creek at Lake Ontario. This barrier was built as part of the MTO barrier retrofit policy.

6	1.7 – 3.3	Along the 407 ETR northbound lanes from north of the Freeman Interchange to Brant Street. This barrier was built under the 407 ETR project and is owned by 407 ETR.
7	Up to 6.8	Earth berm along the QEW Toronto-bound lanes, just east of the CN Railway underpass located midway between Guelph Line and Brant Street. This berm was built as part of the widening and realignment of the Toronto-bound lanes of the QEW. It should be noted that this only includes an earth berm which was built as part of the MTO barrier retrofit policy.

Notes: (1) Many noise barrier sections were built on top of existing berms, the height of the wall does not include the height of the berm.

The findings of the noise assessment are summarized in **Section 8.2.2**.

## 4.3 CULTURAL ENVIRONMENT

### 4.3.1 ARCHAEOLOGY

Stage 1 and 2 Archaeological Assessments were carried out to identify and assess the known and potential archaeological heritage resources within the right-of-way (ROW) along the along the Queen Elizabeth Way (QEW) and Highway 403 within the City of Burlington. Assessment activities were performed in accordance with the provisions of the *Ontario Heritage Act* (R.S.O. 1990) and following Ontario Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) *Standards and Guidelines for Consultant Archaeologists* (2011).

The study area is close to indicators of archaeological potential such as historic roadways, areas of early Euro-Canadian settlement and the shore of Lake Ontario. However, modern construction activities have disturbed most of the area. Greenwood Cemetery is situated within 50 m of the ROW. While the cemetery is indicative of archaeological potential, its location in relation to the ROW does not necessitate a cemetery investigation for the study.

### 4.3.2 BUILT HERITAGE AND CULTURAL HERITAGE LANDSCAPES

A review of the Burlington Heritage Register indicated three listed heritage properties located within approximately 50 m of the study area.



**Table 4-2: Heritage Properties within 50 m of Study Area**

Property Number	Street Name	Designation
1053	Mohawk Road	Listed
1060	Mohawk Road	Listed
1134	Plains Road	Listed

Eighteen (18) of the twenty-two (22) bridges in the study area are under 40 years old and were determined to have no heritage value based on their age.

The North Shore Boulevard East Overpass at QEW Northbound Core and Southbound Core were a part of the QEW North Shore Bridge Replacement Project. A Heritage Screening Technical Memo was completed for the structures and concluded that the bridges were found to have no significance under the Ontario Heritage Bridge Guidelines.

A Bridge Screening for Potential Heritage Value Memo was prepared for the King Road Underpass and the Waterdown Road Underpass in relation to the Ontario Heritage Bridge Guidelines. These structures have some design value, as the T-beam design method used in MTO Central Region had two phases, the early 1940s and the period around 1960. However, the review indicated that neither bridge met the criteria as a significant cultural heritage resource.

From preliminary review, the structures have minimal contextual or historic values. The structures contextually support the transportation character of the region but are not defining elements. The structures are associated with the period of highway expansion after the Second World War and the initial construction of the Highway 403, but are not strongly associated with a specific event, community or person of importance for the region. Further details regarding the characteristics and technical details of the structures is detailed in **Section 4.4.6**.

## 4.4 TECHNICAL CONSIDERATIONS

The following sections summarize the existing highway infrastructure and key technical features within the study area.

### 4.4.1 EXISTING ROAD NETWORKS

The study area focuses on three mainline freeways (Queen Elizabeth Way, Highway 403 and 407 ETR), their convergence at the Freeman Interchange, and the surrounding arterial road interchanges. The study area is detailed in **Exhibit 1-1**.

#### 4.4.1.1 QUEEN ELIZABETH WAY (QEW)

The study area includes the QEW, from 425 m east of the Guelph Line interchange to the northern abutment of the Burlington Skyway. The QEW is a controlled-access freeway that stretches from Fort Erie to Toronto. The QEW through the study area provides the connection between Greater Toronto Area and the Niagara Region, and services the City of Burlington via several interchanges. Within the study limits, the QEW consists of six basic lanes (three lanes in each direction), plus auxiliary lanes and speed-change lanes at interchange locations. The study area includes four arterial road interchanges, and the freeway-to-freeway interchange connecting the QEW, Highway 403 and 407 ETR (the Freeman Interchange). The QEW through the study limits is regularly congested, and the surrounding urban environment introduces constraints to any potential highway improvements. Key existing operational and infrastructure issues of the QEW are summarized in **Section 3**.

#### 4.4.1.2 HIGHWAY 403

The study area includes Highway 403, from Grindstone Creek (west of Waterdown Road) to the Freeman Interchange. Highway 403 is a controlled-access freeway that extends from Highway 401 in Woodstock to Highway 401 in Mississauga, and merges with the QEW through Burlington and Oakville. Highway 403 within the study area accommodates six basic lanes and one arterial road interchange at Waterdown Road. Key existing operational and infrastructure issues of the Highway 403 are further detailed in **Section 3**.

#### 4.4.1.3 407 ETR (HIGHWAY 407)

The study area includes the 407 ETR from the Freeman Interchange northerly to Brant Street. 407 ETR is a tolled, controlled-access freeway that extends from the Freeman Interchange (within this study area) to Highway 35/115 in Clarington. Although 407 ETR is not owned by MTO within this study area, its length between the Freeman Interchange and Brant Street was included in the study in case any potential QEW/Highway 403 improvements had impacts to the 407 ETR infrastructure.



#### 4.4.1.4 HOV LANES

High-occupancy vehicles (HOV) lanes are managed lanes intended to increase the number of people moved on the available roadway. HOV lanes are specifically for use by buses and cars carrying two or more people. MTO has implemented HOV lanes on several freeways in the Greater Toronto Area, including sections of Highway 403, Highway 404, Highway 410, Highway 427 and the QEW – these are identified with signage and diamond symbols on the pavement.

On the QEW, HOV lanes are located at the eastern project limits, east of Guelph Line, and extend to Trafalgar Road in Oakville. When first constructed in 2010, the location of the HOV lane termination on the QEW Niagara-bound lanes was originally 375 m further west of its present-day location. Within one year of operation, the termination of the lane was relocated further to the east to ensure that drivers had sufficient distance to change lanes safely and avoid weaving issues ahead of the QEW Niagara-bound and Highway 403 Hamilton-bound split, west of Brant Street. This split is the same 'lane-balance' issue further described in **Section 3**.

#### 4.4.1.5 ARTERIAL ROAD INTERCHANGES

There is a total of five arterial road interchanges within the study area. There are four interchanges on the QEW at Guelph Line, Brant Street, Plains Road East/Fairview Street and North Shore Boulevard; and one Highway 403 interchange at Waterdown Road. The locations of these interchanges are highlighted in **Exhibit 4-3**.

##### **QEW Interchange at Guelph Line**

The QEW and Guelph Line interchange is located 2.4 km east of the Freeman Interchange and is towards the eastern limits of the study area. The interchange is in a Parclo A4 configuration, with inner-loop entrance ramps in the northeast and southwest quadrants, and signalized intersections at the QEW exit ramp terminals. North Service Road and South Service Road run parallel to the QEW and intersect with Guelph Line via connections to the ramp terminals. The QEW and interchange ramps are constrained in the northeast, southeast and southwest quadrants by adjacent development.

##### **QEW Interchange at Brant Street**

The QEW and Brant Street interchange is located 0.64 km east of the Freeman Interchange. The interchange is built in a Parclo A4 configuration, with inner-loop entrance ramps in the northeast and southwest quadrants, and signalized intersections at the exit ramp terminals. There is no access to and from the Niagara-bound QEW from this interchange. There is commercial development north of the interchange and the north ramp terminal also provides access to the development in the northwest quadrant.





Shared roadway leading to Aldershot GO and Highway 403 Toronto-bound on-ramp.

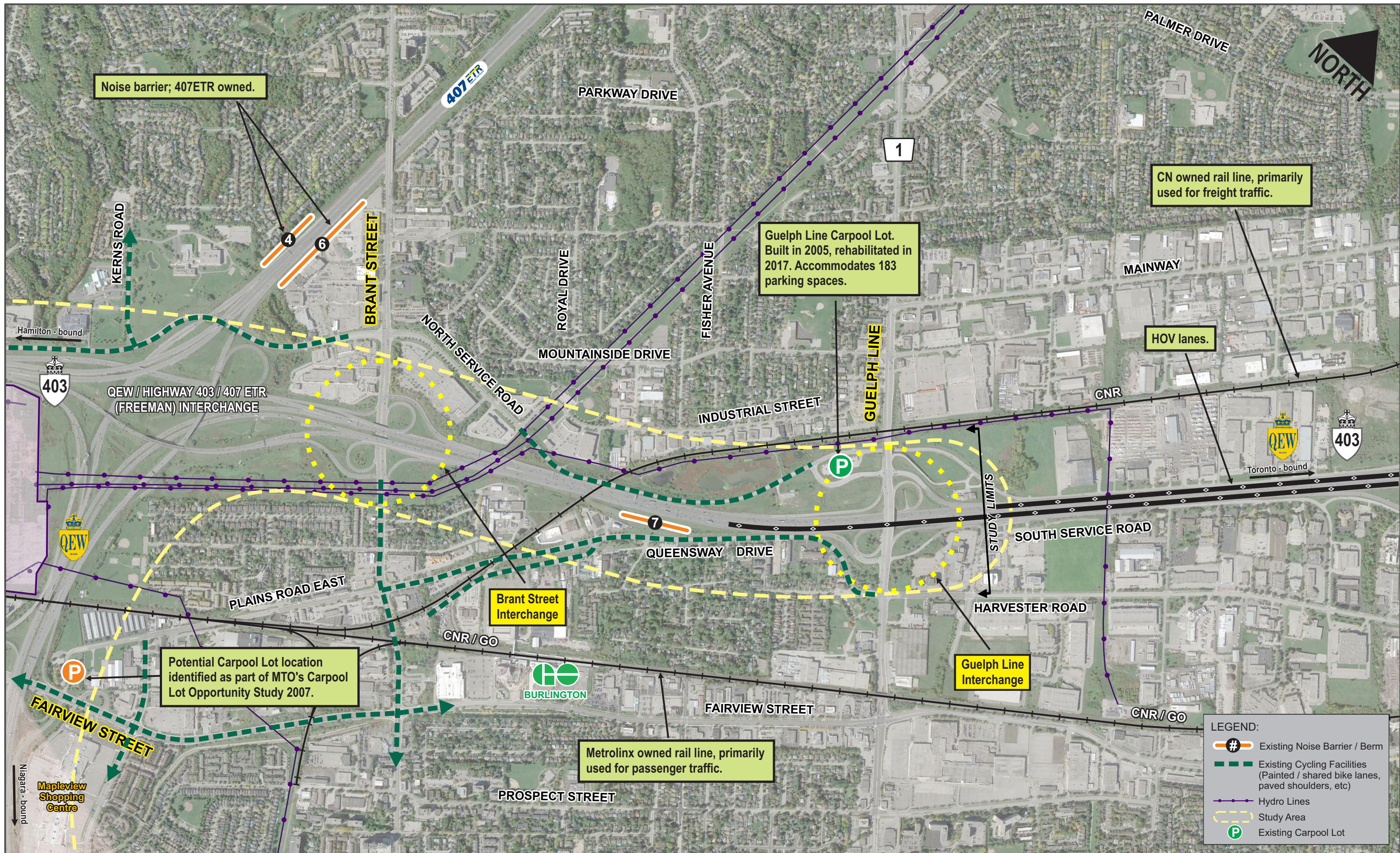
King Road Underpass

Waterdown Road Interchange

- LEGEND:**
- Existing Noise Barrier / Berm
  - Existing Cycling Facilities (Painted / shared bike lanes, paved shoulders, etc)
  - Hydro Lines
  - Study Area
  - Existing Carpool Lot







Noise barrier; 407ETR owned.

Guelph Line Carpool Lot. Built in 2005, rehabilitated in 2017. Accommodates 183 parking spaces.

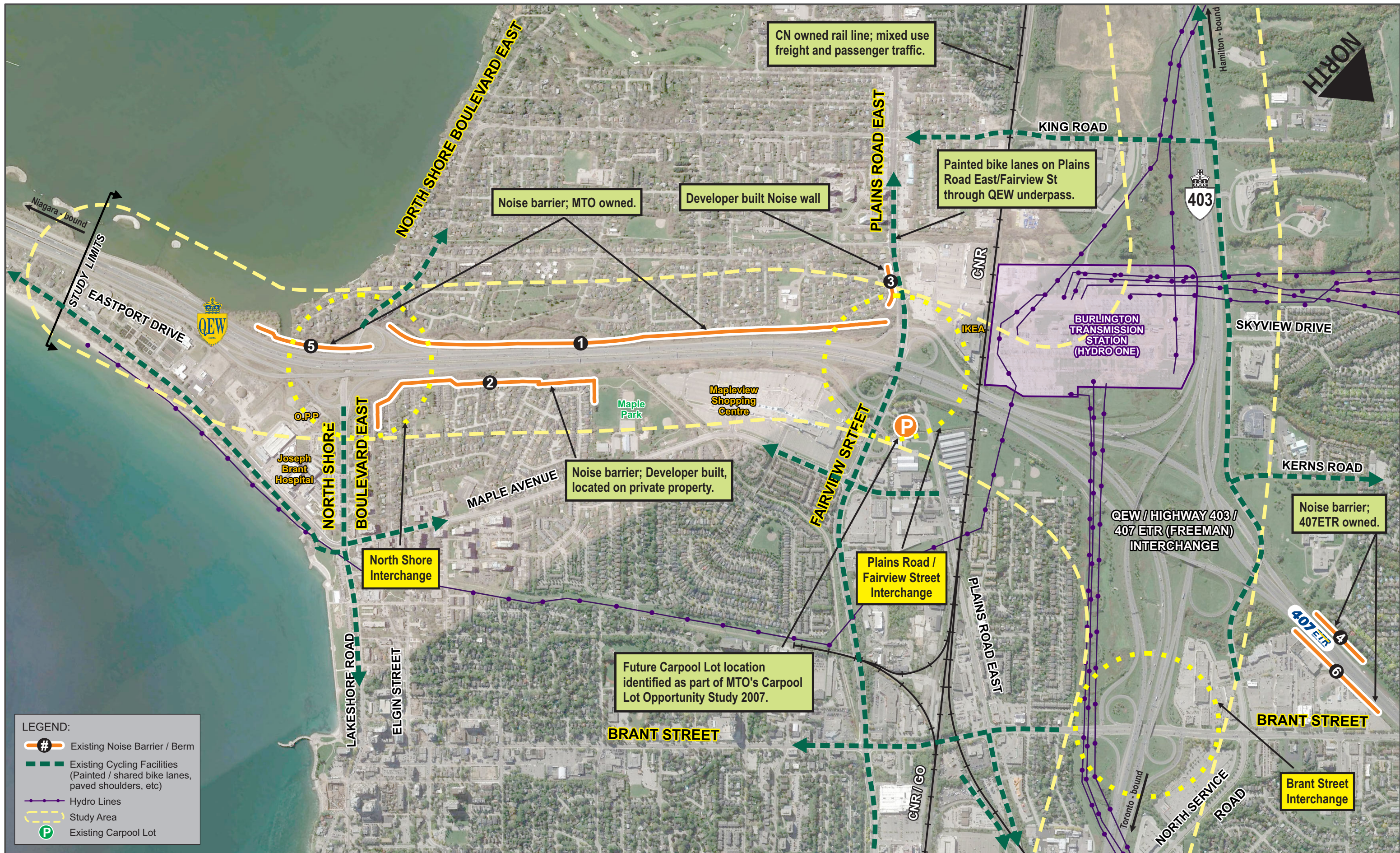
CN owned rail line, primarily used for freight traffic.

Potential Carpool Lot location identified as part of MTO's Carpool Lot Opportunity Study 2007.

Metrolinx owned rail line, primarily used for passenger traffic.







**LEGEND:**

- Existing Noise Barrier / Berm
- Existing Cycling Facilities (Painted / shared bike lanes, paved shoulders, etc)
- Hydro Lines
- Study Area
- Existing Carpool Lot





### QEW Interchange at Plains Road East/Fairview Street

The QEW and Plains Road East/Fairview Street interchange is located 1.2 km south of the Freeman Interchange. The interchange is built in a Parclo A4 configuration, with inner-loop entrance ramps in the southeast and northwest quadrants, and signalized intersections at the exit ramp terminals. The interchange differs from others in that not all movements are provided to and from the QEW. The northbound entrance ramps can only access Highway 403 or 407 ETR, and the southbound exit ramp is only from Highway 403 / 407 ETR. Vehicles on Plains Road/Fairview Street wishing to access the QEW Toronto-bound lanes need to travel to an adjacent interchange (e.g. Brant Street or North Shore Boulevard). Similarly, vehicles on the QEW Niagara-bound wishing to access Plains Road or Fairview Street need to exit the QEW at an adjacent interchange. The interchange has undergone recent improvement with the reinstatement of the inner-loop entrance ramp to QEW Niagara-bound, constructed around 2010. The interchange is constrained by major commercial development in the northwest and southeast quadrants, by residential development in the southwest quadrant, and by the CN Rail corridor immediately to the north.

### QEW Interchange at North Shore Boulevard

The QEW and North Shore Boulevard interchange is located 3.3 km south of the Freeman Interchange near the southern study limit. The interchange was built in a Parclo A3 configuration, with inner-loop entrance ramps in the southeast and northwest quadrants, however no ramps exist in the southwest quadrant due to the constraint of Indian Creek. Eastbound traffic on North Shore Boulevard turn left to access the QEW Niagara-bound entrance ramp. The interchange is constrained in all quadrants, with residential areas and development to the east and west, as well as Indian Creek west of the interchange. The Ontario Provincial Police, Burlington detachment, and Joseph Brant Hospital is also located immediately east of the interchange.

MTO is currently undertaking replacement of the QEW overpass bridges at North Shore Boulevard. This work commenced in 2019 and is anticipated to be completed in 2022.

### Highway 403 Interchange at Waterdown Road

The Highway 403 and Waterdown Road interchange is located 3.9 km west of the Freeman Interchange at the western study limit. The interchange is in a diamond configuration, with no inner-loop ramps / free-flowing movements and has signalized intersections at the ramp terminals. The most recent improvements to the interchange occurred in 2010, when the Highway 403 Toronto-bound entrance ramp and Hamilton-bound entrance and exit ramps were constructed. The Aldershot GO station opened in 1992 and is situated in the southeast quadrant. A shared roadway provides access to the GO station and Highway 403 Toronto-bound entrance ramp, which was part of the improvements constructed in 2010.

### **4.4.2 CARPOOL LOTS**

There is one carpool lot in the study area located in the northwest quadrant of the QEW and Guelph Line interchange as shown in **Exhibit 4-3**. The carpool lot is accessed from North Service Road, northwest of the interchange. The carpool lot was built as part of the Guelph Line interchange improvements in 2005 and rehabilitated in 2017 to have an increased capacity of 183 spaces, including accessible parking.

The MTO Central Region Carpool Lots Opportunity Study (2007) identified a potential new carpool lot at the Plains Road East / Fairview Street interchange. The carpool lot study identified this location as it is MTO-owned land, adjacent to the QEW, and is strategically located between Burlington and Hamilton. This strategic location could attract a large number of potential commuters and original concept designs of the carpool lot identified a potential capacity of approximately 150 spaces. This Freeman IC EA study includes further review of the technical feasibility and potential impacts of a carpool lot at this location.

### **4.4.3 ACTIVE TRANSPORTATION**

Within the study area, on-road painted bike lanes or signed routes are currently located on:

- ▶ North Shore Boulevard, east and west of the QEW interchange;
- ▶ Plains Road East and Fairview Street, through the QEW interchange;
- ▶ Plains Road East and Queensway Drive between Brant Street and Guelph Line;
- ▶ Brant Street, south of QEW interchange;
- ▶ Waterdown Road, north and south of Highway 403;
- ▶ King Road, south of Highway 403; and
- ▶ North Service Road, between Guelph Line interchange and Waterdown Road.

As mentioned in **Section 4.2.3**, complementary to the new Official Plan (adopted April 2018), the City of Burlington has released a Draft Cycling Plan (August 2019). In addition to outlining the City's plan for the future AT network within Burlington, the plan commits to further review the feasibility of two grade-separated active transportations crossings of the QEW, east of Brant Street and south of the Plains Road East and Fairview Street interchange.

As part of the North Shore Boulevard Overpass Replacement contract, as mentioned in **Section 1.4.4.**, the North Shore Boulevard roadway through the interchange will also be improved and accommodate a 1.5 m bike lane in each direction.



#### 4.4.4 RAIL AND TRANSIT

##### 4.4.4.1 CN RAIL AND GO TRANSIT

The Canadian National (CN) rail system crosses below the QEW mainline at two locations in the study area: east of Brant Street and north of Plains Road East/Fairview Street. At the crossing near Brant Street, the railway line is owned by CN and is primarily used for freight traffic. At the crossing near Plains Road East/Fairview Street, the corridor includes lines owned by both Metrolinx and CN, carrying passenger and freight services respectively. These two lines join south of the QEW and Brant Street interchange.

GO Transit's passenger rail service is part of the Lakeshore West line, which provides service from downtown Hamilton to Union Station. The Aldershot GO Station is located adjacent to the Highway 403 and Waterdown Road interchange and the Burlington GO Station is located south of the study limits between Brant Street and Guelph Line.

#### 4.4.5 MUNICIPAL TRANSIT

As shown in **Exhibit 4-4**, Burlington Transit provides bus service on municipal roadways within the study area including Brant Street, Fairview Street/Plains Road East, North Shore Boulevard and the North Service Road. The City of Burlington is also currently undertaking the Burlington GO Mobility Hub study which focuses on the area south of the QEW in the area surrounding the Burlington GO Station. The study aims to define a vision for community development with local and regional transit interfaces.

**Exhibit 4-4: Burlington Transit Routes**



*(Base image from Burlington Transit, September 2019)*

#### 4.4.6 EXISTING STRUCTURES

Within the study area, there are 22 structures accommodating traffic lanes for the QEW, Highway 403 and Freeman Interchange. **Table 4-3** lists the existing structures from east to west, which are also shown on **Exhibit 4-5**. Several QEW mainline structures in the study area are due for their first major rehabilitation since initial construction. The structural rehabilitation will prolong the asset's lifespan and the works are part of MTO's 5-year capital program. These structure rehabilitations were previously described in **Section 3** and are the driver behind the study's consideration of a longer-term improvement plan. The structures will need to be widened during their rehabilitation to mitigate traffic impacts and this widening would have to be compatible with the long-term plan (further detailed in **Section 7.1.2**) to mitigate future cost and throw-away. Due to the large number of structures within the study area, only the structures that will undergo their first major structural rehabilitation as part of MTO's 5-year capital program are further detailed in the following sections of this report. The QEW structures in need of rehabilitation are the Brant Street Overpasses, CN Rail Overheads (South Leg) and Plains Road East / Fairview Street Overpasses.



**Table 4-3: Summary of Existing Structures within the Study Area**

Structure ID	Structure Name	Location	# Spans	Year Built
10-471	North Service Road over CN Rail	Adjacent to QEW mainline east of Brant Street	1	1999
10-139/1	CNR Overhead (Westbound)	On QEW mainline east of Brant Street	1	1998
10-139/2	CNR Overhead (Eastbound)	On QEW mainline east of Brant Street	1	1998
10-138/1	Brant St. Overpass (Eastbound)*	QEW mainline at Brant Street	2	1990
10-138/2	Brant St. Overpass (Westbound)*	QEW mainline at Brant Street	2	1990
10-320	407 ETR Northbound over QEW	Within Freeman Interchange	4	1992
10-321	407 ETR Northbound over Hwy 403 Westbound	Within Freeman Interchange	4	1992
10-333	Hwy 403 Eastbound over QEW	Within Freeman Interchange	3	1994
10-135/1	CNR Overhead (Northbound)*	North of Plains Road East/Fairview Street	3	1984
10-135/2	CNR Overhead (Southbound)*	North of Plains Road East/Fairview Street	3	1984
10-135/5	Ramp from Fairview St. to Hwy 403 over CNR*	At Plains Road East/Fairview Street Interchange	3	1984
10-135/6	Ramp from Hwy 403 West to Fairview St. over CNR*	North of Plains Road East/Fairview Street Interchange	3	1984
10-319/1	Fairview Street Overpass Northbound*	QEW At Plains Road East/Fairview Street Interchange	1	1984
10-319/2	Fairview Street Overpass Southbound*	QEW At Plains Road East/Fairview Street Interchange	1	1984

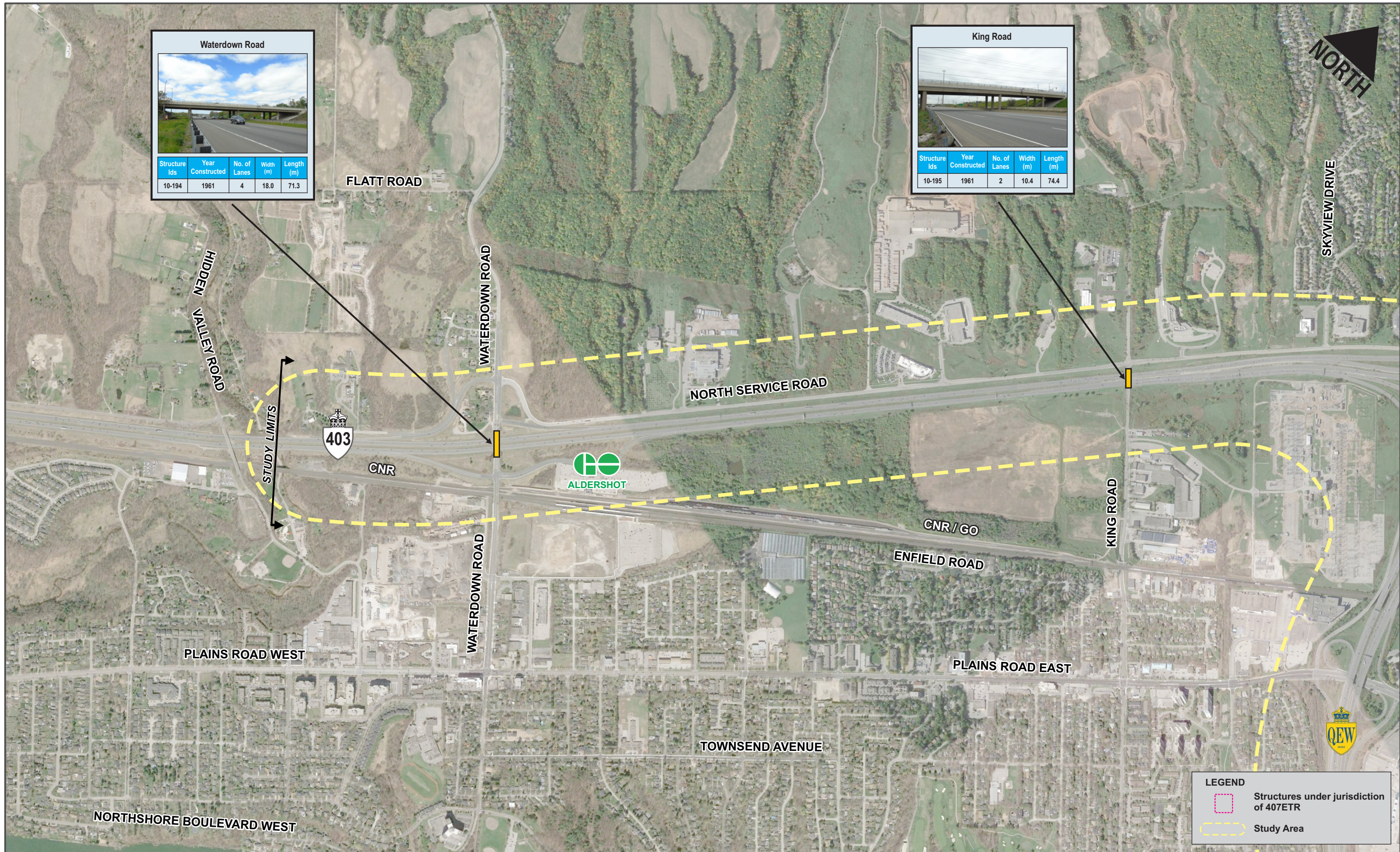
Structure ID	Structure Name	Location	# Spans	Year Built
10-319/5	Fairview Street Overpass Northbound on Ramp*	QEW At Plains Road East/Fairview Street Interchange	1	1984
10-142/1	North Shore Blvd E Overpass at QEW Northbound Collector	QEW At North Shore Boulevard Interchange	1	1983
10-142/2	North Shore Blvd E Overpass at QEW Southbound Collector	QEW At North Shore Boulevard Interchange	1	1983
10-142/3	North Shore Blvd E Overpass at QEW Northbound Core	QEW At North Shore Boulevard Interchange	1	1956
10-142/4	North Shore Blvd E Overpass at QEW Southbound Core	QEW At North Shore Boulevard Interchange	1	1956
10-322	Eastport Drive over North Shore Ramp	QEW South of North Shore Boulevard Interchange	3	1984
10-195	King Road structure	Highway 403 at King Road crossing	4	1961
10-194	Waterdown Road structure	Highway 403 at Waterdown Road Interchange	4	1961

\*Identified for first major rehabilitation; further details outlined in the **Section 7.1.1**

#### 4.4.6.1 BRANT STREET OVERPASSES

The Brant Street overpasses consists of two structures; the north structure carries four QEW westbound lanes that split to QEW Niagara-bound and Highway 403 Hamilton-bound and the south structure carries four QEW Toronto-bound lanes. The structures were constructed in 1990 and are composed of prestressed concrete box girders, in two spans with a total length of 42 m. The structures have not undergone any previous rehabilitation, however they were subject to some work in the early 2010's to accommodate an additional westbound lane. The structures are approaching their first major rehabilitation cycle.





**Waterdown Road**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-194	1961	4	18.0	71.3

**King Road**

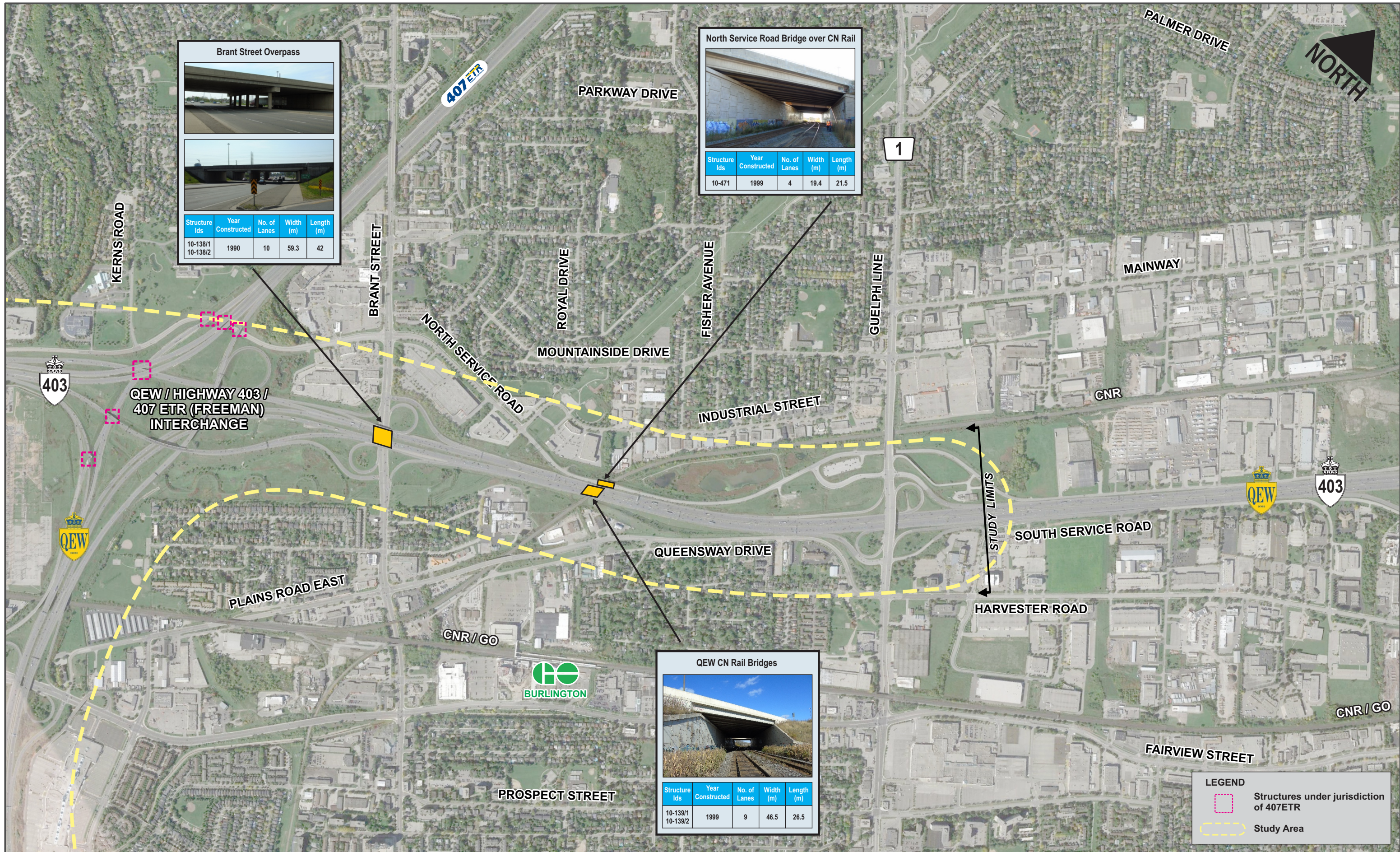
Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-195	1961	2	10.4	74.4

**LEGEND**

	Structures under jurisdiction of 407ETR
	Study Area







**Brant Street Overpass**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-138/1 10-138/2	1990	10	59.3	42

**North Service Road Bridge over CN Rail**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-471	1999	4	19.4	21.5

**QEW CN Rail Bridges**

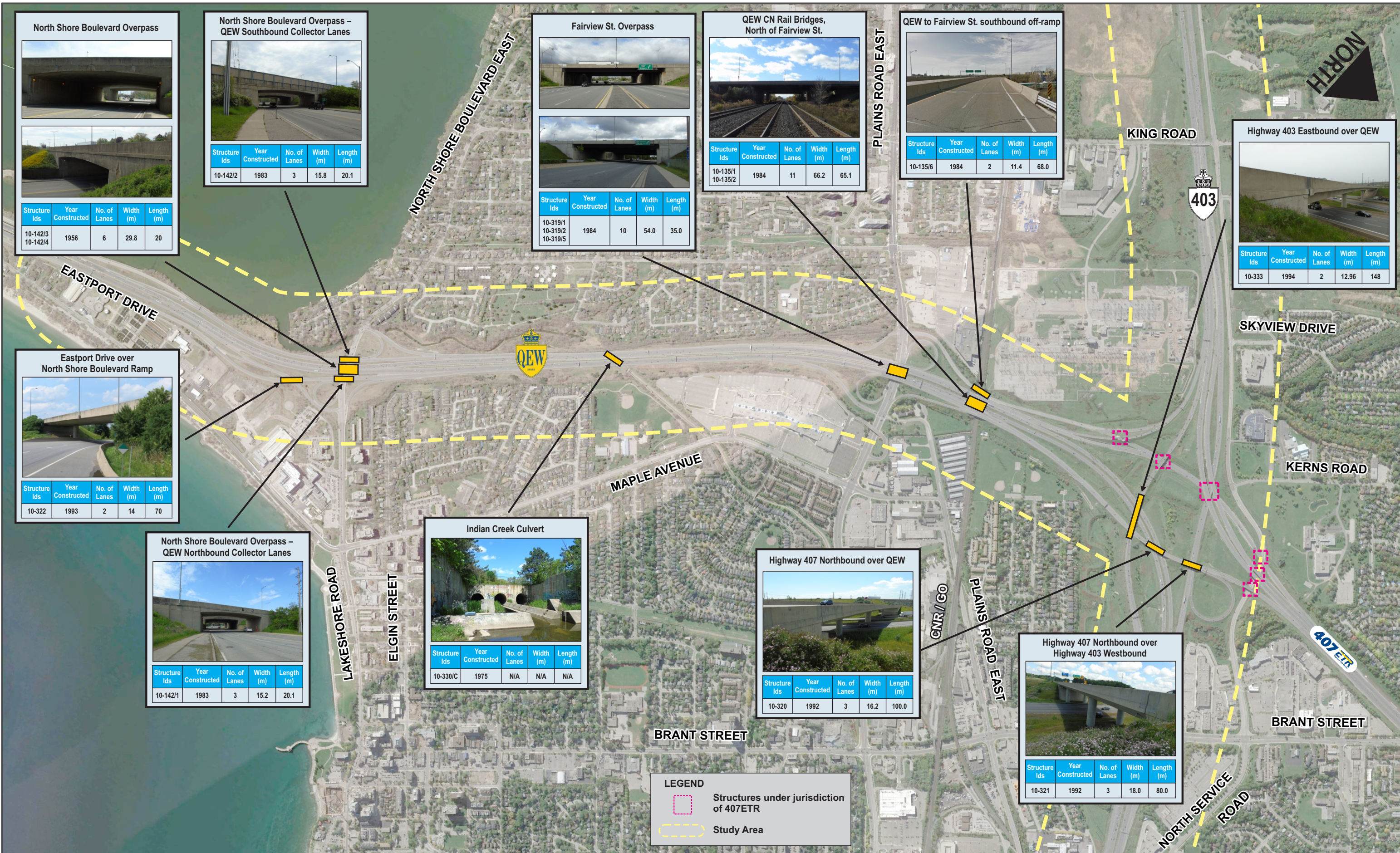
Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-139/1 10-139/2	1999	9	46.5	26.5

**LEGEND**

- Structures under jurisdiction of 407ETR
- Study Area







**North Shore Boulevard Overpass**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-142/3 10-142/4	1956	6	29.8	20

**North Shore Boulevard Overpass – QEW Southbound Collector Lanes**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-142/2	1983	3	15.8	20.1

**Fairview St. Overpass**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-319/1 10-319/2 10-319/5	1984	10	54.0	35.0

**QEW CN Rail Bridges, North of Fairview St.**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-135/1 10-135/2	1984	11	66.2	65.1

**QEW to Fairview St. southbound off-ramp**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-135/6	1984	2	11.4	68.0

**Highway 403 Eastbound over QEW**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-333	1994	2	12.96	148

**Eastport Drive over North Shore Boulevard Ramp**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-322	1993	2	14	70

**North Shore Boulevard Overpass – QEW Northbound Collector Lanes**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-142/1	1983	3	15.2	20.1

**Indian Creek Culvert**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-330/C	1975	N/A	N/A	N/A

**Highway 407 Northbound over QEW**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-320	1992	3	16.2	100.0

**Highway 407 Northbound over Highway 403 Westbound**

Structure Ids	Year Constructed	No. of Lanes	Width (m)	Length (m)
10-321	1992	3	18.0	80.0

**LEGEND**

- Structures under jurisdiction of 407ETR
- Study Area



#### 4.4.6.2 PLAINS ROAD EAST / FAIRVIEW STREET OVERPASSES

The Plains Road East / Fairview Street overpasses consists of three structures that carry QEW traffic over the arterial road. The west structure carries five lanes of QEW Niagara-bound traffic and one on-ramp, the east structure carries three lanes of traffic that split to two lanes heading QEW Toronto-bound and two lanes heading Highway 403 / 407 ETR, and the Fairview Street eastbound on-ramp structure carries one lane of traffic to Highway 403 westbound / 407 ETR. All three are single span structures built in 1984 and are composed of box beam girders with a total length of approximately 35 m. The steel box girders were retrofitted in 2008 and subjected to localized fatigue repairs, and the west structure was widened in 2010 to accommodate QEW and interchange improvements. Excluding these works, the structures have not undergone any rehabilitation to date and the original elements are coming up to their first rehabilitation cycle.

#### 4.4.6.3 CN RAIL OVERHEAD (QEW SOUTH LEG)

The CN Rail overhead crossing consists of three structures carrying QEW traffic over the CN Rail line, north of Fairview Street interchange. The most westerly structure carries the Highway 403 / 407 ETR off-ramp to Fairview Street, the west QEW structure carries five lanes of Niagara-bound traffic, and the east structure carries QEW Toronto-bound and Highway 403 / 407 ETR traffic. All structures are three-span, steel I-girder structures with a total span lengths of approximately 66 m. The steel I-girder structures were constructed in 1984 and the west structure was widened in 2012 to accommodate QEW improvements. The Highway 403 / 407 ETR off-ramp structure to Fairview Street was previously rehabilitated in 1989, with deck work and illumination installed. Excluding these works, the original structures have not undergone rehabilitation to date and the original elements are coming up to their first rehabilitation cycle.

#### 4.4.6.4 STRUCTURAL CULVERTS

There are eight structural culverts within the study area; a culvert is typically considered a structural culvert when it has a span with greater than 3.0 m. **Table 4-4** provides an overview of the structural culverts within the study area. Impacts to the culverts as part of the recommended plan and any structural recommendations for the structural culverts are also tied with the Proposed Stormwater Management plan and this is summarized in **Section 7.5**.

**Table 4-4: Existing Structural Culverts**

Structure ID	Crossing Name	Structure Name	Year Built
10-598/C	H6	Freeman Interchange and North Service Road @ Hagar Creek Culvert	1990
10-402/C	H-3A	Hagar Creek under QEW at Freeman Interchange	1994
10-399/C	H-3B	Hagar Creek under EB 403 ramp at Freeman Interchange	1991
10-330/C	IND QEW	Indian Creek	1975
10-599/C	IND QEW-2	Indian Creek at North Shore Boulevard Interchange	1956
10-597/C	F-Main	Falcon Creek	1960
10-602/C	G13	Aldershot GO Station Access Road Culvert	2011
10-379/C	IE 1	Rambo Creek	1964

#### 4.4.7 EXISTING TRAFFIC CONDITIONS

As outlined in **Section 3**, this study included a comprehensive traffic analysis component which is detailed in the Traffic Report included in **Appendix B**. The traffic analysis undertaken included an assessment of the existing traffic conditions based on 2015 traffic counts, which was the current available data at the start of the study.

A Level-Of-Service rating (LOS) categorizes the operational performance of a roadway and is rated LOS A through F. **Table 4-4** provides description for these performance levels with LOS F being the lowest level of performance, indicative of a breakdown of flow. **Exhibit 4-6** and **Exhibit 4-7** show the existing LOS within in the project limits for the AM and PM peaks, respectively.

In the AM peak, it is observed that most of the highway operates at LOS E or better in the Toronto-bound direction. The analysis observed the worst congestion just east of the study limits, beginning west of Walkers Line and continuing easterly to Toronto.



During the PM peak hour, traffic slows down along the QEW / Highway 403 westbound lanes approaching the QEW-to-Niagara / QEW-to-Hamilton split due to the weaving associated with this split and the existing HOV lane terminus. The weaving ahead of split is worsened by the lack of 'lane balance' as discussed in **Section 3.2** and identified in **Exhibit 3-1**. Lane balance is achieved when the number of lanes leaving a diverging segment is greater than the number of lanes entering it, and this is provided through an 'either-or' lane. This reduction in speed extends westbound along Highway 403 through the Freeman interchange. The QEW / Highway 403 westbound lanes operate at LOS F beginning east of the study limits and continuing westerly through the Freeman Interchange to King Road. Speeds are also reduced west of Waterdown Road where vehicles merging from the on-ramp cause local congestion resulting in a LOS F on Highway 403, west of our study limits.

**Table 4-6: Level of Service (LOS) Definitions**

Level of Service	Description
<b>A</b>	Free flow operations with no effect from presence of other motorists
<b>B</b>	Stable traffic flow with some influence from other motorists
<b>C</b>	Restricted flow that remains stable; level of motorist comforts declines noticeably
<b>D</b>	High density traffic flow; speed and freedom to maneuver are restricted
<b>E</b>	Unstable flow at or near capacity levels; poor comfort and convenience
<b>F</b>	Breakdown in flow; Demand exceeds capacity resulting in stop-and-go waves

**Exhibit 4-6: Existing LOS for AM Peak Period**



**Exhibit 4-7: Existing LOS for PM Peak Period**



#### 4.4.8 ILLUMINATION

The QEW and its interchanges within the study area are currently fully illuminated by a combination of High Mast Lighting (HML) and conventional lighting. The HML extends from the eastern project limit, east of Guelph Line, to the Freeman Interchange. South of the Freeman Interchange, conventional lighting is present to the southern study limit, at the northern abutment of Burlington Skyway.

Highway 403 is currently fully illuminated with HML extending from west of the Freeman Interchange to approximately 200 m west of King Road. Moving westerly, there is no illumination along the mainline between King Road and Waterdown Road, however the entrance and exit ramp terminals at Waterdown Road are partially illuminated with conventional lighting.

All existing lighting consists of steel poles with High Pressure Sodium (HPS) luminaires.

#### 4.4.9 UTILITIES

Consultation with utility providers has been ongoing since the study commencement to identify the locations of existing underground and overhead utilities in the project limits. A composite utility plan was created to detail the locations of utility infrastructure within the study area and identify potential conflicts that may arise due to the proposed works, and is included in **Appendix G**. **Table 4-7** provides a summary list of utility providers within the study area. It is noted that there are no gas or oil pipelines traversing the project limits.

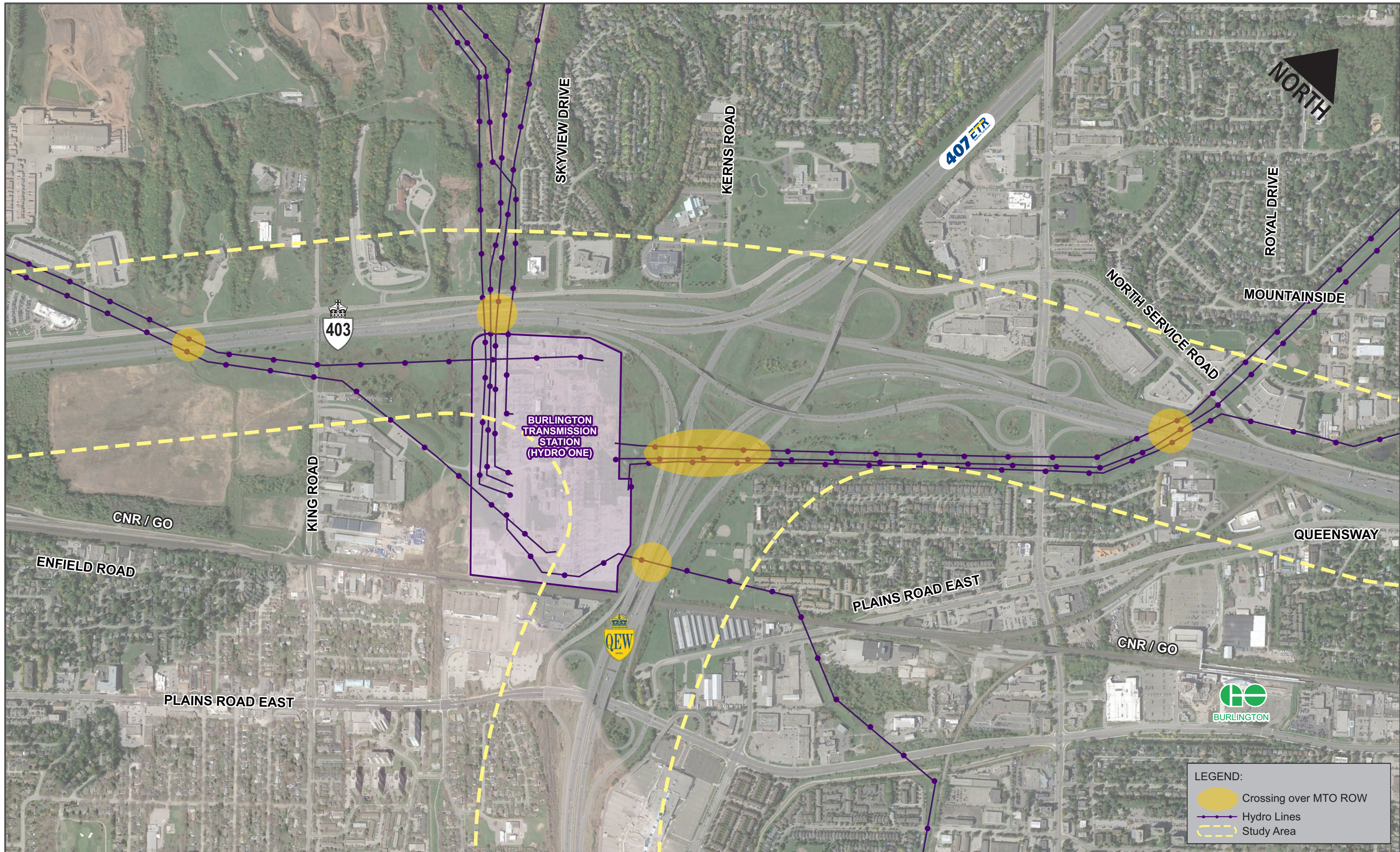


There is a notable presence of Hydro One infrastructure in the study area, including the Burlington Transmission Station immediately southwest of the Freeman Interchange. Transmission lines to and from the Transmission Station cross the MTO right-of-way at five locations within the study area. **Exhibit 4-9** illustrates the Hydro Transmission Station and line crossings. Several towers of the hydro transmission lines are either within or in very close proximity to the MTO ROW. Hydro One has been consulted as part of this study as summarized in **Section 6.2**. Due to the close proximity of the hydro one infrastructure to the existing QEW / Highway 403, any highway improvements would very likely result in direct or indirect impacts. Impacts to Hydro One infrastructure due to the Recommended Plan identified by this study are further detailed in **Section 7.9**.




**Table 4-7: List of Utility Providers within the Study Area**

Utility provider	Utility type	Utility provider	Utility type
Hydro One	Electricity	Bell Canada	Telecommunication
Burlington Hydro	Electricity	Cogeco Cable	Telecommunication
Enbridge Gas	Natural Gas	Telus	Telecommunication
Union Gas	Natural Gas	Zayo	Telecommunication





**LEGEND:**

-  Crossing over MTO ROW
-  Hydro Lines
-  Study Area





#### 4.4.10 DRAINAGE AND STORMWATER MANAGEMENT

For the purposes of this study, an inventory of existing watercourse/drainage crossings within the study areas was completed through a desktop review of available design, contract and as-built drawings, survey information and field investigation.

Within the study area, there are six major water courses that generally flow in a north to south direction across the QEW and Highway 403 before eventually discharging into Lake Ontario, all within the jurisdiction of Conservation Halton (CH). The water courses are listed below and identified in **Exhibit 4-9**.

- ▶ Grindstone Creek
- ▶ Falcon Creek
- ▶ Indian Creek (West, East and Main Branches)
- ▶ Hager Creek
- ▶ Rambo Creek
- ▶ Roseland Creek

All 41 water crossings of the highway mainline within the study limits are associated with these six creeks. The Freeman Interchange includes 15 of those water crossings, which drain to Hager Creek. For details regarding each watercourse and crossing, please refer to the Drainage and Stormwater Management Report in **Appendix F**.

At the time of this study, the hydrologic and hydraulic models for Grindstone Creek, Falcon Creek and the Indian/Hager/Rambo/Roseland Creek system are in the process of being updated by Conservation Halton (CH) and the City of Burlington. As these models are not yet available for consideration, existing hydrologic conditions were modelled based on previously approved models and other available information provided by CH, City of Burlington and MTO.

This separate hydrologic model was used as a baseline model to complete a watercourse/drainage crossing assessment and impact assessments at each outlet downstream of the right-of way. During detail design, if an updated hydrologic model is available from CH and City of Burlington, the hydrologic and hydraulic modeling will be reviewed and updated as needed.





**LEGEND**

- HRP HYDROLOGIC REFERENCE POINT
- CATCHMENT BOUNDARY
- WATERCOURSES
- WATERCOURSE/DRAINAGE CROSSING
- G8 MTO CULVERT/CROSSING ID
- 103/12.0HA CATCHMENT ID

