



5 Existing Conditions

This section describes the existing conditions in the study area related to the natural, cultural, socio-economic, and transportation environments for the Preferred Stage 2 ION route.

5.1 Natural Heritage

The Natural Heritage Report, available in **Appendix B1**, documents the results of the natural heritage investigation including data collection and analysis, field investigations, impact assessment and identification of mitigation measures.

The following sub-sections describe the existing conditions in the study area related to natural environment features, including: physiography, bedrock and surficial geology; fish and fish habitat; vegetation and vegetation communities; wildlife and wildlife habitat; designated natural areas; fluvial geomorphology; water resources; and, groundwater and contaminated soils.

5.1.1 Physiography, Bedrock and Surficial Geology

A secondary source investigation was undertaken to identify physiography, bedrock and surficial geology and soils within the study area. The study area lies within the Waterloo Hills and Guelph Drumlin Field physiographic regions. The Waterloo Hills is characterized by Chapman and Putnam (1984) as sandy hills, including ridges of sandy till and other kames. Fine sand is prevalent within the region, and the soils are well drained. The Guelph Drumlin Field is characterized by loamy and calcareous till, containing fragments of underlying red shale. The till throughout the region is stony with large surface boulders in some locations. There are numerous interconnecting cross-valleys between drumlins, with sand and gravel terraces and swampy bottoms. Bedrock geology comprises the Guelph Bedrock Formation that is middle Silurian in age and comprised of brown or tan dolostone.

The soils found in the study area are primarily Burford – Fox, a gently sloping loamy sand. Other soils found within the study area include Brant – Waterloo, a gently sloping loam; Grand – Kirkland, a level loam; Guelph, a gently sloping loam; Farmington, a level sandy loam; and Freeport – Woolwich, a gently sloping sand over loam. All of the soils in the study area have good drainage.

5.1.2 Fish and Fish Habitat

A secondary source investigation and field surveys were carried out to characterize fisheries and aquatic ecosystems within the study area. Electrofishing sampling was conducted on May 13, 2015 within watercourses where fisheries data was not available from secondary sources. Field investigations of aquatic habitat were also conducted on September 21 and October 10, 2018. The fish habitat along the Preferred Stage 2 ION right-of-way (ROW) was assessed approximately 50 m upstream and 100 m downstream of each watercourse feature, where applicable and accessible. An assessment of mussel habitat was also conducted as requested by agencies during this study. Visual mussel presence surveys were conducted on October 11, 2016 and



September 21, 2018. The purpose of these surveys was to document mussel habitat and record incidental observations of live mussels or relic shells present within the study area.

The study area lies within the Grand River watershed and, specifically, within the Middle Grand River Reach, Speed River Sub-basin Sub-watershed and the Mill Creek Sub-watershed. The Grand River watershed is managed by the GRCA and the MNRF Guelph District Office. **Figures 5-1 to 5-12** present the location of the watercourses and aquatic habitat within the study area, which are described further below.

(1) Tributary of the Grand River (Hidden Valley watercourse - 'North Creek')

This watercourse originates on the immediate north side of King Street East and eventually flows into the Grand River, through the Hidden Valley area. This creek supports a warmwater thermal regime. Generally, morphology is dominated by 85% flats, 10% pools and 5% riffles. Riparian habitat consists of cultural thicket, including Staghorn Sumac (*Rhus typhina*), Hawthorn (*Crataegus spp.*), Crack Willow (*Salix fragilis*), Alternate-leaved Dogwood (*Cornus alternifolia*) and juniper (*Juniperus spp.*), growing along the banks, before opening up to a Reed Canary Grass (*Phalaris arundinacea*) and Cattail dominant wetland. The electrofishing sampling conducted by LGL in May 2015 yielded no catch in the reach upstream of Highway 8. As such, this watercourse is classified as permanent, indirect fish habitat.

(2) Tributary of the Grand River (Hofstetter Creek)

The Hofstetter Creek is another tributary of the Grand River which drains an area known as the Hofstetter Basin. The creek flows through a 1.5 m wide open footed culvert under River Road and Highway 8. The channel downstream of Highway 8 is ditched, with placed rip-rap along the banks within approximately 8m downstream of the culvert. Vegetation adjacent to the stream is dominated by ash and poplar, with cattail dominant further upstream within the marsh, and Phragmites dominating the wetland further west. No fish were observed within Hofstetter Creek during aquatic habitat surveys conducted for this project. This stream was previously sampled in 2004 and no fish were captured (LGL 2014). The gradient of the slope along the Grand River is considered a barrier to upstream fish and mussel movement. Fisheries and Oceans Canada (DFO) and Ministry of Natural Resources and Forestry (MNRF) databases do not identify any species at risk in Hofstetter Creek.

(3) Grand River

The Stage 2 ION LRT crossing will be located immediately downstream of the existing Highway 8 bridges. The channel is slow moving and represents flat/pool morphology through this reach. Along the south bank of the river, a wider littoral zone exists and is vegetated with milfoil, pond lily, sedges, bur-marigold and floating algae, extending mostly within approximately 10 m of the shore. Along the north bank of the river, a steeply forested slope exists comprised of mostly deciduous growth (willow species, maple, oak, Eastern White Cedar), with Manitoba Maple, Basswood and buckthorn growing on the upper slope.



The Grand River, within the vicinity of the proposed right-of-way (ROW) (CN Rail Bridge north of King Street) is habitat for two fish species at risk; Silver Shiner (*Notropis photogenis*) and Black Redhorse (*Moxostoma duquesnei*). Both species are designated as Threatened and regulated under the Ontario *Endangered Species Act* (ESA). Under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), these two species are also designated as Threatened and listed on Schedule 1 of SARA. In addition, two mussel SAR: Wavy-rayed Lampmussel (*Lampsilis fasciola*) and Rainbow Mussel (*Villosa iris*) are both known to occur within the Grand River within the vicinity of the proposed route. Wavy-rayed Lampmussel is regulated as a Threatened species under the ESA and Rainbow Mussel receives protection under both the ESA and SARA as an Endangered Species, listed on Schedule 1. The Grand River at this location is also designated as “critical habitat” for Rainbow Mussel (DFO 2019).

(4) Tributary of the Grand River (Freeport Creek)

Freeport Creek originates in a large wetland complex flowing through several culverts (at the CP Rail corridor, King Street East, and Highway 8) and has been channelized within the reach immediately downstream of Highway 8. This creek was investigated around King Street as well as within the reach downstream of Highway 8 where the Stage 2 ION LRT will cross the creek. Riparian vegetation within this reach is comprised of grasses and herbaceous species (Reed Canary Grass, Giant Ragweed, asters, goldenrod and bindweed).







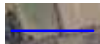







Although the creek is highly altered (channelized) and crossed by several structures, it appears to be providing good quality warm/coolwater fish habitat within the reach fished (460 m upstream of the proposed LRT crossing). Electrofishing surveys were conducted upstream of King Street East and the species captured included: Brook Stickleback (*Culaea inconstans*), White Sucker (*Catostomus commersonii*), Creek Chub, Central Mudminnow (*Umbra limi*) and Rosyface Shiner (*Notropis rubellus*). DFO Aquatic SAR mapping identified Wavy-Rayed Lampmussel and Rainbow Mussel within Freeport Creek.

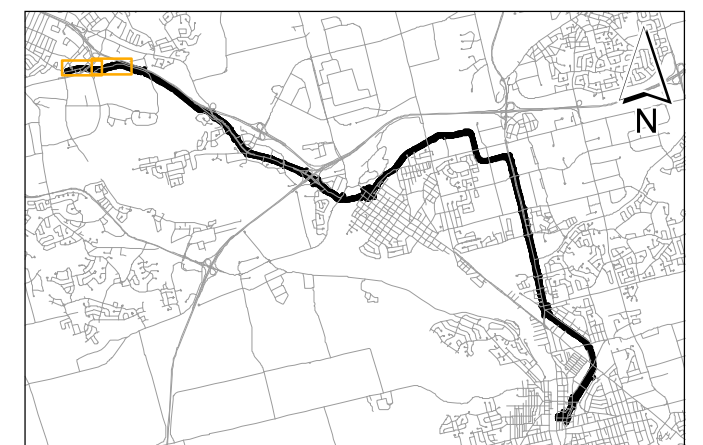
(5) Speed River at Shantz Hill Road

The Stage 2 ION LRT crossing of the Speed River is naturalized and no road crossing currently exists at this location. Along the north bank, existing commercial use (gas station, office and parking lot) exists, with low density residential housing present along the downstream reach. Morphology through the upstream reach is dominated by riffles, while the proposed crossing area is comprised of a deep flat/pool morphology. This bank appears to have been used as a dumping ground in the past. Instream vegetation/cover is comprised of submergent vegetation (pondweed), Yellow Pond Lily, floating algae and woody debris, mostly along the east bank. Riparian vegetation is comprised of mostly Crack Willow, Black Locust, Black Walnut, buckthorn, dogwood, raspberry, Giant Ragweed and Bur-Marigold. The Speed River is habitat to a diverse warm/coolwater fish community and a warmwater thermal regime (Land Information Ontario, 2019) with two fish Silver Shiner (*Notropis photogenis*) and Black Redhorse (*Moxostoma duquesnei*) (LGL, 2009, 2015), in addition to the Wavy-Rayed Lampmussel (*Lampsilis fasciola*) (DFO 2019).



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-  Capture  No Capture
- Aquatic Resource Area Summary Thermal Regime (LIO)**
-  Cold
-  Warm
-  Match Line



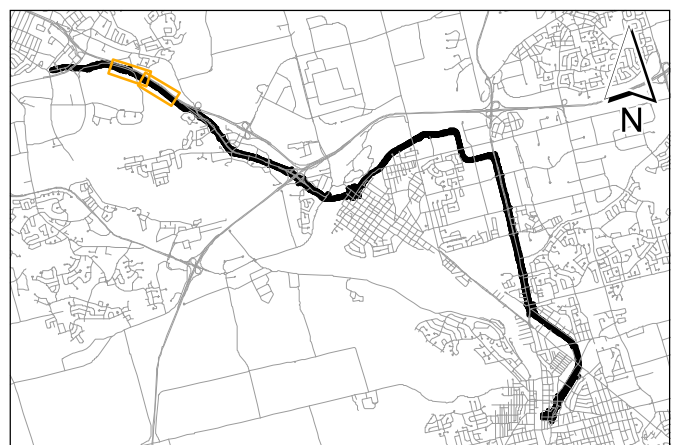
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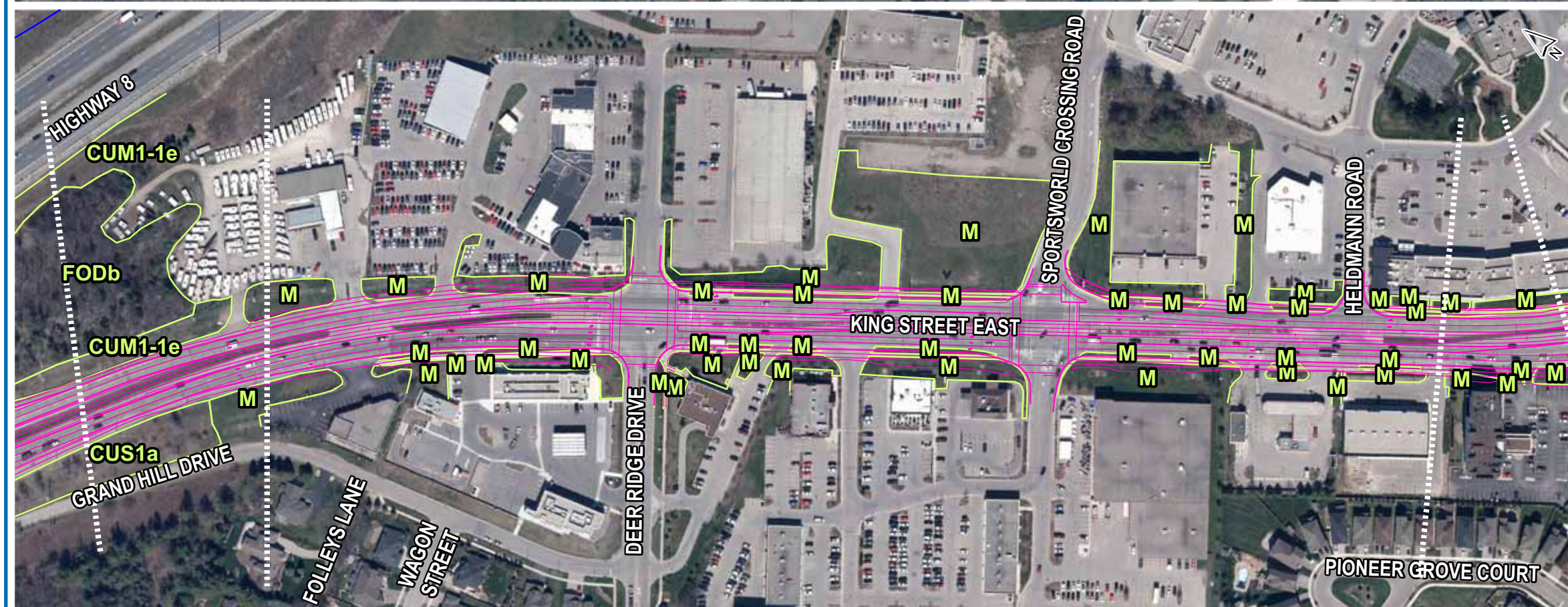
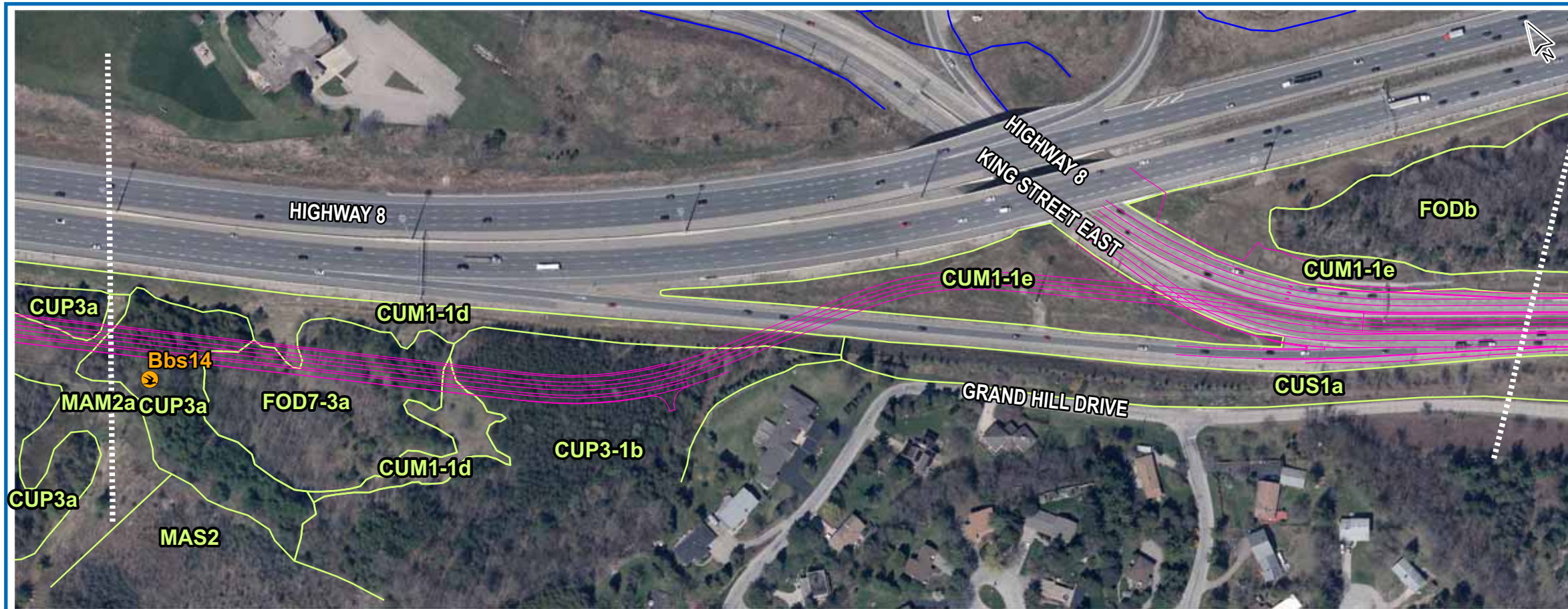
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





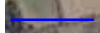









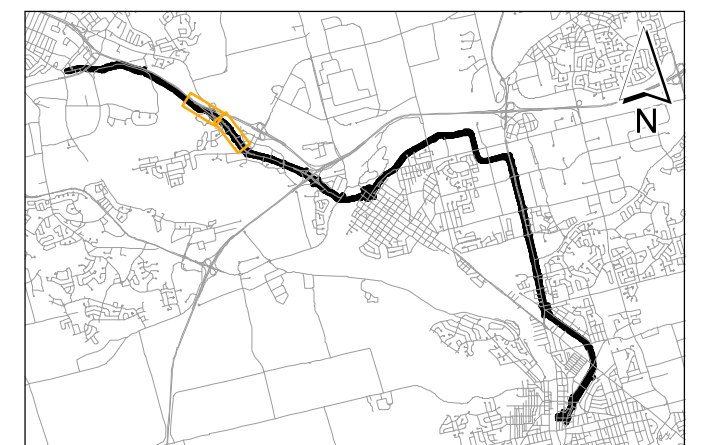
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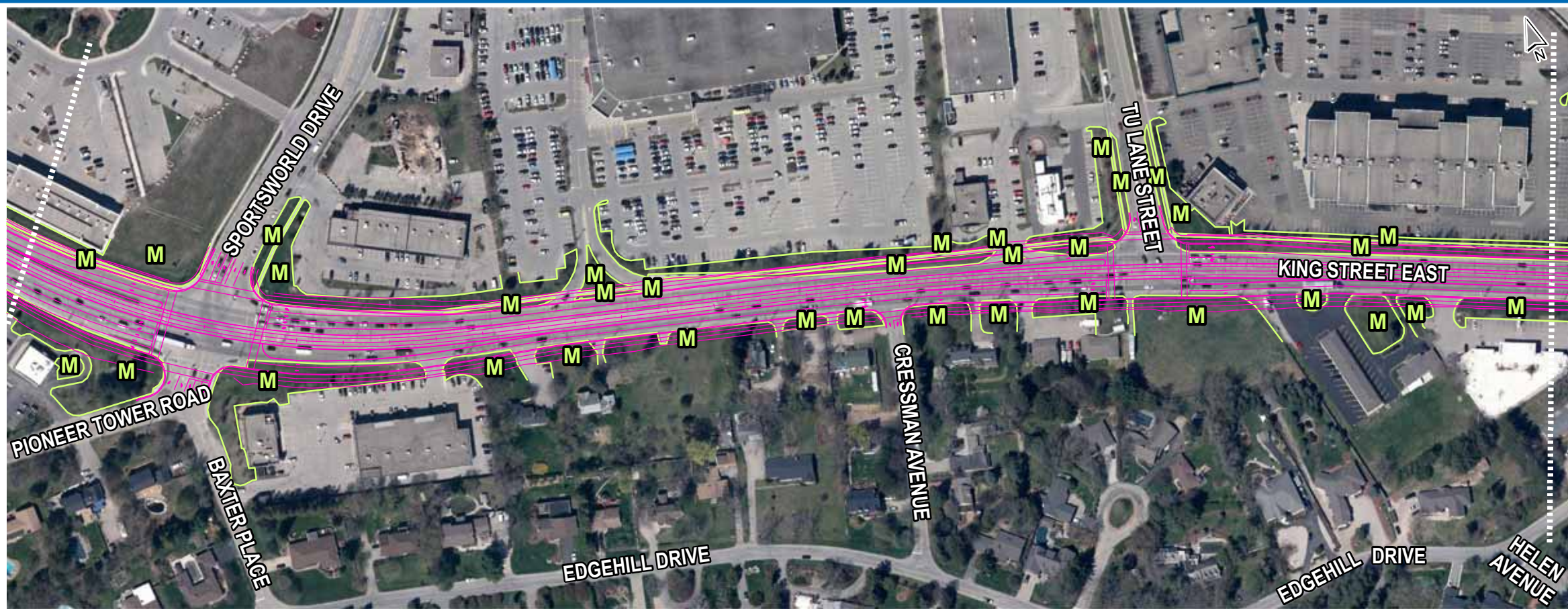
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















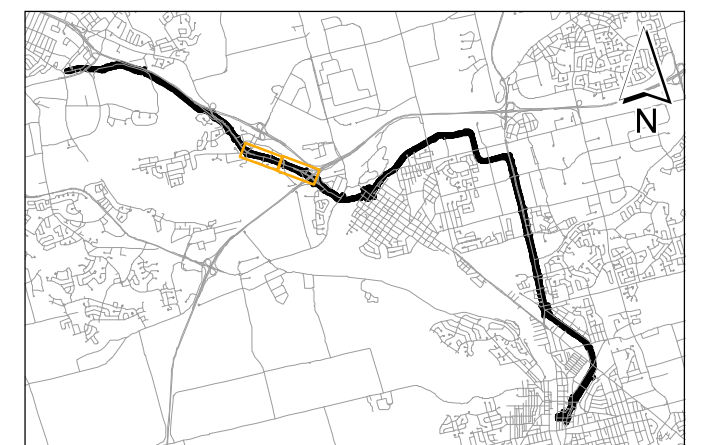
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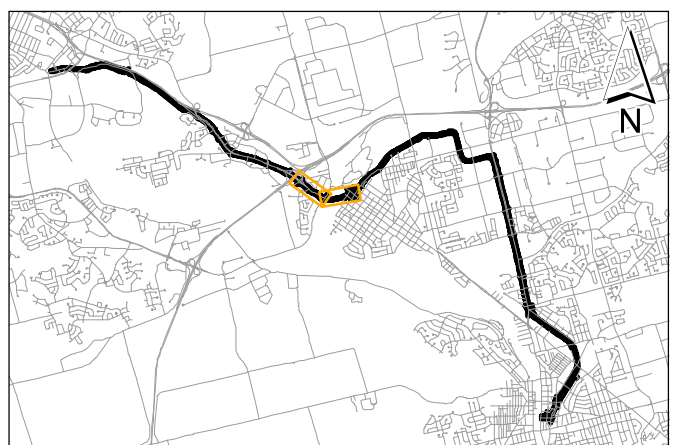
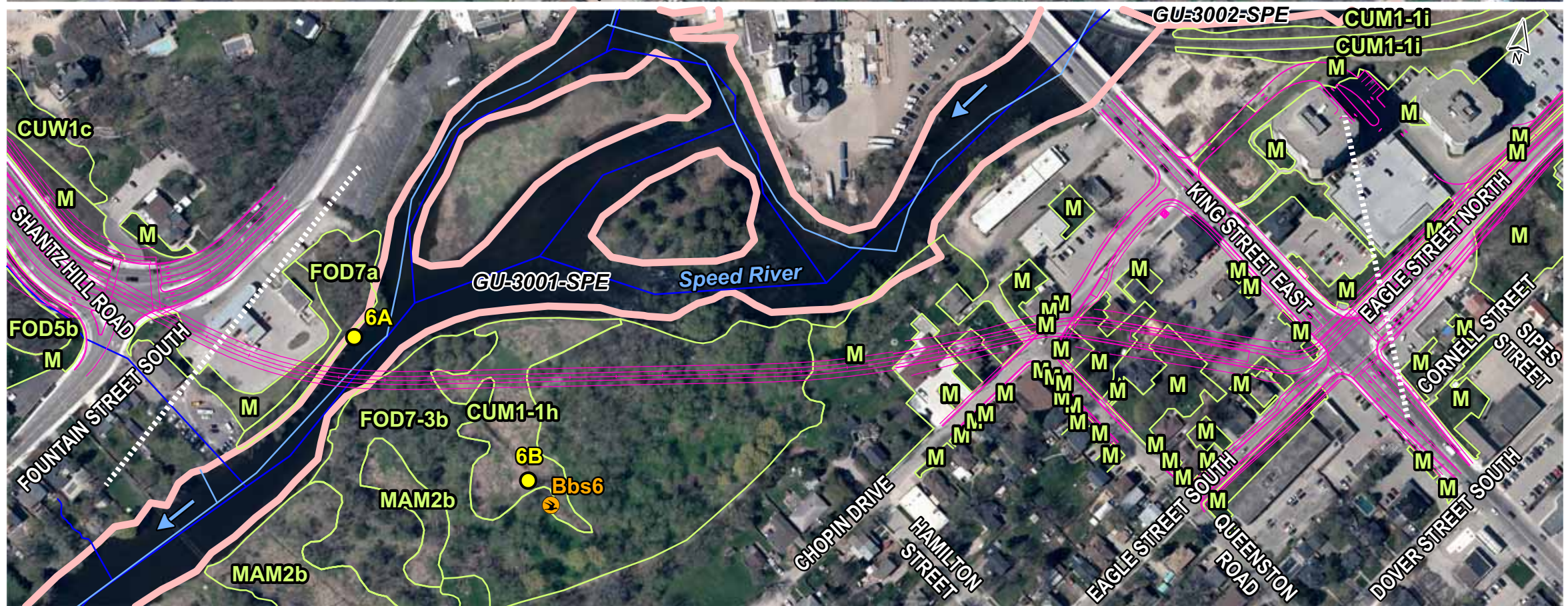
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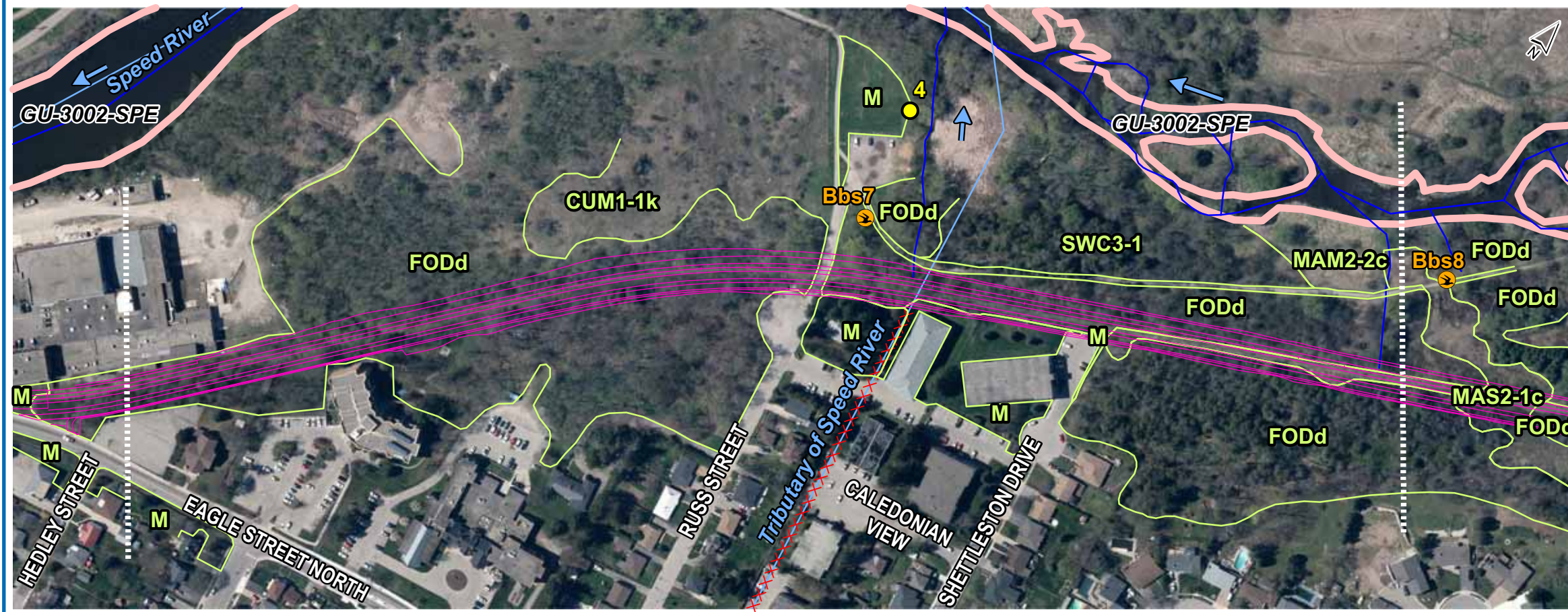
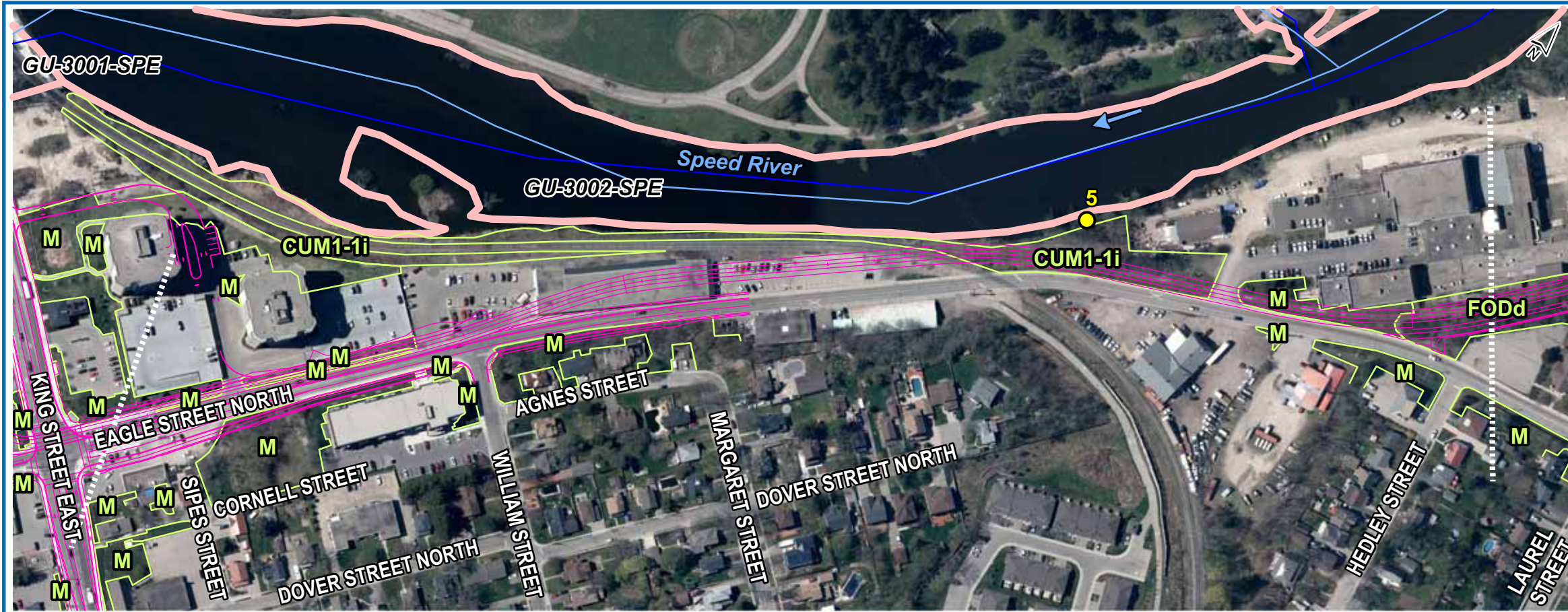
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















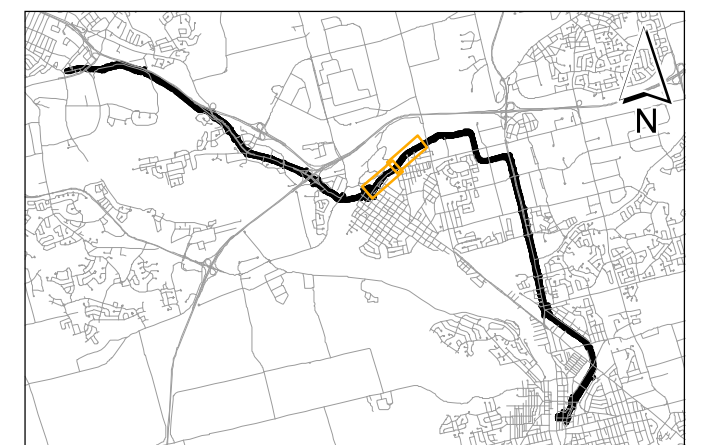
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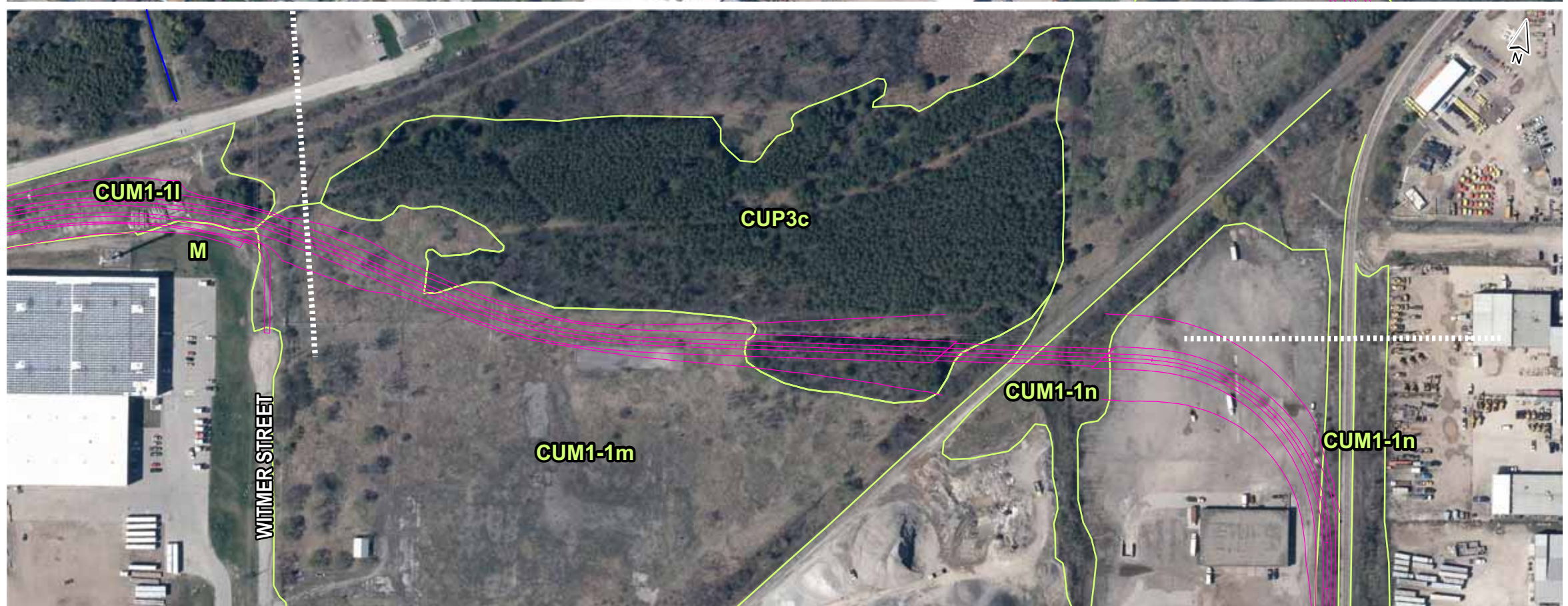
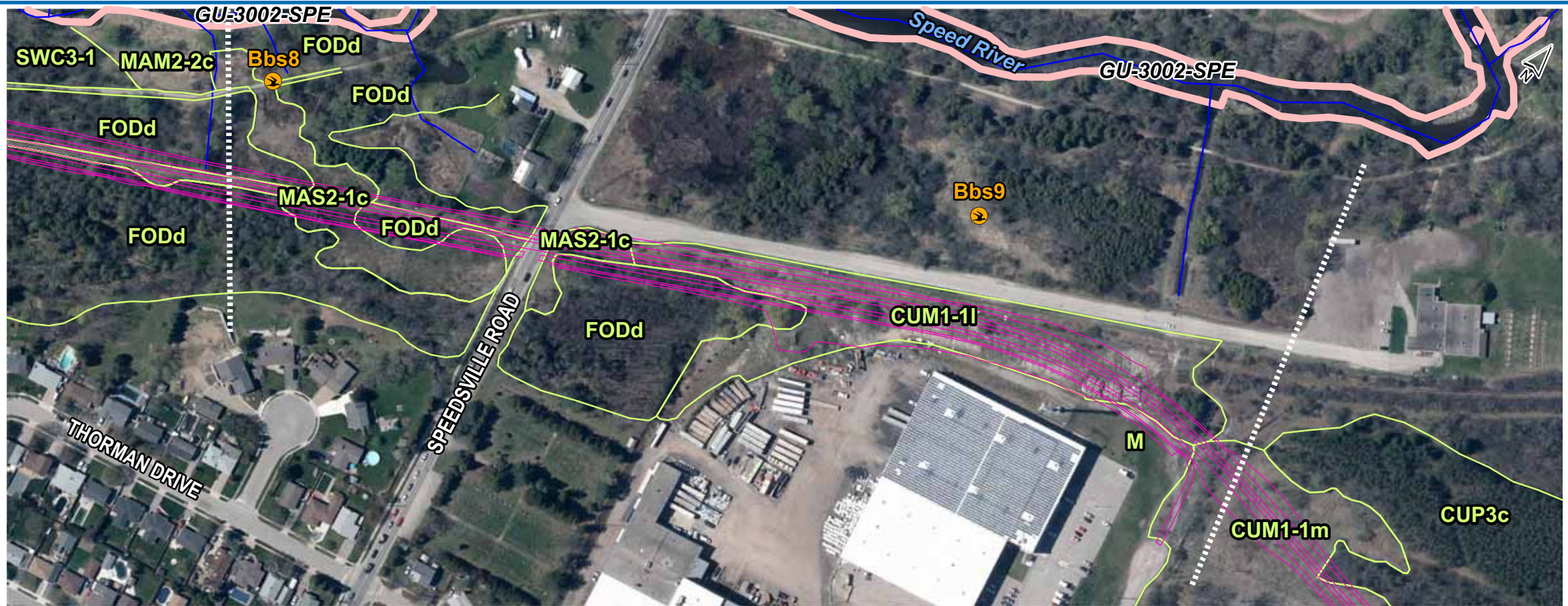
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





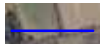









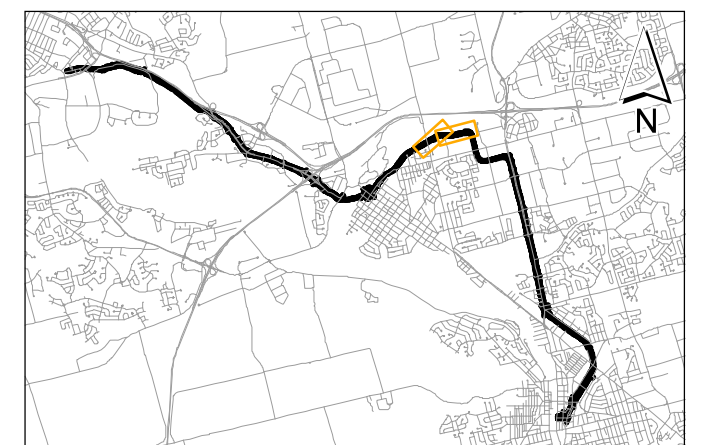
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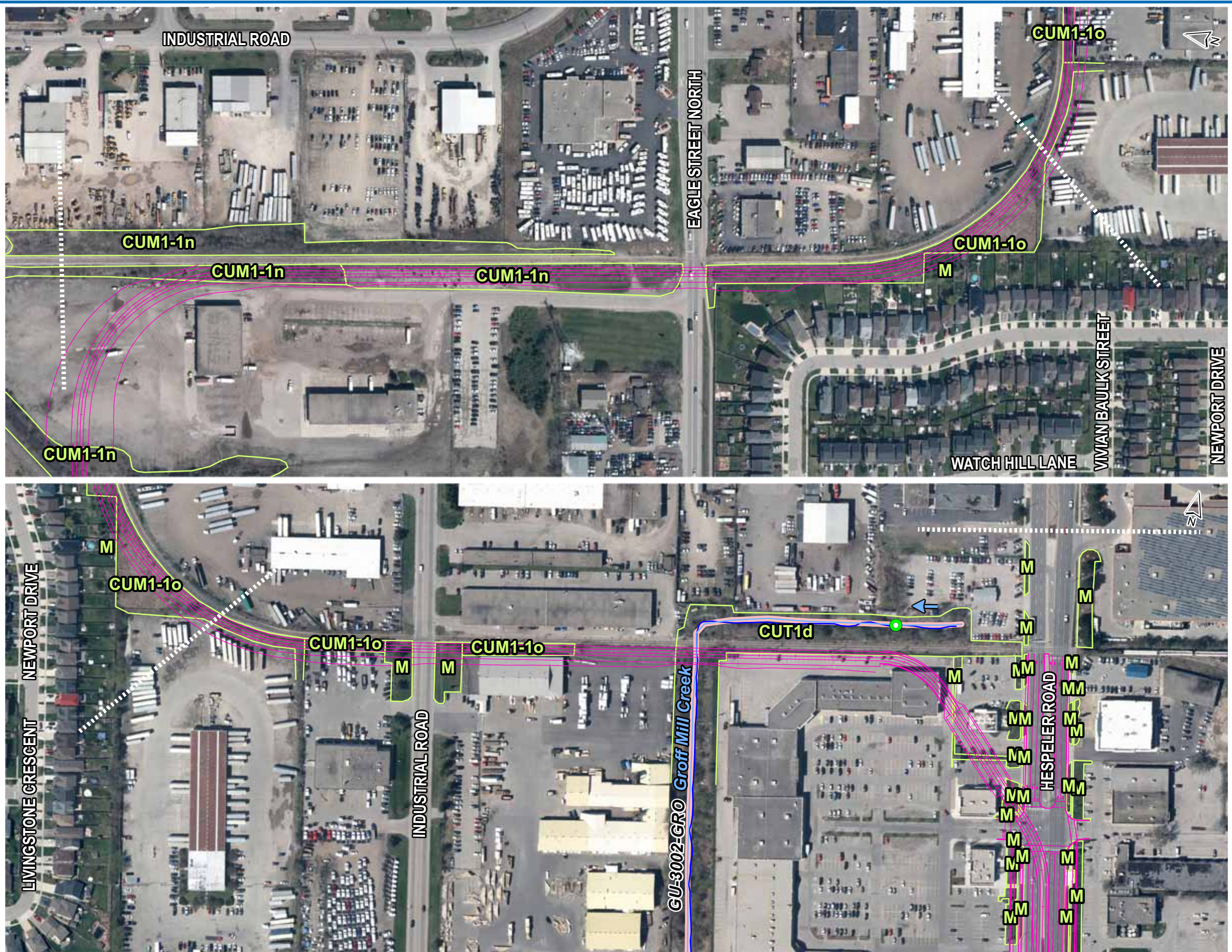
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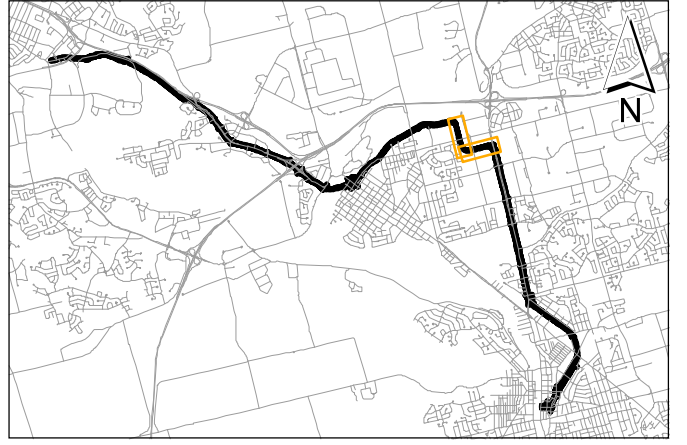
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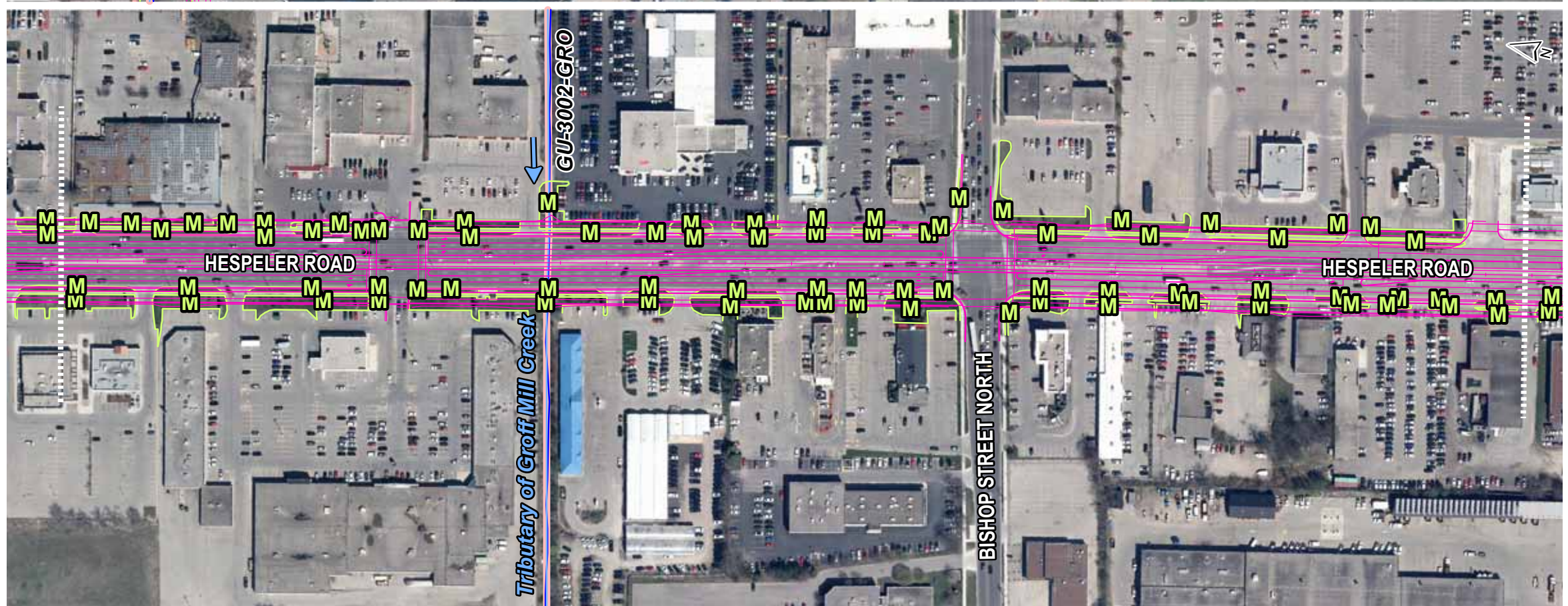
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- Preferred Alignment
- Amphibian Monitoring Stations
- Bird Survey Locations (2020)
- Ecological Land Classification Communities Boundary
- * See Appendix C-1 - Natural Heritage Report for Ecological Land Classification
- Watercourse (LIO) Watercourse (GRCA)
- Watercourse Flow Direction
- Reach with No Surface Feature Present
- Fisheries Sampling Stations**
- Capture No Capture
- Aquatic Resource Area Summary Thermal Regime (LIO)**
- Cold
- Warm
- Match Line



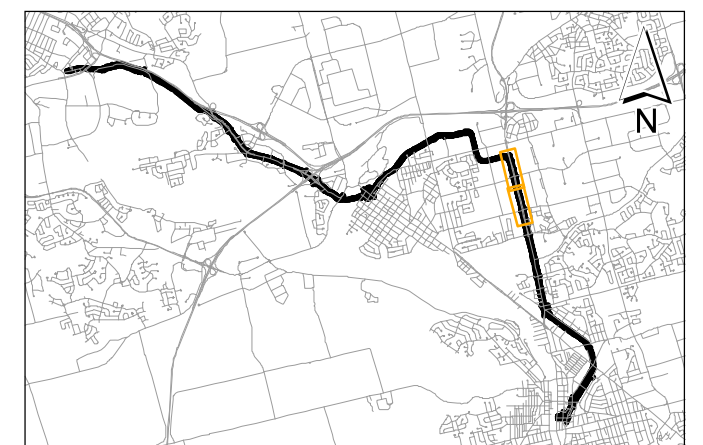
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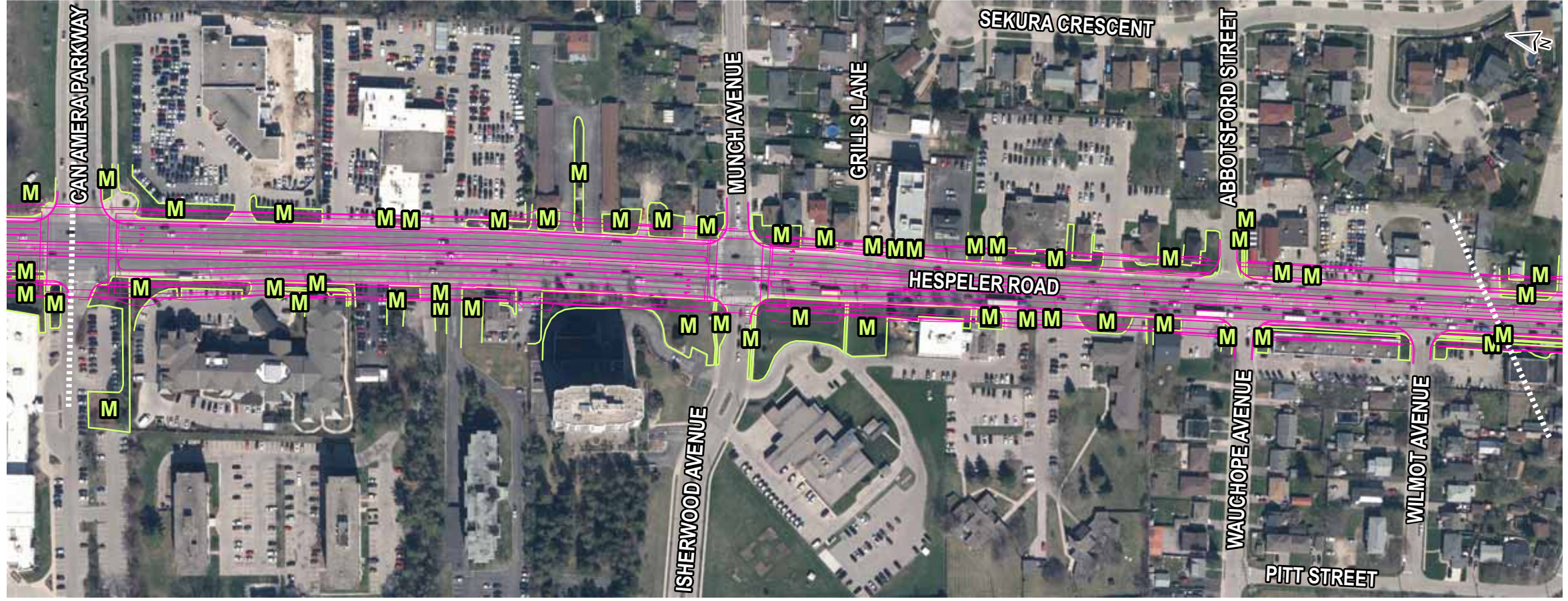
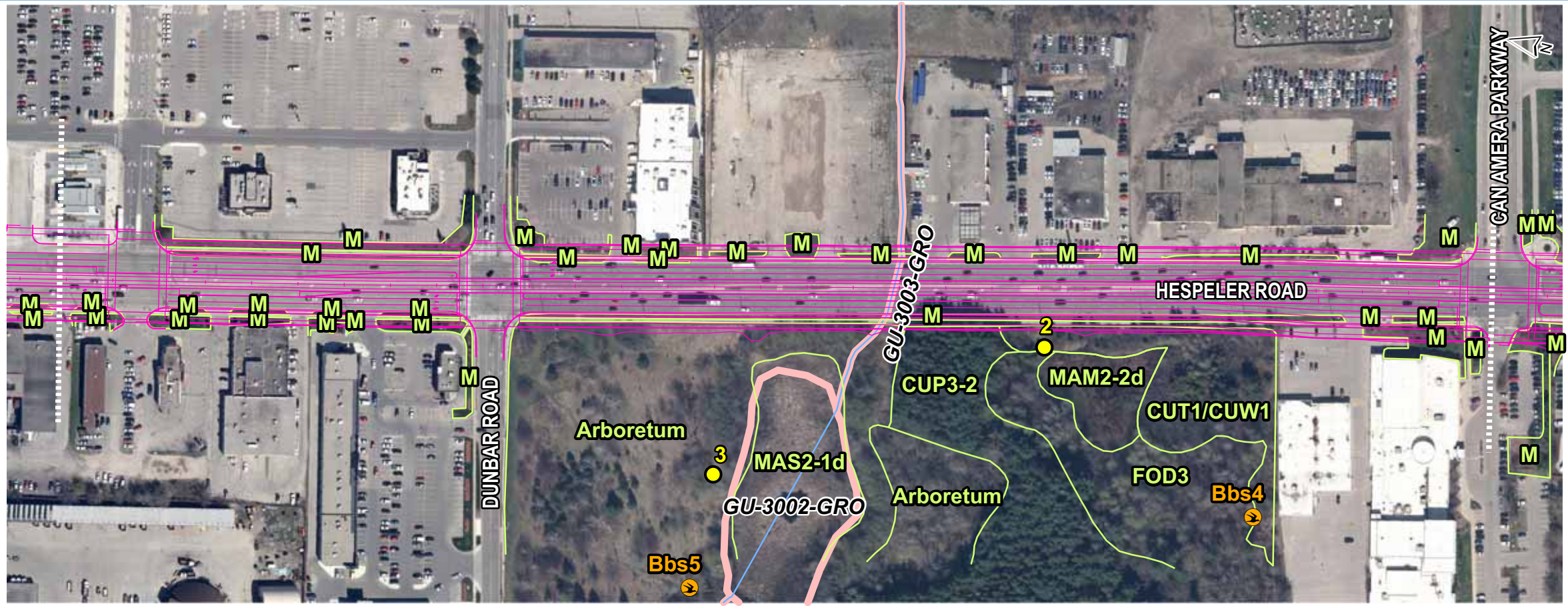
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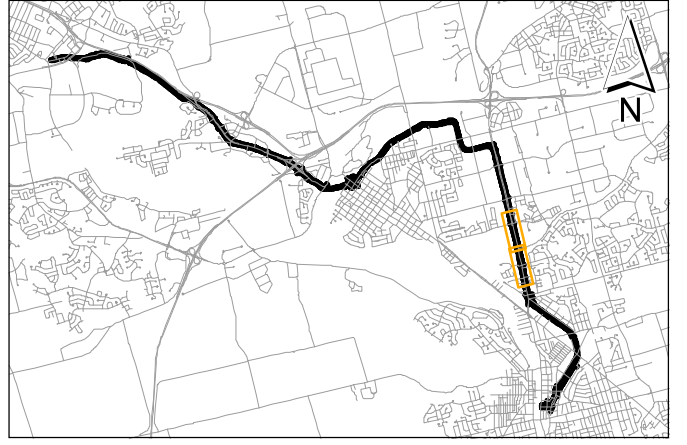
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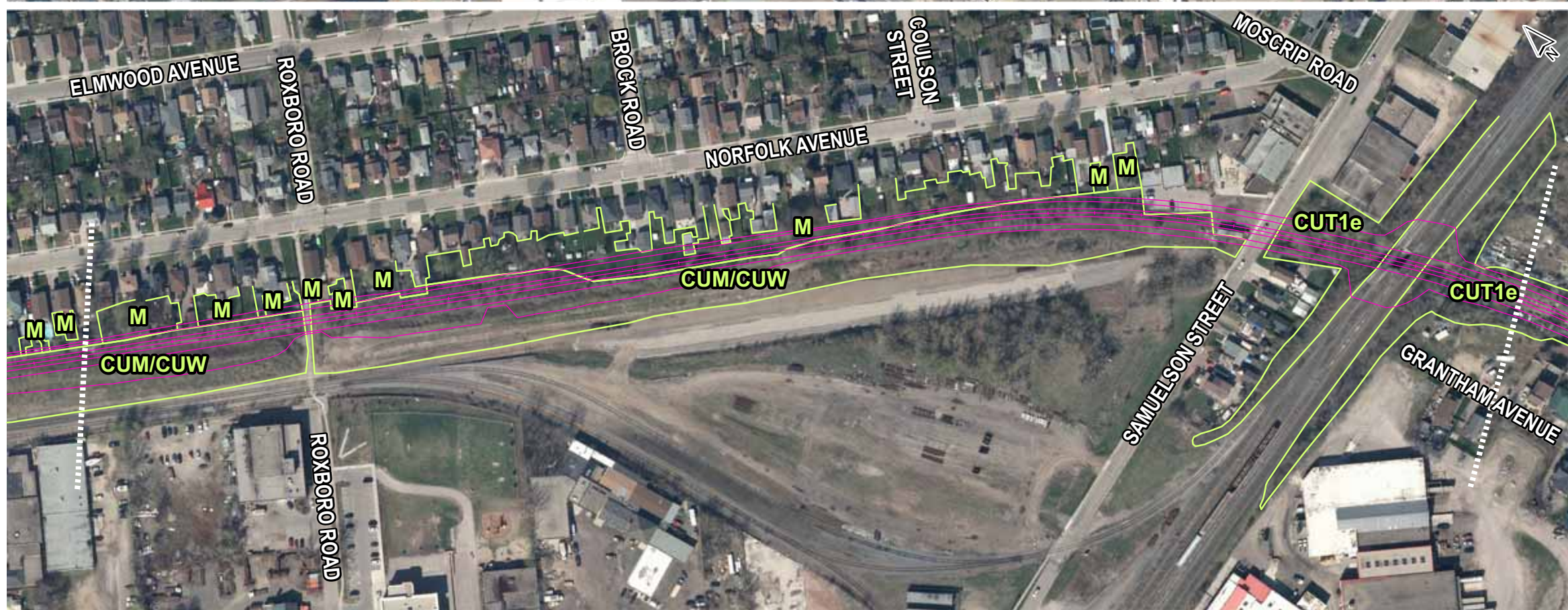
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















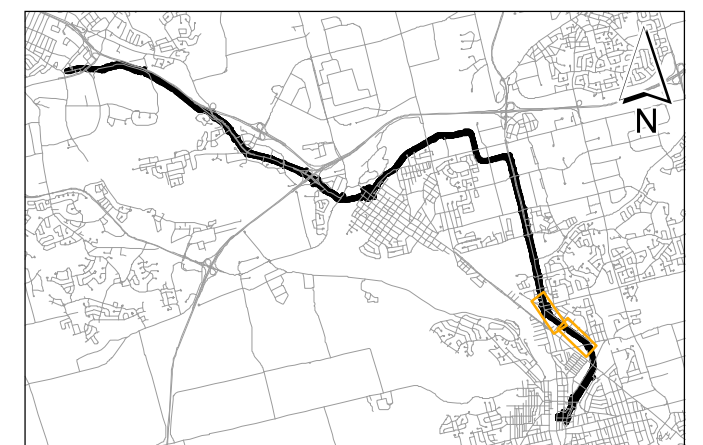
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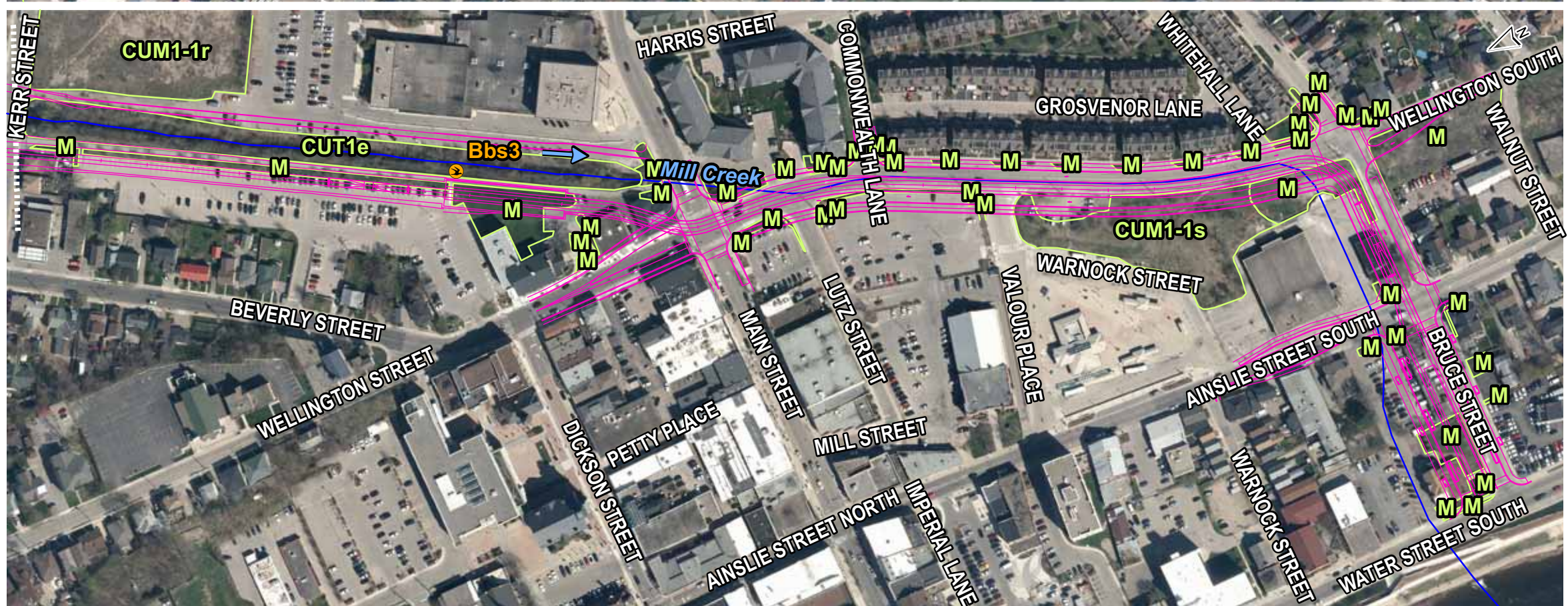
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-  Amphibian Monitoring Stations
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-  Ecological Land Classification Communities Boundary
-  CUM/# * See Appendix C-1 - Natural Heritage Report for Ecological Land Classification
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-  Reach with No Surface Feature Present
- Fisheries Sampling Stations**
-  Capture  No Capture
- Aquatic Resource Area Summary Thermal Regime (LIO)**
-  Cold
-  Warm
-  Match Line






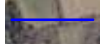









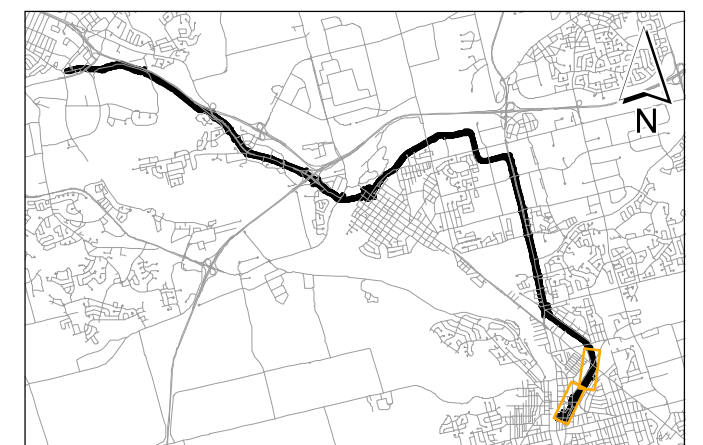
Data Sources: LGL Limited field investigations, Ministry of Natural Resources and Forestry, Region of Waterloo, Grand River Conservation Authority.





LEGEND

-  Preferred Alignment
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-  Bird Survey Locations (2020)
-  Ecological Land Classification Communities Boundary
- CUM#-#** * See Appendix C-1 - Natural Heritage Report for Ecological Land Classification
-  Watercourse (LIO)  Watercourse (GRCA)
-  Watercourse Flow Direction
-  Reach with No Surface Feature Present
- Fisheries Sampling Stations**
-  Capture  No Capture
- Aquatic Resource Area Summary Thermal Regime (LIO)**
-  Cold
-  Warm
-  Match Line



Data Sources: LGL Limited field investigations, Ministry of Natural Resources and Forestry, Region of Waterloo, Grand River Conservation Authority.



(6) Speed River-Eagle Street

Land use in the area is urban in character, with high rise condominiums located on the south side of the river, near the King Street East and Eagle Street intersection, as well as some commercial land use farther upstream, along this shoreline and low density residential downstream of King Street. The proposed Stage 2 ION LRT will travel parallel to Eagle Street and cross the existing CP Rail line, immediately north of the existing CP Rail/Eagle Street crossing. Along the south side of the river, the CP Rail railway lies within close proximity to the shoreline, located at the top of bank, to a maximum of approximately 12 m from the wetted edge of the river. Overhanging cover is generally fairly limited, due to the presence of the adjacent CP Rail line.

Further downstream, wetland species line the banks. Substrates along the vegetated shoreline are comprised mostly of silt and muck, with abundant submergent vegetation present, dominated by Canada Waterweed, pondweed and milfoil species as well as some pond lily. Floating algae is also abundant. The wetland vegetation is dominated by Reed Canary Grass, in addition to cattail, Skunk Cabbage and Yellow Flag Iris. Some overhanging woody vegetation is present upstream of the proposed ION Crossing, mostly by overhanging willow. Riparian species present along the south side of the river includes willow, raspberry, honeysuckle, dogwood, Viburnum species, young poplar and Virginia Creeper.

At the time of the spring assessment (May 2015), schools of minnows and pinhead (young of year) were observed in several locations along both banks of the Speed River. One juvenile Smallmouth Bass was observed near the upstream end of reach, along the south shoreline. Carp were actively spawning in the reach along the southern shoreline, within the vicinity of the cattail vegetation. A local fisherman indicated that carp, bass and pike fishing is popular within this reach.

(7) Tributary of the Speed River (At Russ Street Park)

This tributary appears to surface immediately downstream of a pedestrian trail (within the vicinity of the Stage 2 ION LRT crossing). Substrates within the channel are comprised of mostly sand, with some boulder sections. Iron floc and watercress is abundant within the channel, which may indicate some groundwater influence. Overall, the channel appears to suffer from storm sewer inputs, given the prevalence of eroded banks and anthropogenic debris present within the channel. This channel is confirmed to support direct fish habitat. Baitfish (minnow species) were observed within this channel during an October 11, 2016 survey. No SAR have been identified within this tributary of the Speed River.

(8) Groff Mill Creek

This watercourse originates from a corrugated steel pipe (CSP) approximately 40 m west of the route (Hespeler Road). From air photo interpretation, no watercourse occurs upstream of this point and flow is likely resulting from stormwater/surface runoff. This channel appears to experience very rapid fluctuations in flow during rain events as erosion was abundant at the culvert outlet. Background review indicated the fish community within this watercourse is comprised of tolerant, warmwater fish species in



the vicinity of Dumfries Conservation Area (GRCA, 2004) and supports a warmwater thermal regime (Land Information Ontario, 2019). Electrofishing sampling was conducted in May 2015 and fish were not captured within this watercourse. Based on the observed conditions, it is likely that this watercourse supports indirect fish habitat within the reach assessed, near Hespeler Road.

(9) Tributary of Groff Mill Creek

A tributary of Groff Mill Creek crosses Hespeler Road approximately 230 m north of Bishop Street. The channel was mostly dry, with the exception of a section of standing water within the culvert during the May 2015 site investigation. This creek crosses Hespeler Road via a concrete box culvert indicating it is highly affected by urbanization and likely experiences flashy flows during periods of extended precipitation. The channel is incised and flows through mostly heavy riparian cover consisting of shrubs and grasses. Due to the channel being dry during the spring site investigation, this channel flows ephemerally and provides fish habitat indirectly to the downstream fish community in Groff Mill Creek of tolerant, warmwater fish species (GRCA, 2004).

(10) Mill Creek

Mill Creek is a tributary of the Grand River, originating northeast of Aberfoyle. Groundwater contributions to this stream are high downstream of Aberfoyle where the Paris and Galt Moraines contribute groundwater to the system. This creek flows through Shades Mill Reservoir and Dam, which largely controls low flows downstream through Cambridge to the outlet with the Grand River north of Bruce Street. Mill Creek continues to support a coldwater thermal regime through Cambridge, based on the ARA database results (Land Information Ontario, 2019). Riparian vegetation provides approximately 30 percent cover mostly by Willow trees, Manitoba Maple and Red-osier Dogwood and the banks are very steep. Downstream of Main Street, flow is piped via a concrete box culvert below Wellington Street and across City owned property north of Bruce Street to the outlet to the Grand River.

5.1.3 Aquatic Species at Risk

Based upon a review of the MNR Natural Heritage Information Centre – Biodiversity Explorer on-line database, GRCA, MNR and DFO SAR mapping, Sampling Data collected during this study and correspondence with the Guelph District MNR, several Aquatic SAR are known to occur within the study area. Fish SAR, Silver Shiner (*Notropis photogenis*) and Black Redhorse (*Moxostoma duquesnei*), both regulated as “Threatened” under the Ontario *Endangered Species Act (2007)* are known to occur within the study area within both the Grand River and Speed River. These species are not regulated under the federal *Species at Risk Act (2002)*.

Mussel SAR, Wavy-rayed Lampmussel (*Lampsilis fasciola*) and Rainbow Mussel (*Villosa iris*), are both known to occur within the study area. Wavy-rayed Lampmussel is known to inhabit reaches of the Speed River from the Riverside Park Dam downstream to the Grand River confluence as well as the Grand River. The Rainbow Mussel is known to occur in the Grand River within the vicinity of the Highway 8 crossing and Critical Habitat is mapped for this species within this reach. Both species are regulated as “Threatened” under the Ontario *Endangered Species Act (2007)*. In addition, the



Rainbow Mussel is also listed as “Endangered” and is afforded protection under Schedule 1 of the federal *Species at Risk Act* (2002).

5.1.4 Terrestrial Vegetation and Vegetation Communities

The geographical extent, composition, structure and function of vegetation communities were identified through air photo interpretation and field investigations. Air photos were interpreted to determine the limits and characteristics of vegetation communities. Multiple field investigations of the vegetation communities within and adjacent to the alignment of the Stage 2 ION LRT were conducted. These investigations included a multi-season vegetation survey. Vegetation communities were classified according to the Ecological Land Classification for Southern Ontario: First Approximation and Its Application (Lee et al. 1998).

Vegetation communities within the study area consist of a mixture of forest, wetland and cultural communities. Vegetation communities are also presented in **Figures 5-1 to 5-12**. The majority of the vegetation within the study area has been disturbed by existing land uses including agricultural, residential, and infrastructure. Cultural vegetation communities typically persist in areas that are regularly disturbed, and as a result, generally contain a high proportion of invasive and non-native plant species that are disturbance tolerant. Natural/semi-natural features within the study area are generally restricted to the valleylands associated with the watercourses in the study area. These areas are generally of higher quality and contain a high proportion of specialized and native plant species.

A total of twenty-five ecosites were identified within the study area. These communities include: Dry Moist Old Field Meadow (CUM1-1), Mineral Cultural Savannah (CUS1), Mineral Cultural Thicket (CUT1), Mineral Cultural Woodland (CUW1), Coniferous Plantation (CUP3-1, CUP3-2, CUP3-3, and CUP3), Coniferous Forest (FOC3-1 and FOC4-1), Deciduous Forest (FOD3, FOD5, FOD7-3, FOD7, FOD8-1, and FOD), Meadow Marsh (MAM2-2, MAM2-5, and MAM2), Shallow Marsh (MAS2, MAS21), Coniferous Swamp (SWC3-1), Deciduous Swamp (SWD2-2), Mixed Swamp (SWM1-1), and Swamp Thicket (SWT2-2).

There are several areas that are not identified by the ELC such as areas of manicured grass which include mown lawns, gardens and planted trees, and hedgerows which include trees that have been planted or that have been maintained for the purposes of preserving windbreaks between agricultural fields and screens between residential units and local roadways. All the vegetation communities within the study area are considered widespread and common in Ontario and are secure globally.

(1) Flora

A total of 305 plant species have been recorded within the study area; refer to the Natural Heritage Report in **Appendix B1** for a complete list. Nine of these plants could only be identified to genus and are not included in the following calculations.

Of the 296 plants identified to species, 185 (63%) plant species identified are native to Ontario and 111 (37%) plant species are considered introduced and non-native to Ontario.



A total of six plant species identified within the study area are considered rare in the Region of Waterloo, such as: Wild Parsnip, Northern Bugleweed, Giant Hyssop, Flat-topped White Aster, Jerusalem Artichoke and Rose Sedge.

(2) Species at Risk

One plant species regulated under the Ontario *Endangered Species Act* (2007) was identified during botanical investigations. One butternut (*Juglans cinerea*) was identified on the south side of Shantz Hill Road and Fountain Street South. Butternut is regulated as Endangered under the Ontario *Endangered Species Act* (2007).

(3) Designated Natural Areas

Designated natural areas include areas that have been identified for protection by the MNRF, GRCA, Region of Waterloo, City of Cambridge or City of Kitchener. The limits of designated natural areas located within the study area are presented in **Figures 5-13 to 5-16**.

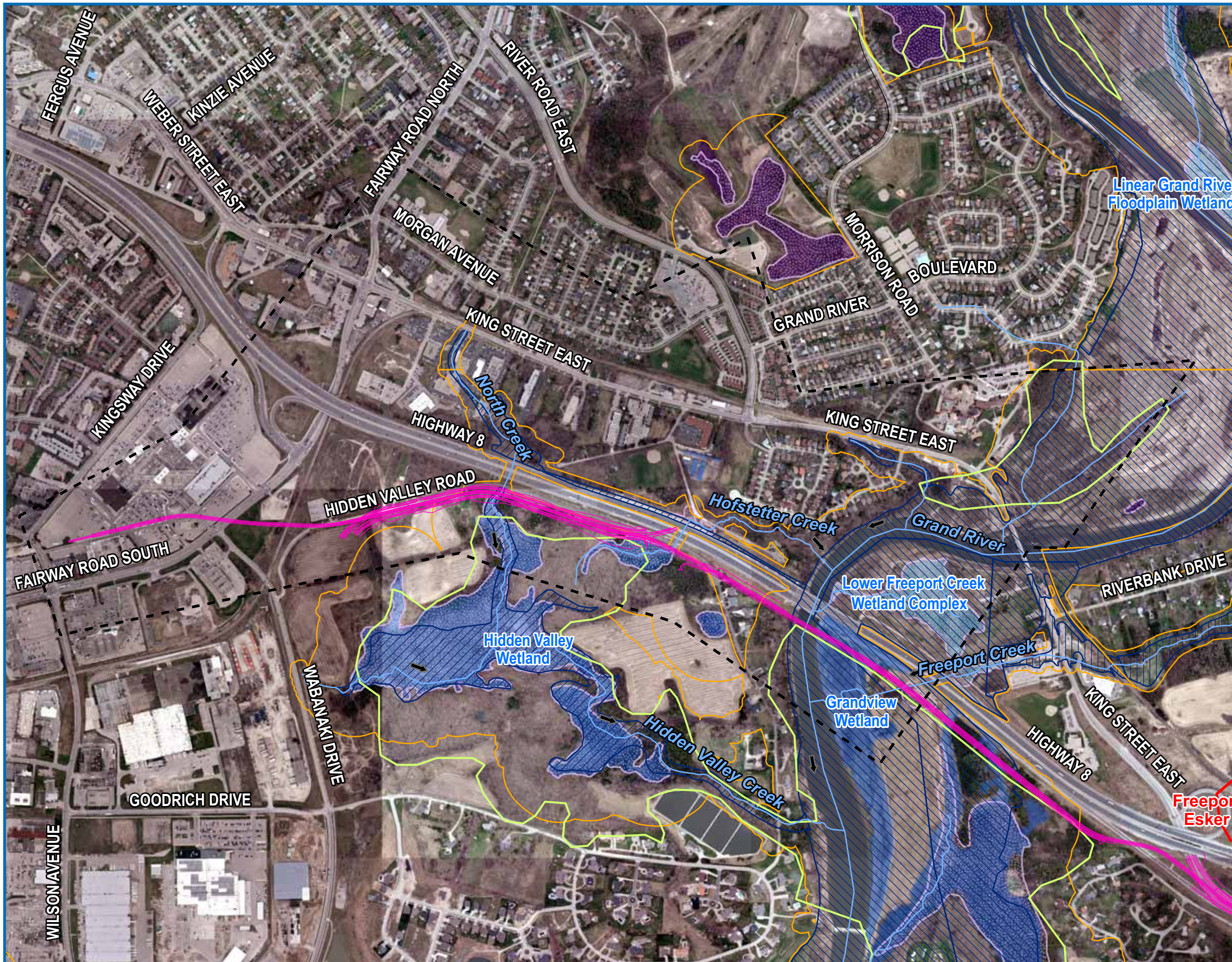
There are three provincially significant wetlands (PSWs) located in the study area including:

- » Hidden Valley Wetland;
- » Grandview Wetland; and
- » Speed River Wetland.













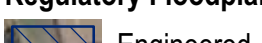
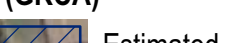

The Hidden Valley PSW is located south of Highway 8, west of the Grand River and north of Hidden Valley Road. The Grandview PSW is located south of Highway 8 and immediately east of the Grand River within the Grand River valleylands. The Speed River PSW is located south of Highway 401 between Speedsville Road and Fountain Street North along the Speed River valleylands.

Two Environmentally Sensitive Policy Areas (ESPA) are identified by the Region of Waterloo and are located within the study area – ESPA #27 Hidden Valley and ESPA #37 Grandview Woods.

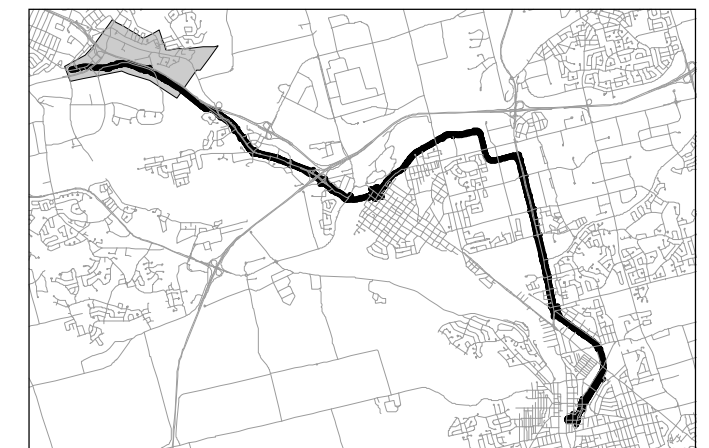
One Conservation Area, Dumfries Conservation Area, totaling approximately 75 ha, is located in the City of Cambridge on the west side of Hespeler Road, south of Dunbar Road.



LEGEND

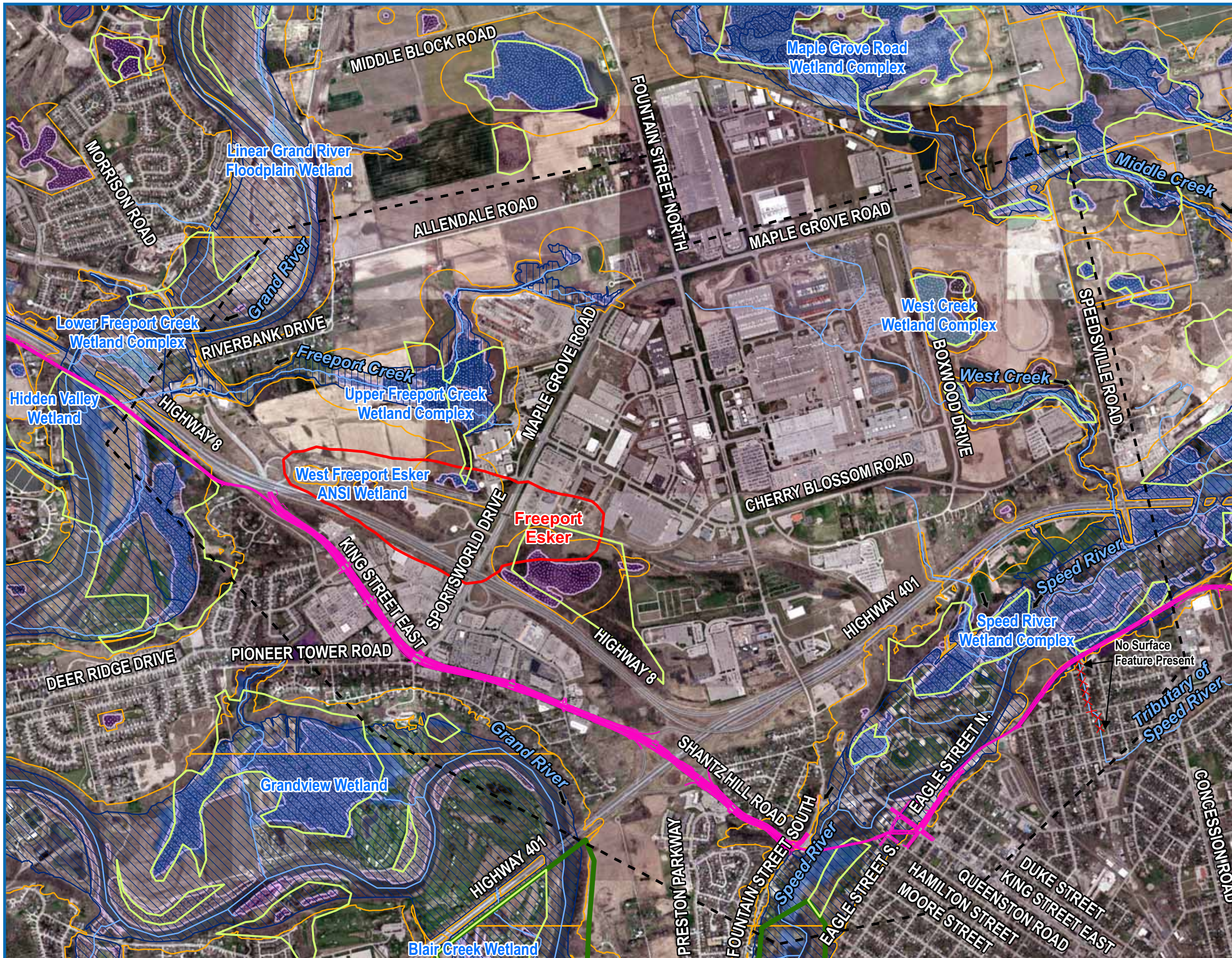
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-  Study Area
-  Area of Natural and Scientific Interest
-  *Core Environmental Features
-  Environmentally Significant Landscape
-  Watercourse
-  Watercourse Flow Direction
- Wetlands (LIO)**
-  Evaluated-Provincial
-  Evaluated-Other
-  Not evaluated per OWES
-  Wetland (GRCA)
-  Regulation Limit (GRCA)
- Regulatory Floodplain (GRCA)**
-  Engineered
-  Estimated
-  Approximate

* Core Environmental Features include: Environmentally Sensitive Policy Areas, Regional Forests, Forests greater than 4 ha, and Significant Valley Features.






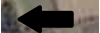


Data Sources: Ministry of Natural Resources and Forestry, Region of Waterloo, Grand River Conservation Authority.








LEGEND

-  Preferred Alignment (August 2019)
-  Study Area
-  Area of Natural and Scientific Interest
-  *Core Environmental Features
-  Environmentally Significant Landscape
-  Watercourse
-  Watercourse Flow Direction




Wetlands (LIO)

-  Evaluated-Provincial
-  Evaluated-Other
-  Not evaluated per OWES

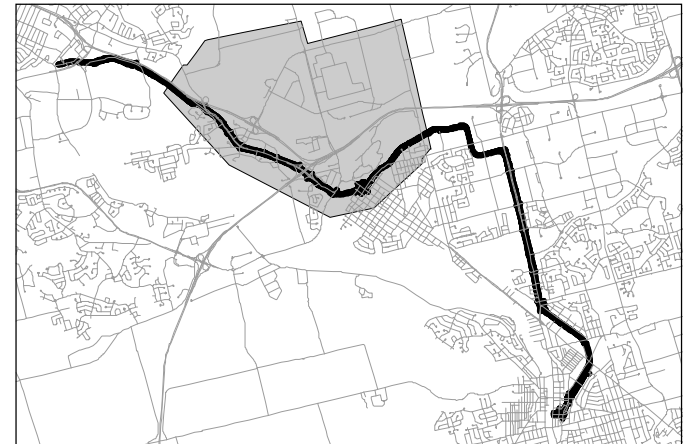
Wetland (GRCA)

-  Wetland (GRCA)
-  Regulation Limit (GRCA)

Regulatory Floodplain (GRCA)

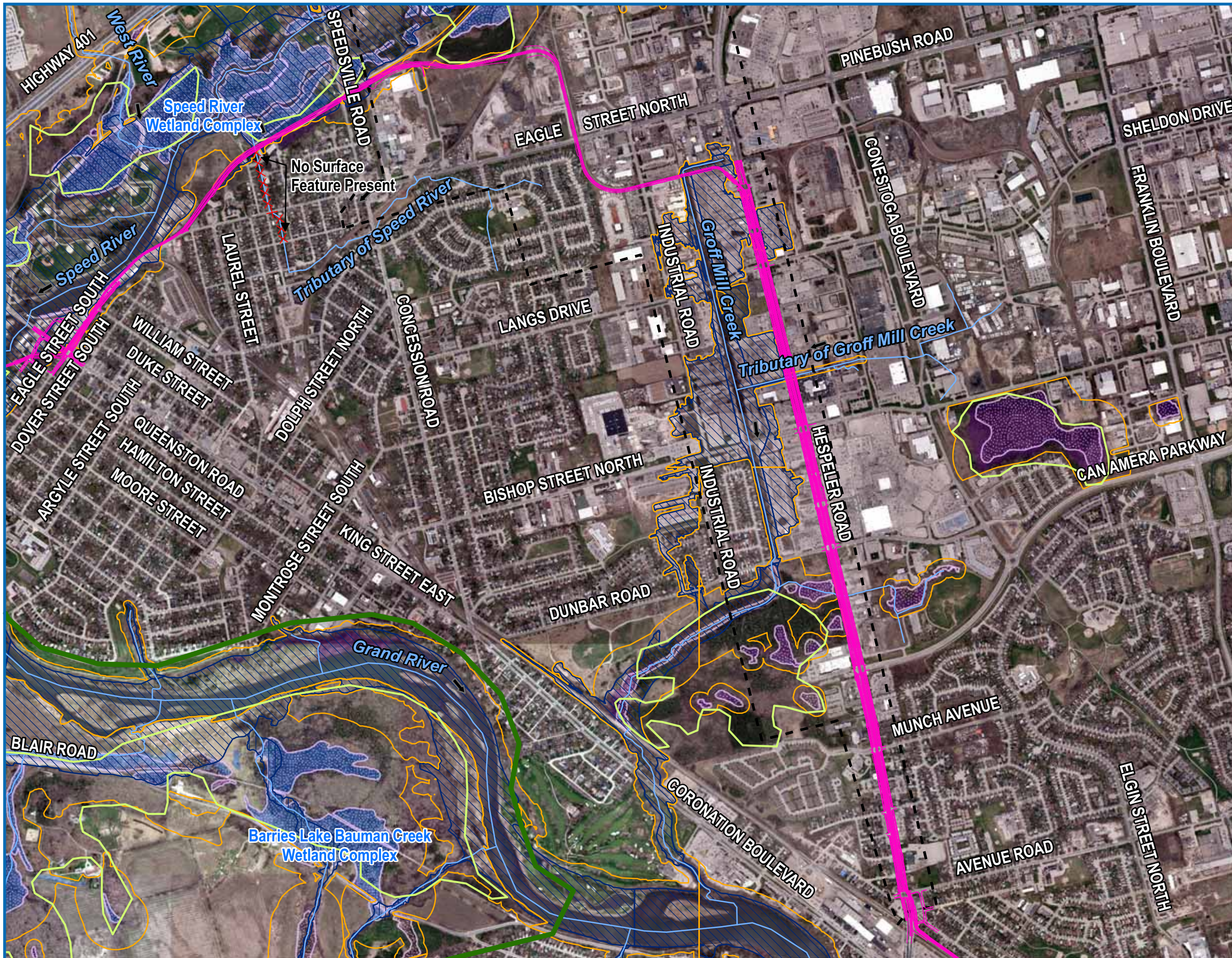
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-  Estimated
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
















Data Sources: Ministry of Natural Resources and Forestry, Region of Waterloo, Grand River Conservation Authority.

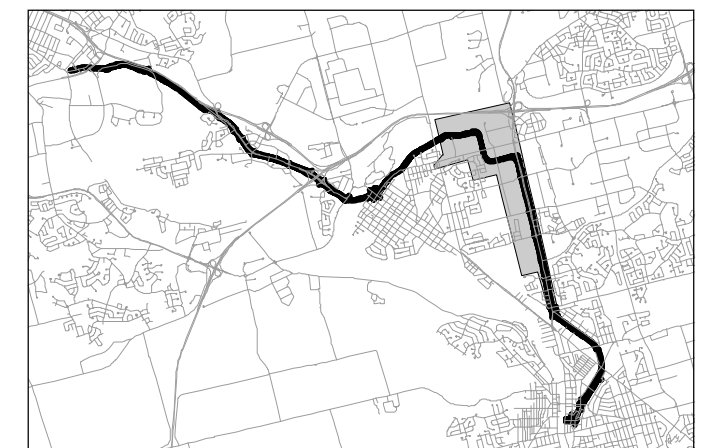




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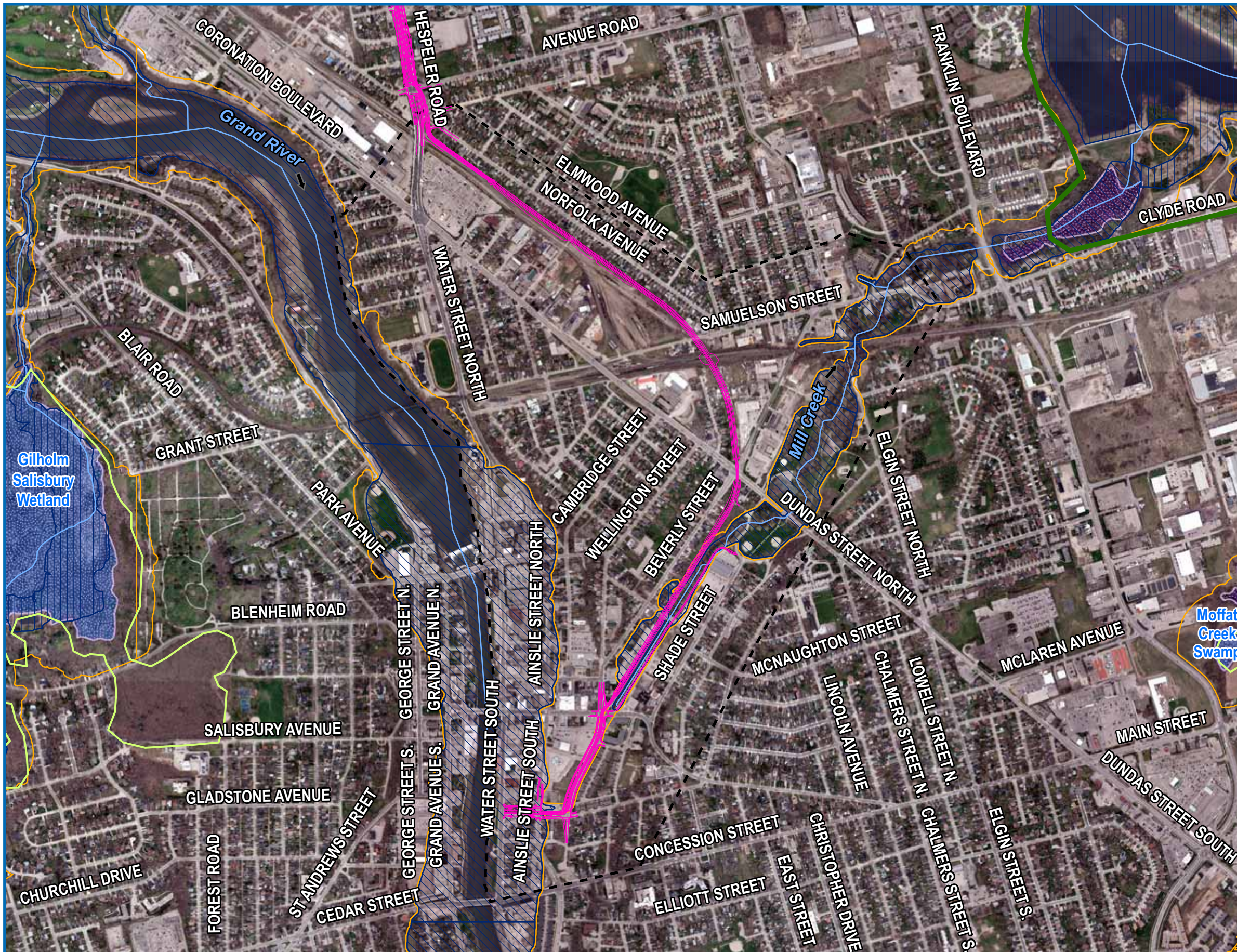
-  Preferred Alignment (August 2019)
-  Study Area
-  Area of Natural and Scientific Interest
-  *Core Environmental Features
-  Environmentally Significant Landscape
-  Watercourse
-  Watercourse Flow Direction
- Wetlands (LIO)**
-  Evaluated-Provincial
-  Evaluated-Other
-  Not evaluated per OWES
-  Wetland (GRCA)
-  Regulation Limit (GRCA)
- Regulatory Floodplain (GRCA)**
-  Engineered
-  Estimated
-  Approximate

* Core Environmental Features include: Environmentally Sensitive Policy Areas, Regional Forests, Forests greater than 4 ha, and Significant Valley Features.



Data Sources: Ministry of Natural Resources and Forestry, Region of Waterloo, Grand River Conservation Authority.





LEGEND

- Preferred Alignment (August 2019)
- Study Area
- Area of Natural and Scientific Interest
- *Core Environmental Features
- Environmentally Significant Landscape
- Watercourse Watercourse Flow Direction

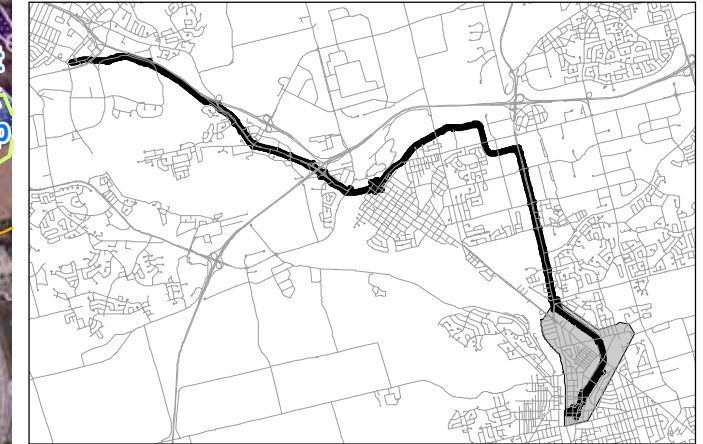
Wetlands (LIO)

- Evaluated-Provincial
- Evaluated-Other
- Not evaluated per OWES
- Wetland (GRCA)
- Regulation Limit (GRCA)

Regulatory Floodplain (GRCA)

- Engineered Estimated
- Approximate

* Core Environmental Features include: Environmentally Sensitive Policy Areas, Regional Forests, Forests greater than 4 ha, and Significant Valley Features.



Data Sources: Ministry of Natural Resources and Forestry, Region of Waterloo, Grand River Conservation Authority.



5.1.5 Wildlife and Wildlife Habitat

Secondary source investigation and field surveys were carried out to characterize wildlife and wildlife habitat within the study area. Fieldwork was undertaken during June and July 2014, April through July 2015, and April through June 2019. A total of 93 wildlife species were recorded within and immediately adjacent to the study corridor during these surveys. Specific surveys were conducted for anurans (frogs and toads) and breeding birds, and observations of all wildlife species were recorded during each survey. No specialized surveys for mammals were undertaken. The entire corridor of the Stage 2 ION LRT route was reviewed, however detailed wildlife fieldwork was conducted only in areas with natural heritage features (e.g., fields, woods, rivers) and not in areas that were predominantly developed. A list of wildlife species recorded during these surveys can be found in the Natural Heritage Report in **Appendix B1**.

There are a variety of vegetation communities within the study area, from cultural meadows and cultural woodlands, forests and marsh, to cropland and heavily developed commercial and residential areas. The study corridor also crosses both the Grand River and Speed River. The section from Fairway Road to the Speed River contains wildlife habitat with higher capability. Where the proposed route follows Eagle Street North and Hespeler Road, the wildlife habitat has lower capability except at the Dumfries Conservation Area, where comparatively high capability habitat for wildlife is found. The proposed LRT corridor is long and narrow, thus the area of wildlife habitat within the study corridor in any one location is small.

Several species of birds were widespread and recorded at most locations along the study area. Bird species that were recorded throughout the study area include Northern Cardinal, Blue Jay, Song Sparrow, American Goldfinch, Red-winged Blackbird, Black-capped Chickadee and American Robin. Other commonly encountered species include Rose-breasted Grosbeak, Mourning Dove, American Crow, Chipping Sparrow, Baltimore Oriole, Gray Catbird, Red-eyed Vireo, European Starling, Common Grackle, and House Sparrow.

Species of birds and mammals that were encountered in cultural meadow, cultural thicket, and cultural woodland habitats included Killdeer, Mourning Dove, Eastern Kingbird, Warbling Vireo, House Wren, American Robin, Gray Catbird, European Starling, Cedar Waxwing, Yellow Warbler, Chipping Sparrow, Field Sparrow, Savannah Sparrow, Song Sparrow, Northern Cardinal, Indigo Bunting, Redwinged Blackbird, Common Grackle, Brown-headed Cowbird, American Goldfinch, Coyote, Northern Raccoon, and White-tailed Deer. Species recorded in forests include Northern Flicker, Eastern Wood-Pewee, Great Crested Flycatcher, Red-eyed Vireo, Blue Jay, Wood Thrush, Pine Warbler, and Rose-breasted Grosbeak.

Few species of reptiles were found; four in total, including two species of turtles near the Speed River and two species of snakes found in drier areas. Seven species of amphibians were found, five of which were heard calling during anuran surveys. These included Blue-spotted Salamander, American Toad, Gray Treefrog, Spring Peeper, Wood Frog, Northern Leopard Frog and Green Frog. The wetlands in Dumfries Conservation Area supported several species of amphibians, and locations along the Speed River also supported a few amphibian species.



(1) Fauna

A total of 93 species of wildlife (reptiles, amphibians, birds, and mammals) were recorded within, or immediately adjacent to, the study area during field surveys. Four species of reptiles were found including two species of turtles near the Speed River and two species of snakes found in drier areas. Common Gartersnake and Dekay's Brownsnake were seen in drier habitats; both are abundant and widespread species in southern Ontario. Queensnake (*Regina septemvittata*) was not recorded during surveys but is known to occur locally along the Grand River within Waterloo Region (Rowell 2012). It is ranked Endangered in Canada under Schedule 1 of the federal *Species at Risk Act* (2002), and Endangered in Ontario under the provincial *Endangered Species Act* (2007).

Two turtle species were found along the Speed River, Midland Painted Turtle and Snapping Turtle, both are listed as species of special concern federally under COSEWIC and are protected under the *Fish and Wildlife Conservation Act* (FWCA, 1997). Three Snapping Turtle females were found digging nests on June 18, 2020 on the south side of the Speed River to the north of the proposed LRT route.

Amphibians were encountered primarily in wetland areas, as expected. Fieldwork was undertaken during June and July 2014, April through July 2015, and April through June 2019. During the anuran surveys, four species of frogs (Gray Treefrog, Green Frog, Spring Peeper, and Wood Frog) and one toad species (American Toad) were heard calling. Leopard Frog and Blue Spotted Salamander were encountered incidentally, so in total seven species of amphibians were encountered. The wetlands within the Dumfries Conservation Area where two of the anuran survey stations were located, supported the highest number of amphibian species and were the only locations with a high density of calling amphibians, indicating that these areas support large numbers of breeding amphibians.

Surveys for breeding birds followed the Ontario Breeding Bird Atlas protocol. Breeding bird surveys were completed in 2020 along the LRT alignment. The 68 species of birds recorded were likely breeding in the Region, and many perhaps near to the study area; few are expected to have been nesting within the narrow study corridor itself though. Nevertheless, all species (refer to list in **Appendix B1**) likely foraged within or adjacent to the study area. Bird surveys completed in 2020 confirmed breeding evidence for three species (Canada Goose, Baltimore Oriole, and European Starling), found probable breeding evidence (e.g. building nests, defending breeding territories) for 14 species, and possible breeding evidence (e.g. male singing, species observed in suitable breeding habitat) for another 14 species.

Many of these species are widespread and abundant in southern Ontario and the Region of Waterloo (Cadman et al. 2007). Seventeen species are ranked Regionally Significant within the Region of Waterloo; 53 are protected under the federal *Migratory Birds Convention Act* (MBCA, 1994), and an additional seven species are protected under Ontario's FWCA.

Fifteen species of mammals were recorded through evidence (e.g., tracks, scat) or direct observation. All are common and widespread species in southern Ontario. All but three of the species receive protection in Ontario under the FWCA.



(2) Species at Risk

A search of the Natural Heritage Information Centre (NHIC) database for records of wildlife SAR within or near the study area resulted in records for ten species. The most recent records for five of those species — Acadian Flycatcher (*Empidonax virescens*, 1974), Loggerhead Shrike (*Lanius ludovicianus*, 1935), Cerulean Warbler (*Setophaga cerulea*, 1900), Louisiana Waterthrush (*Parkesia motacilla*, 1953), and Henslow’s Sparrow (*Ammodramus henslowii*, 1948) — are considered historical and it is likely that these species no longer occur within the study area. There were also no eBird sightings for these five species within the past 10 years in the Cambridge and Kitchener area, and these were not detected during breeding bird surveys. The MNRG Guelph District has records of six wildlife SAR found within or near the study area – Jefferson’s Salamander, Snapping Turtle, Bald Eagle (*Haliaeetus leucocephalus*), Common Nighthawk (*Chordeiles minor*), Chimney Swift (*Chaetura pelagica*), and Eastern Meadowlark.

The NHIC and local MNRG sources list a combined total of eight SAR with recent records of occurrence in or near the study area. Of these, only two were documented during field surveys: Snapping Turtle and Chimney Swift. However, three additional SAR were recorded during fieldwork: Eastern Wood-Pewee, Barn Swallow, and Wood Thrush. Midland Painted Turtle was recently listed as a species of special concern by the COSEWIC and was encountered during field surveys. Thus, there are recent records for 12 wildlife SAR in or near the study area. **Table 5-1** summarizes the federal and Ontario conservation status rankings of these 12 species.

Table 5-1: Federal and Ontario Rankings of Species at Risk

Species	SARA	COSEWIC	ESA
Jefferson’s Salamander	END	END	END
Snapping Turtle	SC	SC	SC
Midland Painted Turtle	-	SC	SC
Eastern Ribbonsnake	SC	SC	SC
Queensnake	END	END	END
Bald Eagle	-	NAR	SC
Common Nighthawk	THR	SC	SC
Chimney Swift	THR	THR	THR
Eastern Wood-Pewee	SC	SC	SC
Bank Swallow	THR	THR	THR
Barn Swallow	THR	THR	THR
Wood Thrush	THR	THR	SC
Eastern Meadowlark	THR	THR	THR

END – Endangered; SC – Special Concern; NAR – Not at Risk; THR – Threatened



5.1.6 Fluvial Geomorphology

The Stage 2 ION LRT route crosses the Grand River, Speed River, and Freeport Creek, a tributary to the Grand River. A Fluvial Geomorphic Assessment was conducted in 2020 to evaluate the route; refer to **Appendix B2**. A background review was undertaken to build on the current understanding of the watersheds and site characteristics that may influence the preferred crossing locations. The review was also completed to identify any disturbances to the watercourses that may have impacted channel dynamics. Existing conditions summarized below were based on field data and observations collected on December 2 and 3, 2015.

The Stage 2 ION LRT crosses the Grand River in Kitchener parallel to Highway 8 on the south (downstream) side. The Grand River figures large-amplitude sinuosity throughout the study reach as a result of being an alluvial channel with a low longitudinal gradient. At the bend upstream of the proposed crossing, valley wall contact was observed on the left bank along the outside bend, with erosion along the toe of slope and bank slumping/failure. At the bend downstream of the CP Rail and King Street crossings, valley wall contact is present on the right bank with minimal erosion. Bankfull widths through the reach ranged from 64 to 122 m, with wetted widths between 55 m and 112 m. Banks comprised coarse-fine sands, silt and clay, with grasses, and shrubs.

The Stage 2 ION LRT crosses Freeport Creek near its confluence with the Grand River parallel and downstream to Highway 8. The Freeport Creek reach was assessed from the confluence of the Grand River to King Street East on December 3, 2015 and was found to have low to moderate sinuosity. Bankfull widths ranged from 1.2 to 2.0 m, with bankfull depths of 0.5 m. Wetted widths ranged from 0.63 to 0.85 m, with wetted depths of 0.11 to 0.21 m. Bed materials included medium-sand deposits, exposed clay, and cobble substrate.

The Stage 2 ION LRT extends easterly on a dedicated alignment from the intersection of Shantz Hill Road and Fountain Street across the Speed River. This reach of the Speed River has a low sinuosity and a low gradient (0.9%). The narrowest channel section is at the proposed crossing location, with a bankfull width of 30.5 m, a bankfull depth of 2.75 m, and a wetted width of 26 m. Greater erosion and undercutting occurs at the meander further downstream.

Although not crossed by Stage 2 ION LRT, Mill Creek was investigated in South Cambridge to consider impacts associated with the proximity of the LRT corridor to the west side of the channel. The Creek has been heavily altered through Soper Park north and south of Dundas Street North where vernal pools and exaggerated meanders appear to have been constructed, and along Beverley Street where it has been armoured and straightened. The bankfull width and depth was uniformly 10 m wide and 1 m deep, with a wetted width and depth of 5 to 7 m and 0.5 to 0.6 m, respectively. Fallen and leaning trees, exposed clay within the bed, and organic debris jams are evident, indicating that widening and degradation are the dominant geomorphic processes within the channel.



5.1.7 Drainage and Stormwater Management

The Preliminary Drainage and Stormwater Management Report is found in **Appendix B3**. The study was conducted using GIS data provided by the Region of Waterloo for the existing storm sewer network and stormwater management facilities along the proposed Stage 2 ION LRT route, background reports and hydraulic models from the Grand River Conservation Authority, and watershed mapping, background studies and master plans from the Cities of Kitchener and Cambridge Field investigations. Modelling and desktop assessments were completed to assess the existing and proposed drainage conditions along the LRT corridor.

The proposed LRT corridor is 18 km long and consists of on-street and off-street sections. The on-street alignment passes through the heavily urbanized sections of Kitchener (King Street) and Cambridge (Eagle Street, Hespeler Road, Wellington Street, Bruce Street) and stormwater runoff is mainly collected through the existing underground storm sewer system. The storm sewer collects the minor system flows and discharges to either an existing sewer outlet or nearby watercourse crossing.

The majority of the storm sewer systems convey flow to sewer outfalls that directly discharge to the various tributaries of the Grand River along the alignment, except the two King Street outlets which discharge into an existing Stormwater Management (SWM) Facility for treatment and attenuation, ultimately discharging into the Grand River. The existing drainage infrastructure along the proposed Stage 2 ION LRT on-street alignment consists of a curb and gutter system and network of storm sewers along the existing roadways to collect and convey the minor and major system flows. Some sections of the roads have swales at various locations being used to collect and convey the major system flows spilled over from the roadway or external areas draining towards the road. Storm runoff collected from the roadway surfaces is discharged either to the storm sewer outlets or adjacent watercourses along the road.

The entire length of the proposed Stage 2 ION LRT corridor is located within the Grand River Watershed being managed by the GRCA. The proposed alignment crosses the tributaries of Hidden Valley Creek, Hofstetter Creek, Grand River, Freeport Creek, Speed River, Groff Mill Creek and Mill Creek (through an underground conduit). The various tributaries of the Grand River crossing the proposed LRT alignment are briefly described below.

(1) Hidden Valley Creek

The west portion of the proposed LRT route is located in the Hidden Valley Creek watershed. The main creek originates west of Wabanaki Drive and flows east to discharge into the Grand River. The north tributary originates near King Street East and collects runoff from Highway 8 and areas north of Highway 8. The proposed alignment through this watershed is located within the surface water Intake Protection Zone (IPZ) of Hidden Valley Intake.

(2) Hofstetter Creek

Hofstetter Creek originates in the wetland located south of the existing Hidden Valley Road / proposed LRT route and flows northward crossing Highway 8, ultimately



discharging into the Grand River on the north side of Highway 8. The proposed alignment through this watershed is located within the surface water IPZ of Hidden Valley Intake.

(3) Grand River

The Grand River starts in the Dufferin Highlands and flows south about 310 kilometres, discharging into Lake Erie at Port Maitland. The Grand River crosses the proposed LRT route immediately south of the existing Highway 8 Bridge. The floodplain at the proposed LRT crossing location is approximately 750 m wide and consists of the main channels of the Grand River, Freeport Creek and segments of wetlands. The proposed crossing is in the surface water IPZ of Hidden Valley Intake.

(4) Freeport Creek

Freeport Creek originates at Fountain Street North and flows westward for about 3 km before it discharges into the Grand River downstream of the Highway 8 bridge. The creek crosses the proposed LRT corridor immediately south of Highway 8 and will flow under the proposed Bridge B1 and no additional crossing structure will be required for this crossing. Freeport Creek is also located in the surface water IPZ of Hidden Valley Intake.

(5) Speed River

The Speed River is one of the main tributaries of the Grand River that originates at the southwest corner of Dufferin County. The proposed LRT route after crossing the Speed River traverses parallel to the Speed River northerly for approximately 3 km. The proposed LRT section in this area is at the southern limits of the floodplains along Eagle Street and an unused CP railway spur line. The proposed LRT will cross the Speed River through Bridge B2 located approximately 260 m south of the King Street East Bridge.

(6) Groff Mill Creek

Groff Mill Creek begins at a storm sewer outlet at the northwest corner of the existing CN railway tracks and Hespeler Road. From this outlet, the creek is a man-made, straightened ditch that flows westward and then turns south to cross the proposed LRT route until it crosses Dunbar Road. Downstream of the Dumfries Conservation Area, the creek crosses the CP railway and Coronation Boulevard and flows through the Galt Country Club to its ultimate outlet into the Grand River. Groff Mill Creek receives storm runoff from the proposed LRT route along Hespeler Road through the storm sewer network outletting westward at Langs Drive and Bishop Street North. A portion of the LRT and associated station is located within the floodplain of Groff Mill Creek, created by overtopping and spillage of floodwater at Langs Drive.

(7) Mill Creek

Mill Creek headwaters originate in Puslinch Township, flows southwest to the Shades Mill Reservoir and Dam, ultimately discharging into the Grand River in downtown Cambridge. Within the Mill Creek Watershed, the proposed LRT route passes along the railway tracks, crosses Samuelson Street and Dundas Street and then traverses parallel



along Beverly Street and Mill Creek before entering a 600 m long box culvert at Main Street which outlets to the Grand River north of Bruce Street. The proposed LRT section from Kerr Street to Main Street is in the floodplain of Mill Creek caused by overtopping of Kerr Street Culverts.

5.1.8 Groundwater and Contaminated Soils

A Contamination Overview Study (COS) was completed and can be found in **Appendix B4**. The study area for the COS included a 250 m buffer on either side of the proposed Stage 2 ION route to account for migration of contaminants from properties/lands adjacent to the corridor.

The study area lies within the Grand River watershed, which includes the lands drained by the Grand River and its associated tributaries. According to Natural Resources Canada Map 40P/08, the topography within the study area ranges from approximately 280 to 320 metres above sea level (masl), with low-lying areas adjacent to the banks of the rivers. Stormwater run-off within the study area is conveyed into municipal storm sewers, or drains naturally into the rivers and wetland complexes. Soils in the study area include till deposits of Port Stanley Till, Maryhill Till, and Catfish Creek Till.

Much of the water supply in the Region of Waterloo is derived from the Waterloo Moraine aquifers, a glacial aquifer system composed of fine to medium sand. The Lower Waterloo Moraine consists of sand and gravel, the Pre-Catfish Creek Aquifer consists of stratified sands and gravels, and the Pre-Canning Aquifer consists of discontinuous sand and gravels. The main bedrock aquifer in the study area is Guelph Formation, composed of crystalline dolostone deposits of Upper Silurian age. The City of Cambridge obtains much of its municipal water supply from fractures in this bedrock aquifer which locally acts as a confined or semi-confined aquifer. The permeability of the Guelph Formation is highly variable due to fracturing and chemical dissolution in the dolomite units, however the unit overall is largely confined and isolated from the shallow overburden aquifer.

The Stage 2 ION alignment lies within the Grand River Source Protection Area. The alignment lies within several wellhead protection areas: the southernmost portion of the alignment is within a Wellhead Protection Area (WHPA) B and Groundwater Under Direct Influence (GUDI) of surface water, the central portion following Highway 8 is within a Wellhead Protection Area D, and the western portion of the alignment along Fairway Road is within Wellhead Protection Areas B and C. None of these areas are listed as a highly vulnerable aquifer, however portions lie within areas of significant water recharge. In addition, the proposed alignment from west of Highway 8 interchange to east of the Highway 53 overpass is an Intake Water Protection Zone 2.

The Ecolog Environmental Risk Information Services (ERIS) system provides information from federal, provincial and private source databases relating to a defined search area. According to an ERIS database search, there are no federal contaminated sites within the study area. There are six (6) records for current waste disposal sites within the study area. As the study area is urbanized, water well records were not included as part of the ERIS search.



A site visit of the study area was conducted on February 11, 2019 to document land uses and business operations that may represent a potential source of contamination (e.g., gas stations, auto repair facilities, and industrial operations). The results of the inspection showed that the predominant land uses within the study area consist of a mixture of residential, commercial, industrial, and parkland, with scattered community and institutional land uses. No actual sources of contamination were observed during the site visit. Several potential sources of contamination were observed during the site visit as a result of current and historical commercial/industrial land uses. These included fuel storage tanks (private and retail), manufacturing facilities and registered waste generators, existing railway lines and drycleaners. The cumulative impacts of many years of high road traffic within the study area may also have resulted in potential soil contamination in the form of residual salt impacts, and metals and petroleum hydrocarbons (PHCs) in the shallow soil and groundwater resulting from winter road salting operations along the road ROW, vehicular exhausts, transportation accidents and spills.

According to the ERIS report, there are two hundred and eighteen (218) spill records in the study area, and one hundred and twenty-eight (128) additional spill records with unknown coordinates. No evidence of spills was observed on any roadways in the study area, however historical spills may have impacted soil and groundwater quality.

5.2 Cultural Environment

Primary and secondary documentation and maps were reviewed to establish a developmental history of the study area, and to identify properties with recognized or potential cultural heritage value or interest (CHVI). The following sub-section provides an understanding of the existing cultural environment conditions, including built heritage resources, cultural heritage landscapes, and archaeology.

5.2.1 Built Heritage Resources and Cultural Heritage Landscapes

A Cultural Heritage Report was completed in 2020, available in **Appendix B5**, which identifies built heritage resources and cultural heritage landscapes associated with the properties affected by the Stage 2 ION Project, to ensure that the Region of Waterloo fulfils its obligations under the Ontario *Environmental Assessment Act* (1990), O. Reg. 231/08 and the *Ontario Heritage Act* (OHA, 2005).

The existing cultural heritage conditions were identified through research into the study area's local context, physiography, Indigenous and Euro-Canadian history. Primary and secondary resources were reviewed, including but not limited to historical mapping, local history sources, relevant previously completed archaeology, heritage or natural heritage studies, municipal or regional natural heritage policy, and online heritage databases.

Many of the built heritage resources and cultural heritage landscapes within the study area are linked to the history of the initial settlement and growth of Euro-Canadian communities in the Cities of Kitchener and Cambridge and the Region of Waterloo. As such, this local context and settlement history spans the early Euro-Canadian settlement history through to present.



Fieldwork was completed for the study area in March and July 2019. A total of 225 properties and/or cultural heritage landscapes located within or adjacent to the preferred route were screened using the screening process and the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes: A Checklist for the Non-Specialist*, and were identified as having known or potential CHVI. The complete list of properties identified as having known or potential CHVI have been identified as built heritage resources and cultural heritage landscapes and can be found in the Cultural Heritage Report in **Appendix B5**. Of the 225 properties and/or cultural heritage landscapes identified as having known or potential CHVI located within or adjacent to the preferred route, 105 will be directly or indirectly impacted by the proposed preliminary design.

For all properties with direct impacts based on the functional design, such as potential demolition or alteration to heritage structures, a Cultural Heritage Evaluation Report was completed prior to the completion of TPA Process (**Appendix B5**), consistent with the expectations of MHSTCI.

5.2.2 Archaeology

A Stage 1 Archaeological Assessment (AA) (Project Information Form Number P439-0052-2019) was completed in December 2019 for the Stage 2 ION study area. A Stage 1 AA consists of a review of geographic, land use and historical information for the property and the relevant surround area, a property visit to inspect its current condition and contacting MHSTCI to find out whether, or not, there are any known archaeological sites on or near the study area. Its purpose is to identify areas of archaeological potential and further archaeological assessment (e.g. Stage 2-4) as necessary. The Stage 1 AA is included in **Appendix B6** and has been accepted into the Ontario Public Register of Archaeological Reports on March 5, 2020.

The Stage 1 AA background research identified elevated potential for the recovery of Indigenous and Euro-Canadian archaeological remains within portions of the study corridor based on the Region of Waterloo's Archaeological Facilities Master Plan, and based on the study corridor's close proximity (within 300 m) to: historic structures, historic villages, several historic transportation routes, numerous designated and listed heritage properties, commemorative plaques, previously registered archaeological sites, three historic pioneer cemeteries, and primary water sources.

Heritage resources listed on a municipal register or designated under the *Ontario Heritage Act* are considered features or characteristics that indicate archaeological potential. The study corridor is located within 300 m of two Heritage Conservation Districts (HCD): Dickson Hill HCD and Main Street HCD. Therefore, these features contribute in establishing the archaeological potential. Commemorative markers of Indigenous and Euro-Canadian settlements and history which may include local, provincial, or federal monuments, cairns or plaques, or heritage parks are considered features or characteristics that indicate archaeological potential. The study corridor is located within 300m of four commemorative plaques, therefore, these features also contribute in establishing the archaeological potential within those portions of the study corridor that fall within 300m of these features. The study corridor is located within



300 m of two pioneer/historic churches/cemeteries which are considered features or characteristics that indicate archaeological potential. Thirty-eight previously registered archaeological sites have been registered within one-kilometre of the study corridor; one site is located within 50m of the study corridor and five sites are located within 300 m of the study corridor. These are considered features or characteristics that indicate archaeological potential and therefore contributes in establishing the archaeological potential in portions of the study corridor that fall within 300m of these features.

To further establish the archaeological context of the study corridor, a review of previous AAs carried out within the limits of, or immediately adjacent (i.e., within 50m) to the study corridor, as documented by all available reports, was undertaken. With previous AAs having fulfilled the Stage 1 and/or Stage 2 AA requirements within their respective portions of the current study corridor, it was recommended that these areas be exempt from further assessment within the scope of this project. While disturbances and areas of low or no archaeological potential exist within the study corridor, areas retaining archaeological potential still remain.

The study corridor was evaluated for extensive and deep land alterations which have severely impacted the integrity of archaeological resources, commonly referred to as 'disturbances,' that remove archaeological potential. Physiographic features of no or low archaeological potential encountered within the study corridor include permanently wet areas consisting of the Grand River and Speed River. On-site confirmation and documentation of the actual condition and exact extent of areas of no or low archaeological potential will, however, be required during the Stage 2 AA. Portions of the study corridor that exhibit neither extensively disturbed conditions nor contain physical features of no or low archaeological potential are considered to have archaeological potential. These areas include grassed margins, meadows, woodlots, and manicured grass lawns. Given the established potential to recover archaeological resources within these identified areas, a Stage 2 AA will be required, and these areas are identified on mapping included in the Stage 1 AA Report in **Appendix C6**.

5.3 Socio-Economic Environment

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 sub-sections will provide an overview of the existing socio-economic conditions that exist within the study corridor, including land uses and economic characteristics, air quality, and noise and vibration.

5.3.1 Land Uses and Economic Characteristics

The assessment of impacts to land use for the Stage 2 ION LRT required consideration of provincial and local municipal policies and objectives pertaining to land use, as well as the types of land uses directly impacted by the project. A comprehensive review of the following was conducted:

- » Provincial Policy Statement (PPS, 2020)
- » Growth Plan for the Greater Golden Horseshoe (2019)
- » Region of Waterloo Official Plan (2015)
- » City of Cambridge Official Plan (2012)
- » City of Cambridge Zoning Bylaws
- » City of Kitchener Official Plan (2014)
- » City of Kitchener Zoning Bylaws
- » Special Policy Areas



The Stage 2 ION Project was concluded to be compatible with all major land use policies established by the Province, the Region and the cities of Kitchener and Cambridge. Higher order rapid transit is at the core of many of the planning documents currently in force and is seen as the catalyst for the reurbanization, intensification and redevelopment sought in many of the plans.

The following sub-sections detail the Provincial, Regional and Municipal land use context and economic characteristics of the area in further detail.

(1) Provincial Context

Land use planning decisions made by municipalities, planning boards, the Province, or a commission or agency of the government must be consistent with the *Provincial Policy Statement* (PPS). The PPS supports improved land use planning and management, which contributes to a more effective and efficient land use planning system. The PPS focuses growth and development within urban and rural settlement areas while supporting the viability of rural areas. The PPS notes that a land use pattern, density and mix of uses should be promoted that minimize the length and number of vehicle trips and support current and future use of transit and active transportation. Stage 2 ION meets the PPS objective of promoting transit.

A Place to Grow, Growth Plan for the Greater Golden Horseshoe (August 2020) is the Ontario government's initiative to plan for growth and development in the Greater Golden Horseshoe (GGH) and builds on the PPS to establish a unique land use planning framework for the GGH that supports the achievement of complete communities, a thriving economy, a clean and healthy environment, and social equity. The Growth Plan recognizes Urban Growth Centres (UGC) as regional focal points for accommodating population and employment growth. Downtown Kitchener, Uptown Waterloo and Downtown Cambridge are recognized as UGCs (*A Place to Grow*, 2019 [Schedule 4]).



(2) Regional Context

The study corridor is currently situated within a mainly urban setting within the Cities of Kitchener and Cambridge and has been largely developed, encompassing various differential land uses. The existing land uses in the study corridor include Mixed Use, Commercial, High Rise Residential, Open Space, Low Rise Residential, Commercial Campus, National Open Space System, Employment Corridor, Industrial, Hespeler Road Mixed-Use Corridor, Blair Core Area, Low/Medium Density and Galt City Centre. Refer to **Figure 5-17** for the Region's urban areas map.

Galt City Centre and the Preston Towne Centre are primarily large retail/commercial areas complemented by smaller sites located throughout the city in areas designated primarily for residential and employment uses. Preston Towne Centre, the former town of Preston's downtown, is located on the western side of the City at the confluence of the Grand River and the Speed River. Preston Towne Centre is comprised of a historic downtown core area, residential neighbourhoods, industrial areas and recreational and open spaces, including the Speed River and Riverside Park. One of the main objectives of the Cambridge Official Plan is to encourage the continued development of the Galt City Centre, Preston Towne Centre and Hespeler Village as Community Core Areas of higher intensity and mix of land uses, promoting such elements as mixed-use buildings, intensification, heritage conservation, social facilities, the reuse of existing buildings and infrastructure renewal. The UGC is planned and designed as the focal area for investment in institutional and region-wide public services, as well as commercial, recreational, cultural and entertainment uses and to accommodate and support major transit including the rapid transit station.

In keeping with the goal of providing greater transportation choice, a new rapid transit system in Cambridge will assist in achieving the goals set out in the Official Plan. The City supports a coordinated, multi-modal approach to transportation, which includes a strong public transit system.

(3) Municipal Context – Kitchener

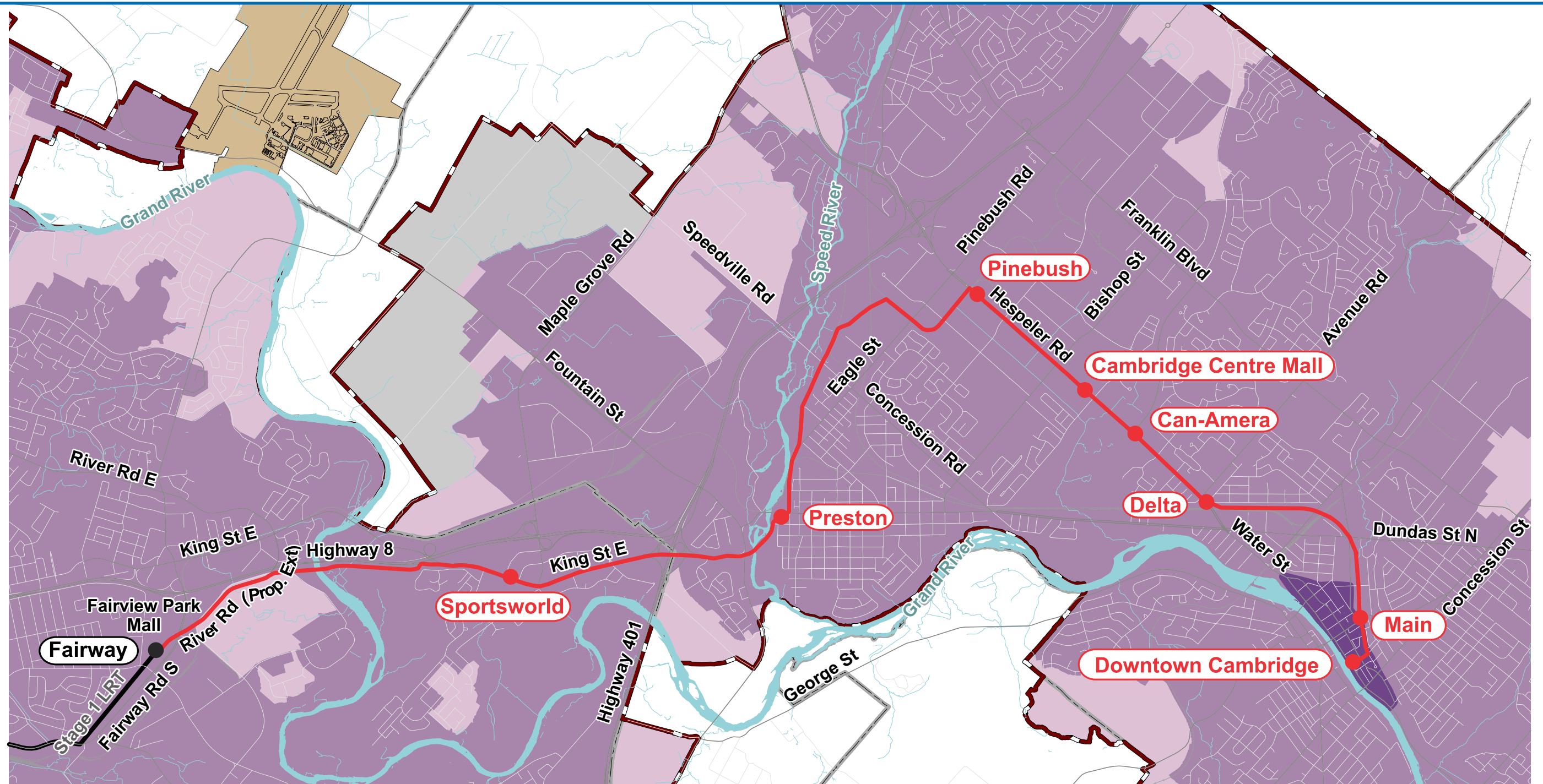
Since Kitchener's early beginnings as an urban area, the once primarily German and Mennonite population has grown and diversified into a multi-cultural community. The Grand River runs along the northeast side of the city and meanders through the southeast portion.

The City of Kitchener Official Plan (2014) incorporates the policy and regulatory framework established by the Province, as outlined in the Provincial Policy Statement and the Growth Plan for the Greater Golden Horseshoe (Growth Plan). The primary vision of the City of Kitchener Official Plan (2014) is to create a complete community which provides access to a mix of land uses including, a full range and mix of housing, including affordable housing, recreation, commerce, community and cultural facilities, health care facilities, employment, parks and open spaces distributed and is connected in a coherent and efficient manner. A complete community also supports the use of public transit and active transportation, enabling residents to meet most of their daily needs within a short distance of their homes. The existing land use designations in the Official Plan that are adjacent to the corridor include Commercial Campus, Commercial,



Mixed Use, Institutional, Open Space, Medium Rise Residential and High Rise Residential as shown in **Figure 5-18**.

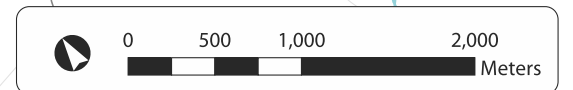
Major Transit Station Areas are designated in the Regional Official Plan, as areas within a ten-minute walking radius centered around the location of Rapid Transit Station Stops. Major Transit Station Areas achieve a mix of residential, office (including major office), institutional (including major institutional) and commercial development (including retail commercial centres) and provide a focus on supporting existing and planned transit and rapid transit service. Sportsworld Crossing is a development within the Major Transit Station Area within the study corridor. Sportsworld Crossing is a prominent commercial development located in Kitchener along Highway 401, Highway 8 and King Street. This development supports the community by providing employment, retail and recreational opportunities, and contributes to an integrated transportation system with convenient and complimentary choices for residents. An existing multi-modal transit terminal is located in the Sportsworld Crossing area, serving Grand River Transit and GO Transit bus routes.

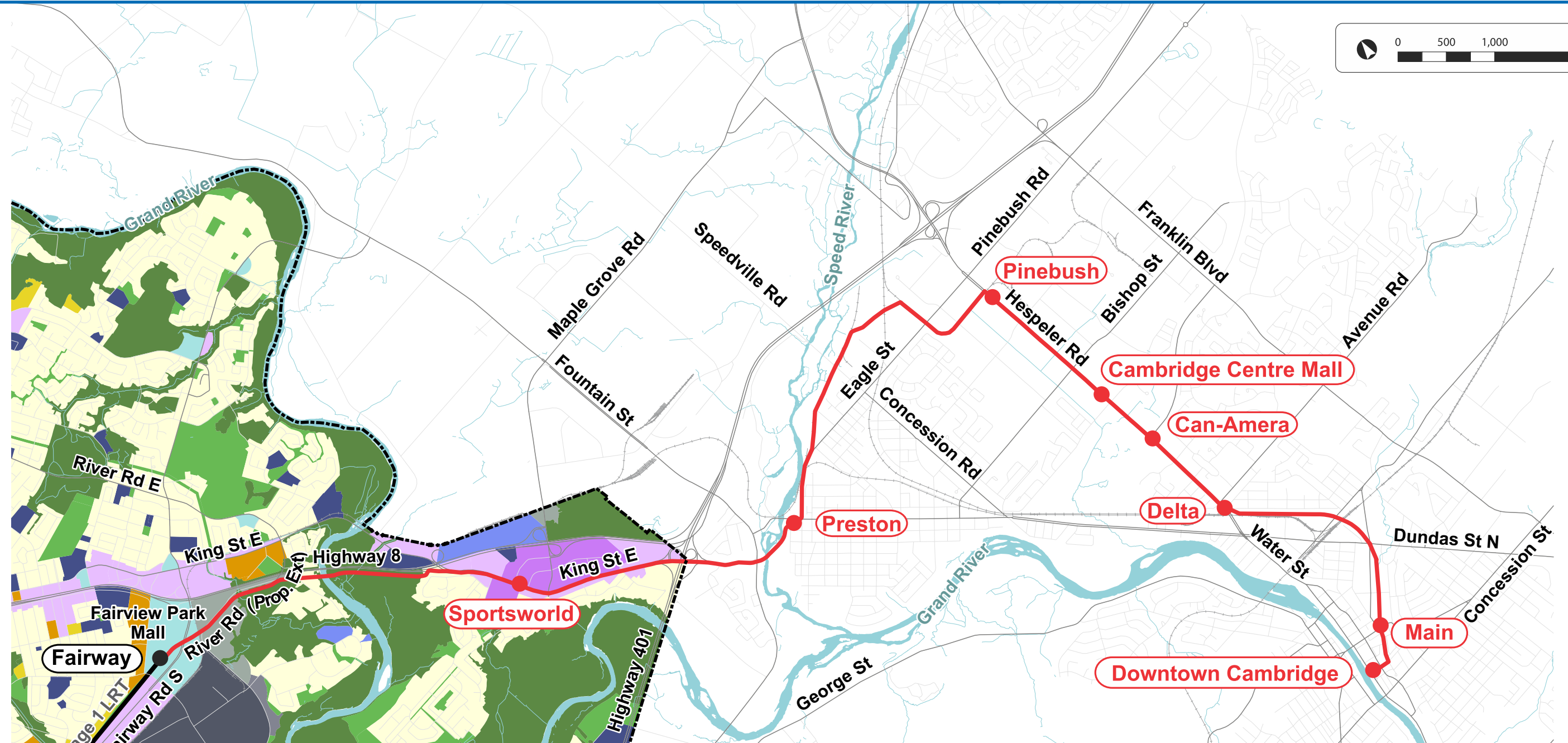
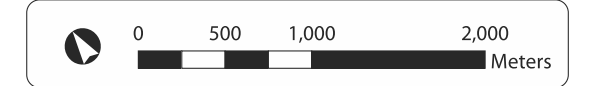


LEGEND

- | | | |
|---|--|-----------------------------------|
| Urban Area | Urban Area Boundary | River |
| Built-Up Area | Region of Waterloo International Airport | Stage 1 ION LRT (In Service 2019) |
| Urban Designated Greenfield Areas | Municipal Boundary | Proposed Stage 2 ION LRT |
| Prime Industrial/Strategic Reserve (Served) | Railway | Proposed Stage 2 ION Station |
| Urban Growth Centres | Roads | |

Source: Regional Official Plan
Shaping Our Future - Map 3A Urban Area (2015)





LEGEND

Low Rise Residential	General Industrial Employment	Stage 1 ION LRT (In Service 2019)
Medium Rise Residential	Business Park Employment	Proposed Stage 2 ION LRT
High Rise Residential	Institutional	Proposed Stage 2 ION Station
Mixed Use	Natural Heritage Conservation	Municipal Boundary
Commercial Campus	Open Space	Railway
Commercial	Major Infrastructure and Utilities	Roads
Heavy Industrial Employment		River

Source: City of Kitchener Official Plan, Map 3 - Land Use (Last revised June 24, 2019)



(4) Municipal Context – Cambridge

The City of Cambridge is part of the Region of Waterloo and was incorporated in 1973, when the three municipalities of Galt, Preston and Hespeler and the settlement of Blair were amalgamated into a single legal entity under a new name. Cambridge is located in southern Ontario at the confluence of the Grand River, and the Speed River and along the Galt and Paris Moraines. **Figure 5-19** shows the existing land uses within the City of Cambridge, in relation to the corridor. The area to the east of Water Street in the Galt City Centre Core Area (recognized as Downtown Cambridge) is an Urban Growth Centre (UGC), as designated in the Growth Plan (Schedule 4). The UGC is planned and designed as the focal area for investment in institutional and region-wide public services, as well as commercial, recreational, cultural and entertainment uses and to accommodate and support major transit including a rapid transit station.

Reurbanization Corridors are areas located along existing or planned transit corridors that link directly with rapid transit. Reurbanization Corridors serve as connectors, between the UGCs and Major Transit Station Areas and are planned and developed to accommodate additional population and employment growth served by rapid transit and/or frequent transit service, which may or may not operate on an exclusive right-of-way. Major Transit Station Areas are lands typically located within approximately an 800 metre radius of a rapid transit station and are planned in consultation with the Region to achieve increased residential and employment densities which support and ensure the viability of existing and planned transit service levels.

The Stage 2 ION LRT corridor in Cambridge will operate on an exclusive right-of-way or in dedicated lanes on an arterial road. Transit oriented development will be supported along these rapid transit corridors along with transit priority measures and especially within Major Transit Station Areas and Reurbanization Corridors.

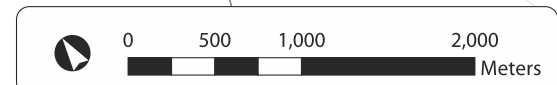
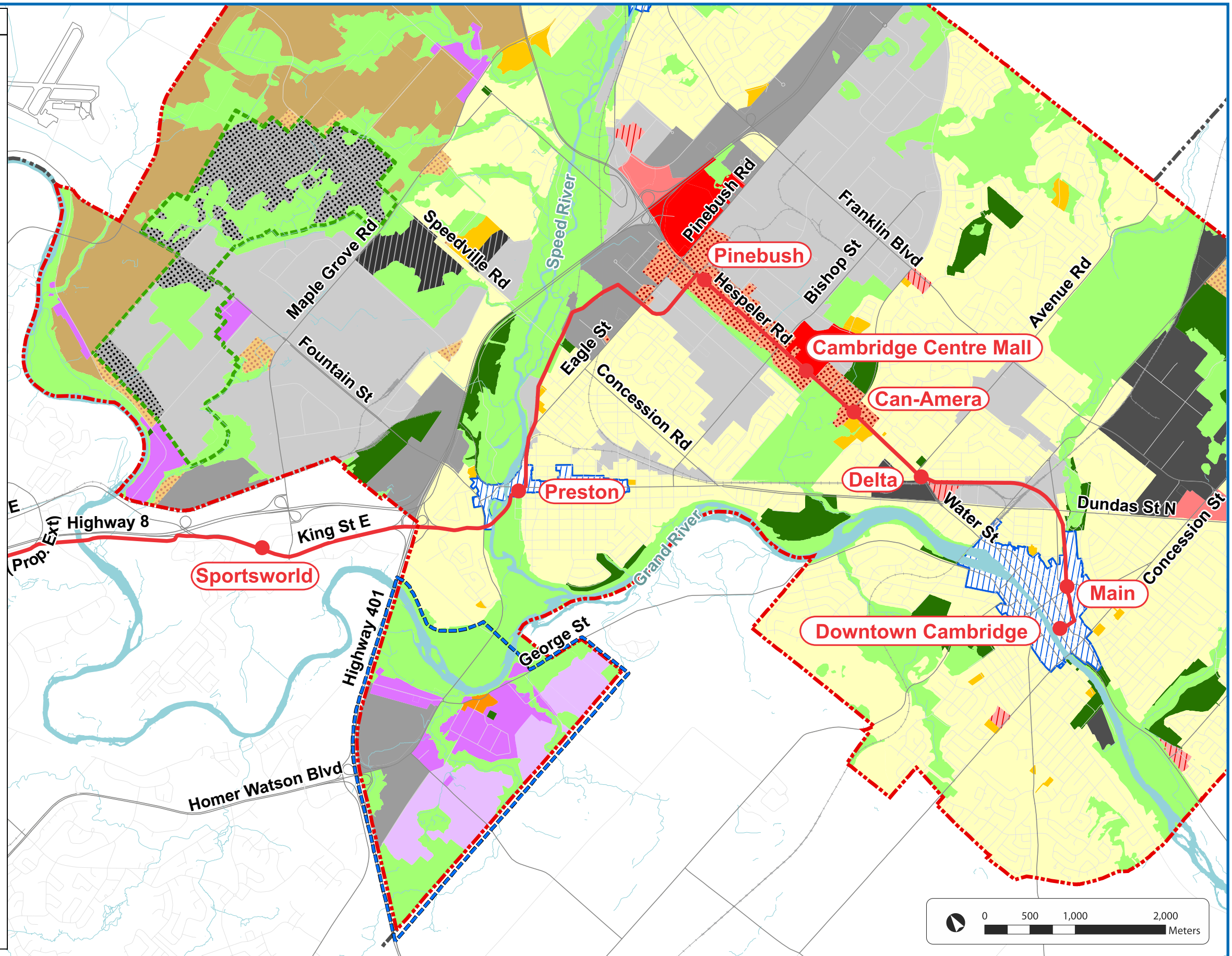
As noted in **Section 1.5.4**, land-use, transportation and infrastructure development within the Region of Waterloo is required to conform to the policies, goals and objectives of the Regional Official Plan. The two central concepts that provide the foundation for the policies and future actions set out in the Official Plan are sustainability and livability. One of the main objectives of the Regional Official Plan is to promote Transit Oriented Development with a diverse mix of land uses, housing types and open spaces in close proximity to each other. In 2003, the Region of Waterloo Council unanimously adopted the Regional Growth Management Strategy (RGMS), a long-term strategic framework that identified where, when and how future residential and employment growth will be accommodated.

The Region of Waterloo has developed plans to re-urbanize and intensify the existing urban corridors that exist in all three cities that comprise the Region (Waterloo, Kitchener, Cambridge).

LEGEND

- Stage 1 ION LRT (In Service 2019)
- Proposed Stage 2 ION LRT
- Proposed Stage 2 ION Station
- - - City Limits
- - - Municipal Boundaries
- ▭ Blair Village
- ▭ East Side Lands (RMW)
- ▭ Future Urban Reserve
- Community Core Areas**
- ▭ Galt City Centre; Preston Towne Centre; Hespeler Village
- Residential Designations**
- ▭ Low / Medium Density Residential
- ▭ High Density Residential
- ▭ Blair Core Area
- ▭ Rural Residential
- Rural Designations**
- ▭ Rural
- ▭ Prime Agricultural
- Commercial Designations**
- ▭ Regional Commercial
- ▭ Community Commercial
- ▭ Hespeler Road Mixed-Use Corridor
- ▭ Neighbourhood Commercial
- Employment Designations**
- ▭ Business Industrial
- ▭ Prime Industrial Strategic Reserve (Served)
- ▭ Employment Corridor
- ▭ Industrial
- ▭ Prestige Industrial
- Open Space Designations**
- ▭ Recreation, Cemetery and Open Space
- ▭ Natural Open Space System
- Railway
- Roads
- River

Source: City of Cambridge Official Plan - Map 2 - General Land Use Plan (September 2018 Consolidation)

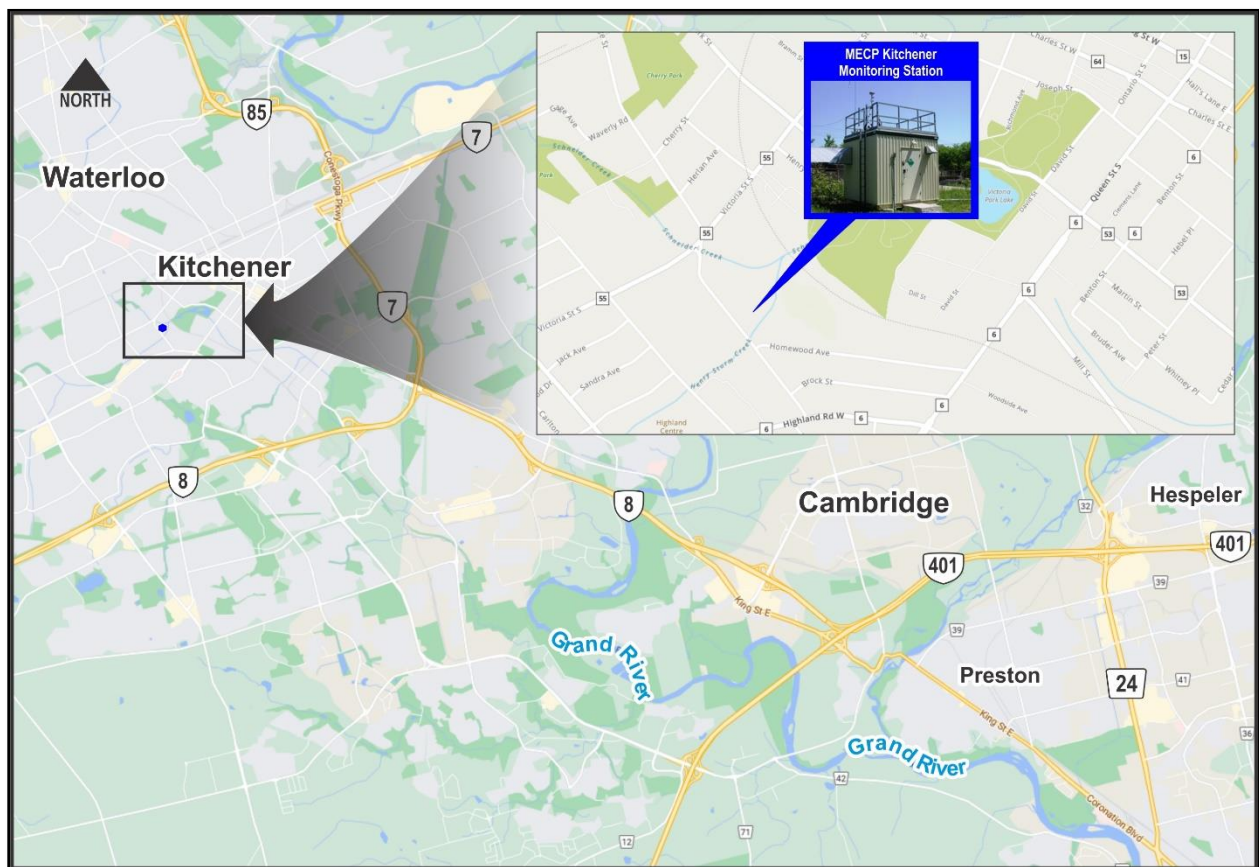


5.3.2 Air Quality

An Air Quality Assessment, available in **Appendix B7**, was completed to document the existing air quality conditions within the study area, as a basis for more detailed assessment of the preferred route, and recommendations for specific mitigation measures. An estimate of the current air quality baseline was primarily established by consulting data from the Ministry of Environment, Conservation and Parks (MECP) *Air Quality in Ontario Reports and Environment Canada's National Pollutant Release Inventory Reports*.

The MECP Kitchener Monitoring Station (see **Figure 5-20**) provides the best estimates available of general background air quality and monitors three pollutants: Ozone (O₃), Fine Particulate Matter (PM_{2.5}) and Nitrogen Dioxide (NO₂). Other pollutants in the Provincial program, such as sulphur dioxide (SO₂), carbon monoxide (CO) and total reduced sulphur (TRS) compounds, have reached background levels and are no longer required to be monitored at this station.

Figure 5-20: Location of MECP Kitchener Monitoring Station



Nearby industrial and commercial facilities have the potential to impact existing air quality conditions surrounding the study area. Twenty-six (26) facilities have been identified within 5 km of the study area which may contribute to existing air quality conditions. These facilities have been identified based on National Pollutant Release



Inventory (NPRI) data from 2016 which corresponds to the latest available year with data that has been quality assured by Environment and Climate Change Canada.

The areas surrounding the proposed Stage 2 ION LRT are comprised of residential, commercial, and industrial land use types. Various sensitive receptors have been identified within the study area including residential developments, places of worship, schools, childcare centres, and retirement homes.

Stage 2 ION will replace the current ION Bus with LRT, creating a continuous LRT system across the region's three urban centres. The ION Bus service, implemented in 2015, has provided an alternative travel mode for commuters that both live and work close to the route resulting in a shift of the travel mode towards public transportation and away from the single occupant driver. Consequently, this has contributed to the existing reduction in emission of air pollutants in the Region.

5.3.3 Noise and Vibration

A Noise and Vibration Impact Assessment of the proposed Stage 2 ION Light Rail Transit route was completed in 2021 and can be found in **Appendix B8**. For potential noise and vibration impacts, the study area is limited to 100 m and 50 m, respectively to either side of the proposed Stage 2 ION route. The study area encompasses the most critical receptors along the corridor and represents the worst-case in terms of potential noise and vibration impacts.

As per the MECP/Toronto Transit Commission (TTC) protocol, sensitive receptors are identified as existing or municipally-approved residential developments, nursing homes, group homes, hospitals, and other such institutional land uses where people reside. Residential receptors dominate the sensitive receptors along the proposed route.

5.4 Transportation and Utilities

This sub-section describes the operational characteristics of the existing transportation system and utility network within the study area. The description covers the existing road network and associated transit services, cycling and pedestrian facilities, utilities and railway operations.

5.4.1 Road Network

The extensive road network in the study area includes City roads and Regional roads, as well as access to major Provincial highways; see **Figure 5-21**. Each City in the Region operates and maintains its own roads that connect to the Regional road network, while the major Provincial highways that pass within the study area (Highway 401 and Highway 8) are maintained by the Ontario Ministry of Transportation. One of the road network's purposes is to provide transportation links to move people and goods safely throughout the region and the adjacent municipalities. Roads also provide important connections for emergency responders and other critical municipal services.

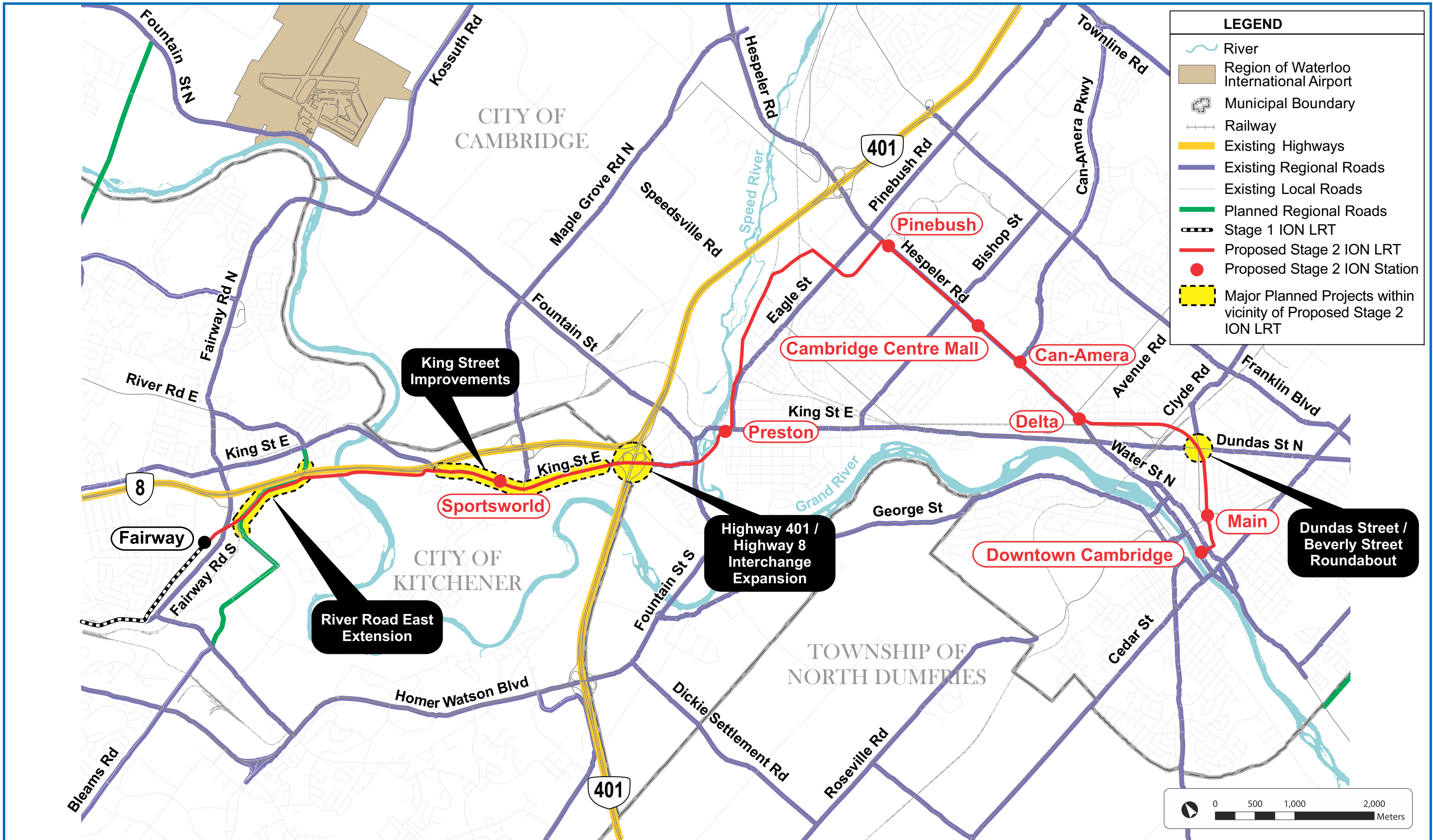
Within the corridor, several roads serve a variety of functions critical to the social and economic vitality of the Region as a community. The roads serve the daily travel needs of residents and employees and serve commercial vehicles and tourist trips coming to and leaving the Region of Waterloo.

- » **King Street** functions as a gateway entrance into Kitchener and the downtown. King Street also provides direct access to Highway 8, Highway 401 and the Sportsworld Crossing complex located north of Highway 401. King Street from south of Highway 401 and Fountain Street becomes Shantz Hill Road which is characterized with a steep grade as the roadway extends southward towards the Speed River. King Street in Preston Towne Centre is vibrant with a wide range of goods and services. Sections of both King Street and Shantz Hill Road have recently been reconstructed and improved.
- » **Eagle Street North** extends for about 3 km from Hespeler Road to the Preston Towne Centre. The street experiences high traffic volumes during peak periods, which impacts signalized intersections along the corridor, particularly at Eagle Street and King Street. Feedback from local residents indicate that Eagle Street is used frequently as an alternative to Highway 401 when incidents occur on the freeway, as well as during periods of significant congestion.
- » **Hespeler Road** provides access to a mixed commercial corridor. The corridor has grown to become one of City of Cambridge's main commercial areas, offering full range of retail, services and commercial uses/destinations. Within the study area, the corridor connects Highway 401 (to the north) to Downtown Cambridge (to the south), with many east-west intersecting roads that provide access to surrounding neighbourhoods. Hespeler Road also currently provides an important goods movement connection for commercial vehicles between destinations to the south (e.g. Brantford) and to the east and west along Highway 401.
- » **Wellington Street** connects Dundas Street West to Downtown Cambridge. The street's north extent passes through a residential area but transitions into commercial properties as the street reaches the downtown core.

There are several separate but related projects at different stages of design within the Stage 2 ION LRT study area. Careful and continued coordination with these projects is vital to ensure that design plans fully incorporate the requirements for the LRT project.

- » **River Road East Extension – Regional Project:** Regional Council approved the recommended design concept which includes a proposed 3.6 km extension of River Road East, from King Street East to Manitou Drive in Kitchener. The expansion of River Road will help alleviate delays and congestion on Fairway Road South.
- » **King Street Improvements – Regional Project:** This project extends along King Street East from south of Grand River to Highway 401, along with a section of Sportsworld Drive from King Street East to Gateway Drive. This project involves road reconstruction and widening, intersection improvements, active transportation and drainage improvements. As part of the roadway improvements, the median will be widened to accommodate the future LRT rapidway and station at Sportsworld Crossing Road.

- » **Highway 401/Highway 8 Interchange Expansion – MTO Project:** This project will be constructed in stages, and will include widening of Highway 401 and construction of new interchange ramps connecting Highway 401 (to and from the west) with Highway 8 (W-N and N-W ramps). This will also include ramp reconfigurations at the Highway 401/King Street interchange. This project will be implemented by the Ministry of Transportation. The timing of the implementation of this project is not known at this time, but its completion is anticipated to yield a significant reduction of inter-regional traffic along King Street between Highway 8 and Highway 401.
- » **Dundas Street/Beverly Street Roundabout – Regional Project:** This project involves replacing the existing signalized intersection with a roundabout, to improve traffic operations and safety for vehicles, pedestrians and cyclists. Currently, this intersection experiences excessive southbound queuing, since Dundas Street reduces to one through lane per direction south of the intersection. This project will be constructed ahead of Stage 2 ION, and the two projects have been coordinated to ensure compatibility (e.g. track horizontal alignment and vertical profile) and minimize the impact of the future addition of the LRT project to the roundabout.





The Region has completed several studies to examine the potential traffic operations and capacity challenges in areas of Kitchener and Cambridge. A more detailed overview of the existing road system is provided in the Region's Transportation Master Plan (TMP) called "Moving Forward" (2018).

The City of Kitchener completed its own Integrated Transportation Master Plan in 2013, which aims to strengthen transportation's role in a complete and healthy Kitchener. The plan recommends operational and management improvements to the City's transportation network in the next 20 years.

The City of Cambridge updated its own TMP in 2019 "Moving Cambridge" (Notice of Completion issued: December 2020) as a follow-up to the Region's TMP update. The plans will help guide the City's and Region's decisions on how to maintain and improve the Cambridge transportation system as the City and Region continue to grow over the next 25 years.

With the growth projected for the Region, a more comprehensive approach is required to address the growing congestion of the road network. As a result, the Region has identified several strategies to improve area mobility while investing in alternative, more sustainable modes of transportation. The shift from a road-centered solution to a rapid transit and multi-modal system, including the Stage 2 ION LRT, is a key component of this approach.

5.4.2 Existing Transit Service

Public transit services in the Region of Waterloo are operated by Grand River Transit (GRT) and include local buses, express buses, ION Bus and door-to-door accessible services; see **Figure 5-22**. Bus transit and LRT are important aspects of alleviating congestion and making greater use of the Region's road system, as outlined in the Regional Transportation Master Plan.

(1) Intermodal Stations

Intermodal stations are locations where passengers can transfer between different modes of travel, or between transit services provided by different operators. There are four intermodal stations located within the study area:

- » The **Fairway Station** is the southern terminus of the Stage 1 ION LRT system, and the transfer point between ION LRT and ION Bus, as well as other local bus routes. The station is strategically located close to Fairview Park Mall, existing residential and retail destinations, and future planned high density residential and employment uses. The Fairway bus terminal, located beside Fairway ION station, has 9 bus stops and includes a park-and-ride facility.
- » The **Sportsworld Park & Ride and Bus Terminal** is strategically located directly adjacent to the Highway 8 interchange with Sportsworld Drive/Maple Grove Road with access to Highway 401 to and from the east, and near the Highway 401 interchange with King Street. In addition to GRT local bus services and ION Bus, the terminal is used by GO Transit and Greyhound bus services, providing inter-regional and local transit connections. The terminal



includes platforms for 6 buses along with 125 commuter parking spots. The terminal is located 450 metres from the Stage 2 ION LRT corridor on King Street. Evaluation of and planning for changes to the existing bus routes through this area as Stage 2 ION is implemented to improve transfer connections will be examined as part of the next phase of work.

- » The **Cambridge Centre Station** is a relatively new station which began operation in 2016. It is located on the east side of Hespeler Road at the Cambridge Centre Mall. Amenities in the terminal include heated shelters, benches and bicycle parking for passengers and a driver's facility for breaks and shift changes. The terminal includes 10 bus platforms.
- » The **Ainslie Street Terminal** is the main transit hub for GRT bus services in Downtown Cambridge. The terminal is located on Ainslie Street South and consists of a central building surrounded by bus platforms. The terminal includes platforms for 10 GRT/ION buses and one for Coach Canada that provides full week intercity service through this terminal to Hamilton. The building facility includes public washrooms, ticket counters and a waiting room for passengers.

(2) Local and Express Service

GRT provides service on approximately 54 bus routes across the Region as of November 2020, including ION Bus (Route 302) and iXpress routes, using low-floor accessible buses. The buses are equipped with accessibility features including priority seating, stabilizer belts, audio announcement and ramps. GRT also utilizes 30-foot vehicles and smaller 19-seat fully accessible vehicles for services on new routes, new neighbourhoods, rural transit routes to Townships and lower ridership routes.

GRT's express network includes 6 express routes (iXpress 201, 202, 203, 204, 205, 206) which provide frequent and limited-stop service. These routes provide service along the major corridors in the Region. The shelters for iXpress and ION Bus routes are equipped with digital signs that show real-time departure information for the next buses. Select bus stations also have map displays, bike racks and bike lockers.

(3) ION Bus Service

GRT also operates the 302 ION Bus route between the Fairway ION Station and the Ainslie Street Transit Terminal in Downtown Cambridge. ION Bus operates on the "adapted Bus Rapid Transit" corridor implemented as part of the Stage 1 ION project. ION Bus currently provides bus stop services at similar areas covered by the Stage 2 ION LRT stations (Ainslie Street Terminal, Cambridge Centre etc.). ION Bus vehicles are equipped with special features including WIFI, USB charging stations, high-back seating, etc. The buses use transit priority signals and queue jump lanes at certain intersections to move along routes more quickly. The signals detect buses as they approach and either extend the green signal or shorten the red signal to minimize delays. Queue jump lanes on the approach to an intersection allow buses to bypass queued traffic, enabling them to move to the front of the line and gain an advantage at signalized intersections.



(4) Inter-Regional Transit Services

Interregional transit services connecting the Region include VIA Rail, GO Transit rail and bus services, and Coach Canada and Greyhound bus coach services.

GO Transit operates commuter rail service from Downtown Kitchener to Union Station in Toronto on weekdays with several stops along the route. GO Transit operates bus service to Mississauga and Milton, from Sportsworld terminal, an on-street stop at Hespeler Road and Pinebush Road, and at Smart Centres Cambridge. VIA Rail currently provides service to Toronto and London (and onward destinations) from the downtown Kitchener VIA station.

In 2015, the “Cambridge on the GO” initiative completed a Business Case for the extension of GO Transit rail service from Milton to Cambridge on the CP Rail Galt Subdivision. In 2018, the Region commissioned a study to examine the feasibility of GO Transit rail service from Guelph to Cambridge using the CN Rail Fergus Subdivision. Although these initiatives are still under study, potential GO stations on either line could be situated to provide direct connections to Stage 2 ION.

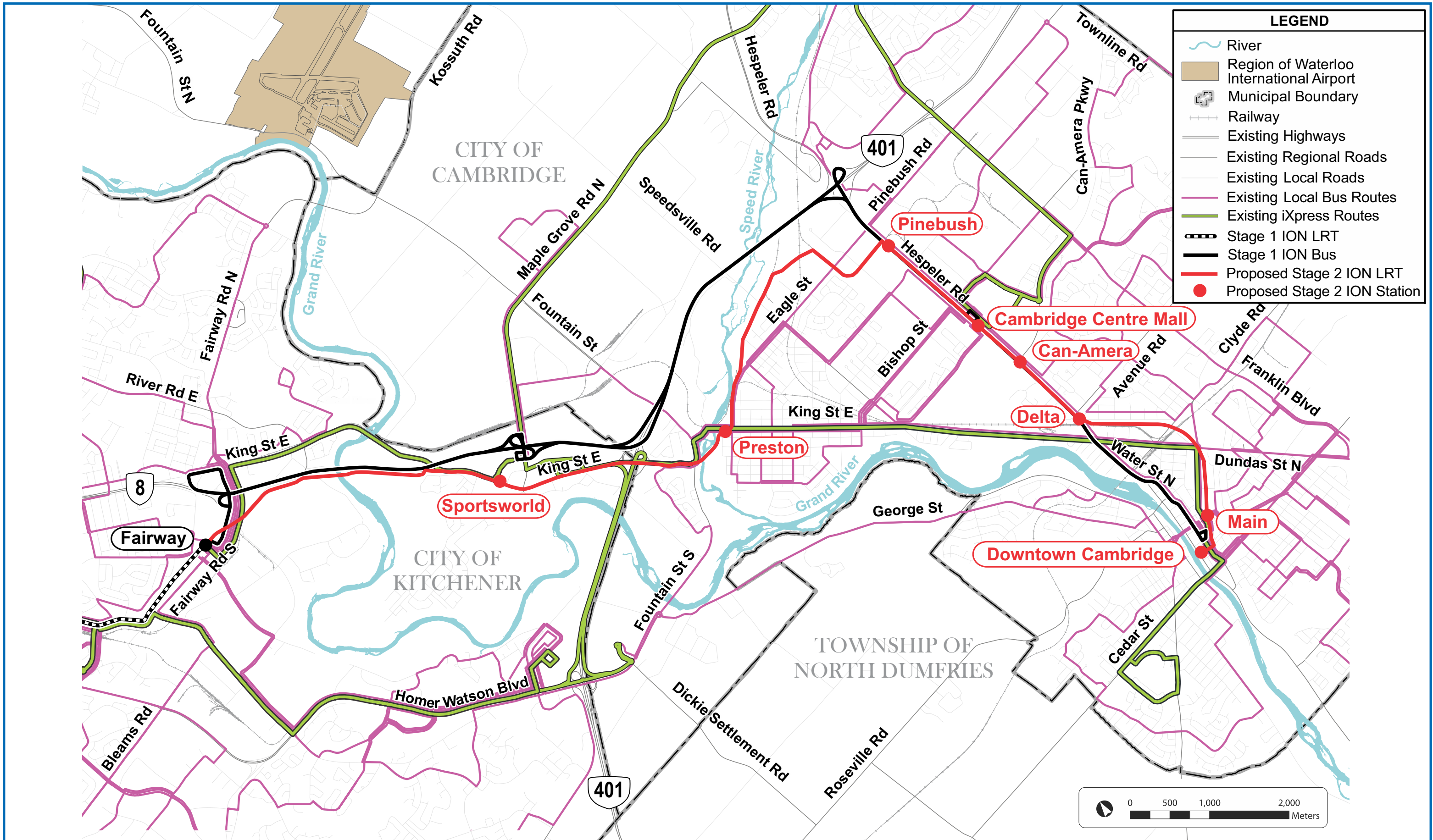
Intercity bus carriers Greyhound and Coach Canada serve different locations in the Region. Greyhound’s services are provided at Sportsworld Terminal, with regular services on weekends and weekdays. Coach Canada also provides full week service from the Ainslie Street Transit Terminal between Cambridge to Hamilton.

5.4.3 Cycling and Pedestrian Facilities

The Region has a wide network of existing and planned active transportation facilities including bike lanes, sidewalks, multiuse paths and trails; see **Figure 5-23**. One of the most effective strategies for the Region to achieve its walking and cycling mode share goals is to encourage more active transportation by providing a safe, comfortable and convenient network of facilities. By providing attractive cycling facilities to LRT stations, the catchment area can be significantly increased.

In Kitchener, close to Fairway Mall, a dedicated bike lane runs along Manitou Drive (including a physically separated section south of Bleams Road) and connects with Homer Watson Park via a multi-use trail. The Toyota Motor Manufacturing facility is indirectly connected to the Sportsworld Terminal and the Sportsworld commercial complex via the nearby on-road bike lanes on Maple Grove Road (between Fountain Street North and Gateway Park Drive). The Maple Grove cycling facilities are likely to be upgraded to include some form of physical separation from the traffic lanes as part of the ongoing Maple Grove Road Environmental Assessment, being carried out separately by the Region.

In Cambridge, one of the popular stone dust trails is the Bob McMullen Linear Trail located in the Preston area of North Cambridge. The trail heads are along Hamilton Street at Bishop Street and Chopin Drive, with a parking lot at the entryway. The Mill-Run Trail is a 6.5 km natural stone dust trail from Riverside Park in Preston, crossing the Speed River and passing through Russ Street and Speedsville Road, and ultimately under Highway 401, providing a key highway crossing for cyclists and pedestrians.





Hespeler Road is connected to a number of streets with existing dedicated bike lanes including Bishop Street, Conestoga Boulevard and others which offer comfortable cycling routes to and from Hespeler Road.

In Downtown Cambridge, Mill Creek Trail runs parallel to Mill Creek between Soper Park and Main Street. The Grand Trunk Trail in Downtown Cambridge connects both sides of the Grand River via a new pedestrian bridge located just south of Bruce Street.

The Region's vision for walking and cycling was established in the Active Transportation Master Plan "Walk Cycle Waterloo" (2014) and updated in the Region's 2018 "Moving Forward" TMP. The successful implementation of this vision would encourage residents and visitors of the area to mobilize active transportation alternatives throughout the Region. This plan helps achieve the Region's "Vision for a sustainable and liveable Waterloo Region" and supports its Official Plan.

The City of Kitchener's Cycling and Trails Master Plan was approved by City council in October 2020. Extensive public feedback was part of the process of the developing these master plans.

The City of Cambridge's newly released Cycling Master Plan "Bike Your City" (approved in October 2020) encourages bicycle use by developing an integrated network of off-street trails and on-street bike facilities. The proposed bikeway network from the plan includes a multi-use trail along Shantz Hill and separated facility along both Hespeler Road and Wellington Street.

5.4.4 Utilities

There are several utility providers, both public and private, with infrastructure in the study area. These are summarized below. As part of a future design phase, more detailed information on existing and planned utilities within the study area and consultation with the utility companies will be required to further examine potential impacts and relocation needs.

(1) Municipal Services

Municipal services include water treatment and distribution (watermains), stormwater (storm sewers) and sanitary sewers. The municipal services within the study area fall under the jurisdictions of the Region of Waterloo and the Cities of Kitchener and Cambridge, depending on the service and the geographical area. The water and sanitary systems include larger trunk networks combined with smaller watermain and sewer systems for local distribution, and individual service connections to properties. These are all located underground, with above ground supporting appurtenances such as valves, maintenance access holes and fire hydrants. The stormwater management system includes ditches or curb and gutter, catch basins, storm sewers, outfalls and stormwater management ponds. Further information about the stormwater management system is found in Section 5.1.7, Water Resources.

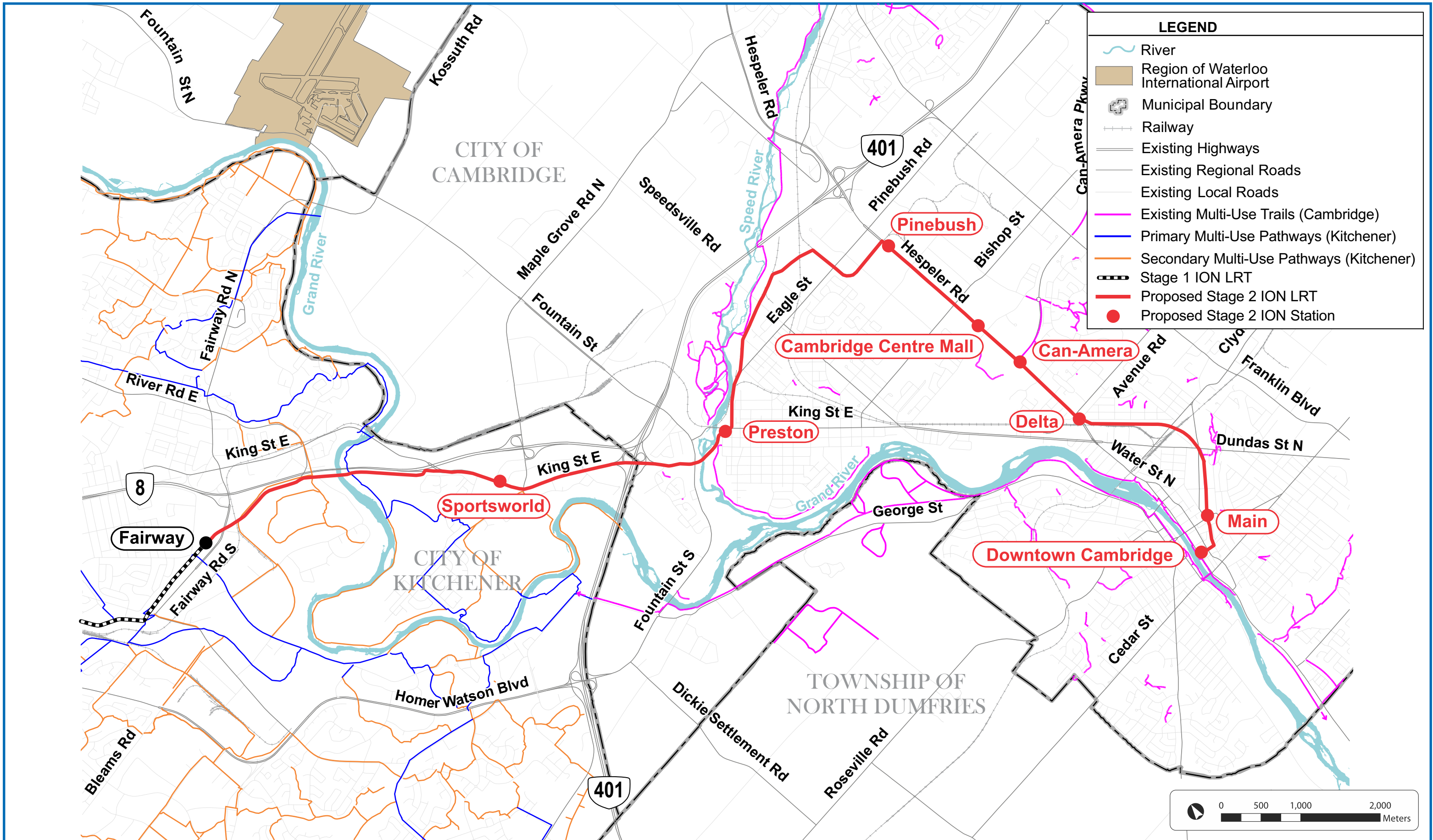




Figure 5-25: Hydro One Substation

(2) Electricity

The distribution and/or transmission of electricity is under the jurisdiction of Energy+, Kitchener-Wilmot Hydro, and Hydro One. A major Hydro One corridor is located in the northern part of the study area, including both underground and overhead facilities crossing the Fairview Park Mall parking lot. Within this corridor, Hydro One has a major substation just east of the Fairway ION Station that transitions underground Hydro to aerial cables crossing Fairway Road South. East of this location, there are two major electrical facilities between

Fairway Road and Hidden Valley Road: Kitchener-Wilmot Hydro's Transformer Station TS 7, and Hydro One's Freeport Substation. Both facilities have extensive infrastructure on site, with tower lines across Fairway Road and paralleling Hidden Valley Road.

(3) Gas

Natural gas distribution services are provided in Kitchener by Kitchener Utilities and in Cambridge by Enbridge. Most of the roads where Stage 2 ION will be implemented parallel or cross existing 4, 6 and 8-inch steel and plastic 420 kPa gas distribution pipelines within the road rights-of-way. Significant gas plant includes:

- » A 6-inch diameter steel main crossing King Street West at the intersection of Sportsworld Drive
- » A 10-inch diameter steel 3450 kPa pipeline along the west side of Eagle Street North between Witmer Street and Hespeler Road, this main crosses Pinebush Road south of Hespeler Road
- » An Enbridge distribution regulator station located at the corner of Bruce Street and Wellington Street South

(4) Telecommunications

Telecommunication providers that have been identified as having plant within the study area include Bell Canada, Rogers, Telus and Zayo. This telecom infrastructure includes both aerial and buried fiber optic and coaxial cables most commonly located along roadway boulevards on hydro poles or in buried conduit.

Along the Stage 2 ION LRT corridor, the following locations have been identified as containing critical Rogers plant:

- » Fairview Park Mall
- » King Street W and Eagle Street intersection

- » Hespeler Road intersections at Pinebush Road, Bishop Street, Can-Amara Parkway and Avenue Road
- » The entirety of the Downtown Cambridge Area

5.4.5 Railway Operations

The two main freight railway companies operating within the Region and study area are Canadian Pacific Railway (CP Rail) and Canadian National (CN) Rail; see **Figure 5-26**.

Within the Stage 2 ION LRT study area, CP Rail operates on two key corridors:

- » The Waterloo Subdivision runs parallel to Fairway Road in Kitchener, passes under Highway 8 and crosses King Street East at-grade, and then continues in a north-south direction along the north/east side of King Street. CP Rail operates two siding/working track areas, located just east and west of Maple Grove Road, and adjacent to Fountain Street North (Hagey Yard). A spur line provides service to the Toyota Manufacturing Plant on Maple Grove Road. South of Highway 401, the CP Rail Waterloo Subdivision follows an embankment adjacent to Riverside Park, crosses the Speed River adjacent to King Street East, and then parallels the Speed River to a level crossing of Eagle Street North between William Street and Hedley Street. In addition to the main track along the Speed River between King Street and the level crossing, CP Rail also maintains additional track for operational needs and storage. The Waterloo Subdivision crosses under Hespeler Road at a grade separation between Avenue Road and Coronation Boulevard/Dundas Street North, and joins the CP Rail Galt Subdivision near Dundas Street and Samuelson Street.
- » The Galt Subdivision follows an east-west direction adjacent to Samuelson Street in Cambridge and crosses the Grand River. The area around Dundas Street and Samuelson Street, where the Galt and Waterloo Subdivisions join, is a works yard. The former Lake Erie and Northern Railway and Great Western Railway, which is no longer present in the corridor, operated in a corridor paralleling Grantham Road, crossing Beverly Street at Dundas Street and along the Mill Creek into Downtown Cambridge. The railway line has been removed, however a concrete bridge carrying the CP Rail Galt Subdivision over this corridor, referred to as the Grantham Rail Bridge, remains in place.

CP Rail also owns an unused spur line which is located off the Waterloo Subdivision from the Eagle Street level crossing to near Highway 401. While remnant tracks are still present, rail service has not operated on this line in many years. A portion of the 2019 Council endorsed Stage 2 ION LRT route will utilize this corridor.

Based on video survey at key rail crossing locations within the study area conducted in late 2015, CP Rail operates an average of 3 trains per day along the section of the Waterloo Subdivision through the study area and an average of 4 trains per day along the Galt Subdivision through Cambridge. It should be noted that most freight services are adapted as needed to meet customer requirements, and in cases where deliveries



do follow a more routine schedule (e.g. certain days or time of day), these are updated regularly.

CN Rail's Guelph Subdivision crosses Highway 401 between Speedsville Road and Hespeler Road. South of Highway 401, the main track continues south across Eagle Street North at a level crossing, through the residential subdivision and then parallel to the CP Rail Waterloo Subdivision between Dolph Street North to its terminus at an industrial facility adjacent to Coronation Road. South of Highway 401, a spur track exits the mainline, crosses Eagle Street at grade, and travels through an industrial area to Hespeler Road. A portion of the Stage 2 ION LRT corridor is located parallel to this industrial spur.

It is understood that CN Rail does not operate regular freight services on either the mainline or the spur track; at present, a local freight service provides scheduled deliveries to one customer located between Eagle Street and Hespeler Road.

