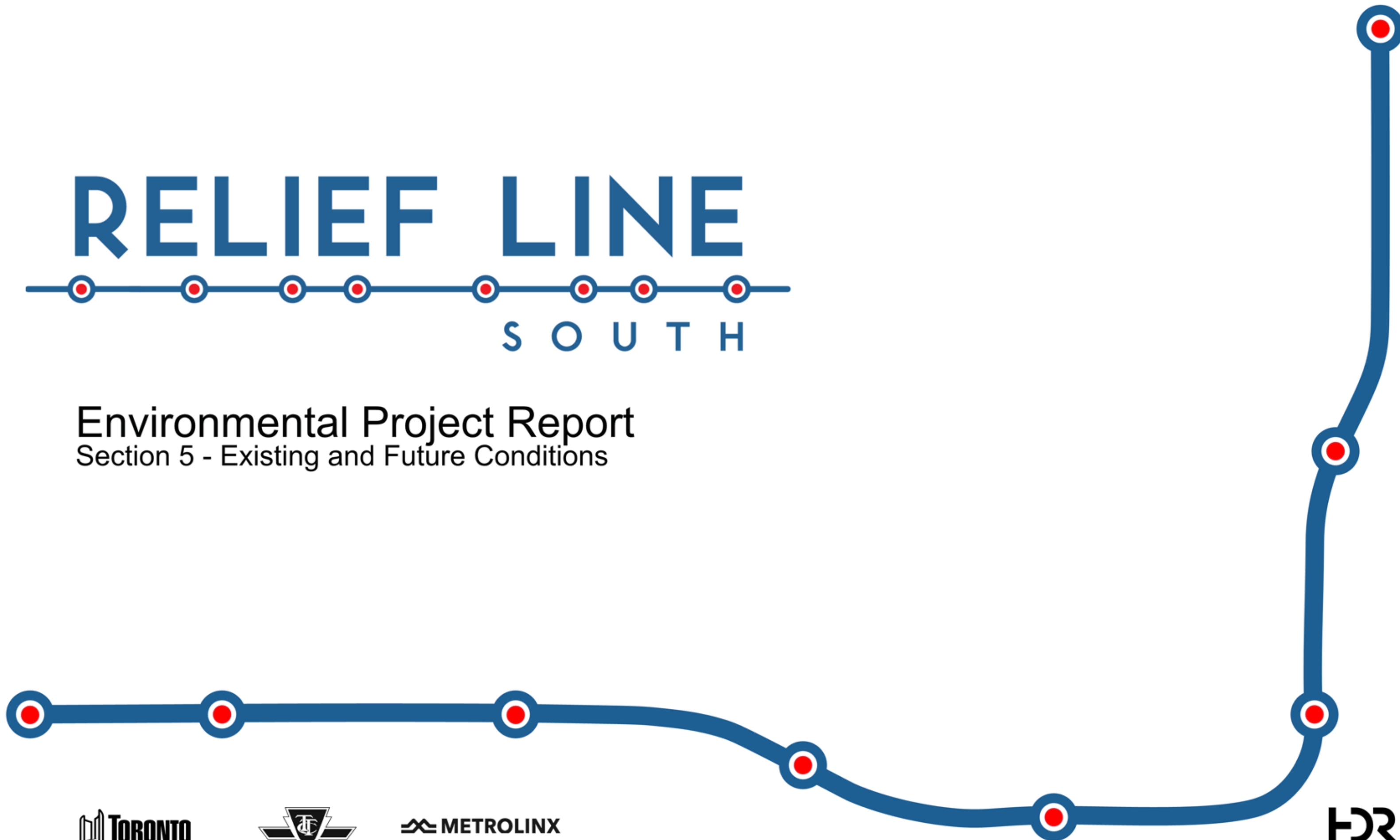


RELIEF LINE



Environmental Project Report Section 5 - Existing and Future Conditions



5 Existing and Future Conditions

The description of the existing and future environment within the study area is presented in this section to establish an inventory of the baseline conditions against which the potential impacts of the project are being considered as part of the Transit Project Assessment Process (TPAP). Existing transportation, natural, social-economic, cultural, and utility conditions are outlined within this section. More detailed findings for each of the disciplines have been documented in the corresponding memoranda provided in the appendices.

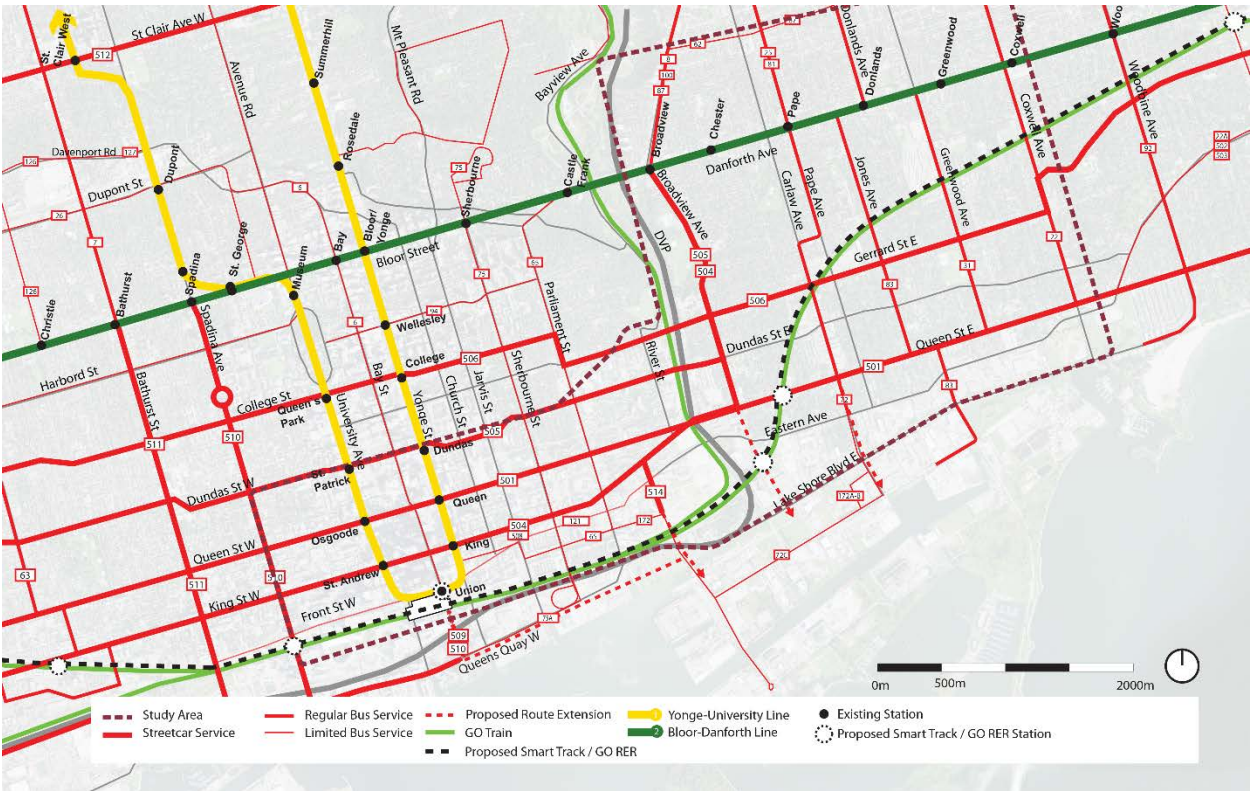
5.1 Transportation

An inventory of the existing local and regional transit, vehicular, cycling and pedestrian transportation networks in the study area is outlined below.

5.1.1 Existing Transit Network

This section documents the existing transit network within and around the study area, shown in **Figure 5-1**.

Figure 5-1: Transit Network within the Study Area



The study area is unique in that it is served by most transit modes that make up the Greater Toronto Area's (GTA's) transit network, including:

- TTC Subway – High-speed, high-capacity rapid transit serving both long distance and local travel.
- TTC Streetcar – Low-speed surface routes operating on fixed rail in mixed traffic lanes (with some exceptions), mostly serving shorter-distance trips into the downtown core and feeding to / from the subway system.
- TTC Conventional Bus – Low-speed surface routes operating in mixed traffic, mostly serving local travel and feeding subway and GO stations.
- TTC Express Bus – Higher-speed surface routes with less-frequent stops operating in mixed traffic on high-capacity arterial roads, connecting neighbourhoods with poor access to rapid transit to downtown.
- GO Rail - Interregional rapid transit primarily serving long-distance commuter travel to the downtown core (converging at Union Station).
- GO Bus - Interregional bus service primarily serving long-distance commuter travel to the downtown core (converging at Union Station).

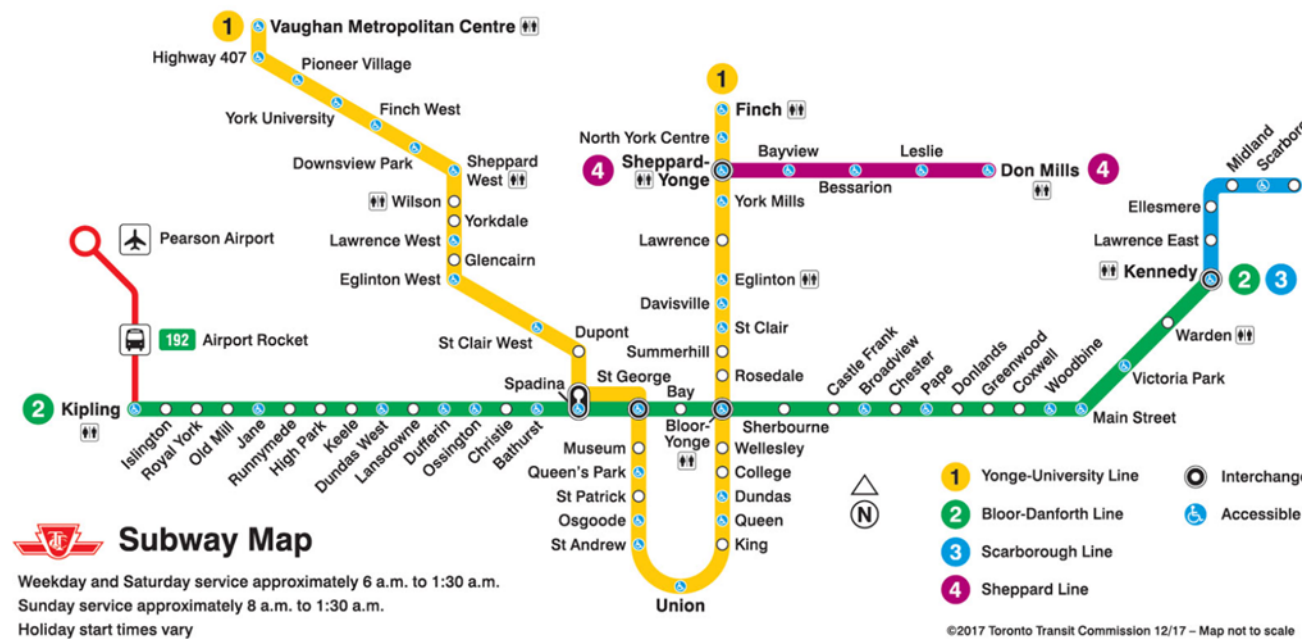
TTC Subway

The TTC subway network, shown in **Figure 5-2**, is a high-speed, high-capacity rapid transit service that is the primary transit access to the downtown core from within the City of Toronto. The downtown core is served by the U-shaped Line 1, which runs underneath Yonge Street in the east, and mainly University Avenue and Spadina Road to the west.

Both the Yonge and University legs of Line 1 have stops at King, Queen, Dundas and College Streets to serve the downtown core. All four roads have a corresponding TTC streetcar service on the surface which facilitates convenient transfers for passengers. The most southerly stop on Line 1 is at Union Station which is served by several TTC bus routes.

Immediately north of the downtown core, both the Yonge and University legs of Line 1 (Yonge-University) intersect the cross-town Line 2 (Bloor-Danforth) that runs east-west underneath Bloor Street west of the Don Valley and Danforth Avenue east of the Don Valley. Line 2 stretches from Kipling Avenue in the west to Kennedy Road in the east.

Figure 5-2: TTC Subway Network (Toronto Transit Commission, 2017)



At suburban terminal stations and other stations located near termini, commuter parking, and passenger pick-up and drop-off (PPUDO) facilities in addition to local transit service connections are provided for connecting passengers.

As they are vital links in Toronto’s transit network, demand for both subway lines is very high and as such the TTC runs both lines at their maximum practical capacity during peak periods to accommodate demand. Subway train frequencies through the study area during the AM peak period and associated capacities are presented below in **Table 5-1**.

Table 5-1: AM Peak Period TTC Subway Service Summary*

Subway Line	Average Headway	Number of Trains in Peak Hour	Hourly Capacity (pphpd)*
Yonge-University	2 mins 21 sec	26	28,600
Bloor-Danforth	2 mins 21 sec	26	26,000

Source: TTC Service Summary September 3, 2017
* Hourly capacities calculated based on Toronto Rocket trains exclusively serving Line 1

Currently, Line 1 operates an average of 26 trains per hour at peak times. Since the end of 2014, all train-sets used on Line 1 are the newer Toronto Rocket (TR) model, which have a design capacity of 1,100 passengers per train. This results in a planning hourly peak-direction capacity of the current system of 28,600. Even with this improvement, the line operates at least 11% over capacity, regularly carrying over 31,000 passengers per hour peak direction (pphpd).

In response to growing demands on the subway network, particularly on the Yonge subway leg, the TTC has begun an extensive capacity improvement program on Line 1. This includes the recent conversion of the Line 1 subway fleet to Toronto Rocket cars and the replacement of the signalling system to allow for Automatic Train Control/Operation (ATC/ATO). Additional

information on the Line 1 subway capacity improvement initiatives can be found in **Section 5.1.2**.

Surface Transit

The TTC streetcar and bus network provides local and express services, generally following the grid network within the downtown core. In the downtown core, east-west streetcars operate in mixed traffic on King Street, Queen Street, Dundas Street, and College Street. A partially grade-separated right-of-way on Queen’s Quay provides service along Toronto’s Harbourfront and connects to Union Station.

Streetcar services are provided by a fleet of 152 Canadian Light Rail Vehicles (CLRV) with a planning capacity of 75 passengers per vehicle, and 43 Articulated Light Rail Vehicles (ALRV) with a planning capacity of 108 passengers per vehicle. In August of 2014, TTC started introducing its next generation Flexity M-1 streetcars into revenue service. A fleet of 204 29 metre long articulated low-floor vehicles, each with a planning capacity of 130 passengers, will eventually replace all of the CLRV and ALRV vehicles.

The 502 Downtownier streetcar only operates during weekdays and is similar to the 501 Queen service except that it diverts onto Kingston Road towards Scarborough. The 503 Kingston Road streetcar service only operates during the AM and PM peaks in the peak direction of travel (inbound to the downtown core in the AM and outbound in the PM). These routes are similar to services on King and Queen Streets in the downtown core but there are route variations outside of the downtown area. Off-peak service, including weekends, typically has ten minute or better headways for all routes in the downtown core.

Although the majority of surface transit service in the downtown core is provided by streetcars, there are several bus services within the study area, primarily serving north/south arterial roads. East-west bus service is limited to premium express buses. These express buses only operate during peak periods and require an additional fare supplement. There are five express bus routes that travel through the study area. When crossing the downtown core, eastbound buses use Adelaide Street while westbound buses use Richmond Street. The five routes are as follows:

- 141 Downtown / Mount Pleasant Express
- 142 Downtown / Avenue Rd Express
- 143 Downtown / Beaches Express
- 144 Downtown / Don Valley Express
- 145 Downtown / Humber Bay Express.

Surface routes are an important aspect of downtown transit as they are used for local trips within downtown. Also, many streetcar routes are the primary mode for transit users who live in the areas immediately adjacent to the downtown core. Many surface routes will intersect with the Relief Line South.

Table 5-2 presents a brief service summary for the surface routes that serve the study area including information on frequency and capacity during the AM peak period. The “Downtown Express” routes are not shown since they operate only a few trips per day and their capacity is minimal when compared to the other surface routes.

Table 5-2: AM Peak Period TTC Surface Route Service Summary*

Transit Route	Average Headway	Number of Vehicles in Peak Hour	Hourly Capacity (pphpd)
6 Bay	3 mins 15 sec	18	900
65 Parliament	16 mins	4	200
72 Pape	7 mins	9	450
75 Sherbourne	7 mins 30 sec	8	500
83 Jones	12 mins	5	250
501 Queen	5 mins 10 sec	12	1,250
502 Downtowner / 503 Kingston Rd	6 mins	10	750
504 King / 508 Lake Shore EB	4 mins + Trippers	15 + Trippers	2,440
504 King / 508 Lake Shore WB	4 mins + Trippers	15 + Trippers	1,630
505 Dundas	5 mins 15 sec	11	830
506 Carlton	3 mins 45 sec	16	1,200
510 Spadina	2 mins 30 sec	24	1,800

* Based on TTC service data received in 2012

GO Transit

GO Rail is a regional heavy rail service with high-speed and high capacity trains but low frequencies and a limited number of stations. It is also dependent upon and limited to existing rail corridors and available parking at each station. As such, GO Rail is primarily a competitive travel mode choice for persons living outside the City of Toronto and travelling into the downtown core for work.

The GO Transit rail network, as shown in **Figure 5-3** is a radial commuter rail network consisting of seven lines that serve the Greater Toronto and Hamilton Area (GTHA). All seven lines converge at Union Station in Downtown Toronto, the only existing GO Rail Station within the study area. There are direct connections to the TTC’s Line 1 subway at Union. At most other GO Transit stations, commuter parking, kiss and ride, and connections to local transit service are provided.

Figure 5-3: GO Transit Network (Metrolinx, 2017)



Most GO Rail routes now provide some level of off-peak service, with the exception of the Milton and Richmond Hill lines, which only operate in the AM and PM peak periods in the peak direction of travel (inbound in the morning, outbound in the evening). In addition to peak service, the Lakeshore corridor (Lakeshore East and Lakeshore West lines) offers two-way all-day service with half-hour headways during off-peak periods between Aldershot and Oshawa. From June 2017, service on the Stouffville line has been increased to approximately every half hour in both directions during weekday midday and evening periods. On the Kitchener Line, mid-day service is provided between Mount Pleasant GO and Union Station approximately every hour in each direction.

Seated capacities for GO Train cars range from 136 to 162 depending on the car model while standing total “crush load” capacity is estimated at approximately 276. For capacity analyses undertaken for RLPA, seated capacity is assumed to be the threshold while persons per train-car are assumed to be 160 for simplicity. A brief GO Rail service summary for the AM peak hour is provided in **Table 5-3**.

Table 5-3: GO Rail AM Peak Hour Service Summary

GO Train Line	AM Peak Hour Number of Trains*	Hourly Capacity (pphpd)**
Lakeshore East	9	17,496
Lakeshore West	13	25,272
Milton	9	17,496
Kitchener	5	9,720
Barrie (Bradford)	6	11,664
Richmond Hill	4	7,776
Stouffville	5	9,720

*Arriving at Union Station, based on 2018 service

** Peak hour capacity based on 162 people per coach, assuming 12-car trainsets on all lines

The GO rail lines that enter downtown from the east including Lakeshore East, Stouffville and Richmond Hill, all intersect the study area and the Relief Line South corridor. Just outside of the study area, Danforth Station is also serviced by the Stouffville and Lakeshore East lines. As such, strong multi-modal opportunities exist between the Relief Line South and the aforementioned GO Rail services. The Relief Line South could provide additional relief to these train services before they enter the Union Station Rail Corridor (USRC), alleviating demands at Union Station.

Despite GO Rail's continuing popularity with Toronto-area commuters, its ability to provide enough service to match demands is currently constrained by its infrastructure. Infrastructure constraints include:

- Track signals cannot accommodate more frequent train service
- Platform length constraints across the network, cannot add extra cars
- Union Station's limited number of platforms
- Train capacity – 162 seats per car.

GO Transit and Metrolinx are working to address this issue by upgrading their infrastructure and increasing the capacity of the network. The GO Electrification Study (2010) found that “there are transportation and economic benefits to electrification”, as converting from diesel to electric trains would enhance service speeds and frequencies, allowing the GO Rail network to serve more trips and provide faster service compared to today. Metrolinx is proceeding with the improvements, including electrification, necessary for increased service through their 10-year Regional Express Rail (RER) program.

With the exception of the number 16, Hamilton – Toronto Express bus, all peak-hour GO Transit service to the downtown core is provided by GO Rail.

5.1.2 Future Transit Network

TTC Subway

Increased Capacity on the Yonge Line

The existing capacity of Line 1 is 28,600 passengers per hour; however, Line 1 consistently approaches or exceeds capacity during the AM peak hour. Therefore, the TTC is implementing infrastructure and system upgrades that will result in a significant increase in capacity - 45% in system capacity compared to 2010 levels (prior to the full roll-out of TR vehicles).

As mentioned, the TR cars provide an additional 10% capacity per train and have made up the entire fleet of Line 1 since the end of 2014, increasing system capacity to 28,600 passengers per hour.

Current operations are constrained both by the current signaling system that limits the maximum number of trains that can be operated on the line, and by passenger congestion at Bloor-Yonge Station that results in extended dwell times. There is no opportunity to increase train throughput without changes to these constraints.

The replacement of Line 1's 50-year old signaling system with ATC/ATO technology is planned to be completed by 2020. The new signal system is expected to allow the operation of additional trains on Line 1. Current operations achieve a train frequency of one train every 2'20". The new signaling system will be capable of increasing this to one train every 1'50". This will increase the maximum capacity possible on the line by approximately 25%.

Overall, the full TR roll-out and ATC/ATO programs will increase theoretical capacity from the current 28,600 passengers per hour to 36,000 passengers per hour in 2021. The achievement of this increase in capacity assumes that station capacity improvements, particularly at Bloor-Yonge Station, will be implemented to allow for a throughput of trains every 1'50" and effective line management procedures are in place to manage random incidents that occur on the line to minimize delays.

In the longer term it may be possible, with the precise stopping capability of ATC/ATO operation, to lengthen the trains utilized on Line 1 by 10% while maintaining the physical structure of the existing stations. This is not part of the TTC's current plans but could be considered at some future time as another mechanism to increase the passenger carrying capacity of the line.

Capacity increases from improvements at Bloor-Yonge Station are unknown at this time. In addition, there are no funded programs in place to increase capacity on Line 2 at this time. However it is probable that many initiatives to increase capacity on Line 1 can be implemented on Line 2.



Scarborough Subway Extension

The City of Toronto, together with the Toronto Transit Commission (TTC), is planning an extension to the Bloor-Danforth Subway (Line 2) to better serve residents. The Scarborough Subway Extension (SSE) will replace the aging Scarborough RT and contribute to an integrated and comprehensive rapid transit network that will improve transit service in Scarborough and across Toronto. On October 30, 2017, the Transit Project Assessment Process was completed with the Minister of the Environment, Conservation and Parks Notice to Proceed, which satisfies the requirements of the Environmental Assessment Act.

Surface Transit

By the 2031 horizon year, the largest improvement to surface transit capacity and service within the study area will be the replacement of the existing streetcar fleet with Low-Floor Light Rail Vehicles (LFLRVs). Starting in August 2014, the TTC began a gradual replacement process spread over a number of years. The planning capacity for a LFLRV vehicle is about 130 passengers per vehicle.

Additionally, the City and TTC intend to expand Transit Signal Priority initiatives throughout the downtown core along streetcar routes. Transit Signal Priority at signalized intersections gives transit vehicles extra green time or less red time to reduce the time they are slowed down by traffic signals. This will improve travel times along streetcar routes and in theory could increase vehicle throughput, and therefore improve line capacity.

The current streetcar fleet replacement program does not plan for fleet expansion to absorb future demand; however, it is likely that additional vehicles can be acquired to do so. The capacity of the streetcar routes in 2031 can therefore theoretically be adjusted as required to match line demands; however, signal priority is less effective when streetcars operate more frequently than every three minutes through the dense grid of downtown traffic signals. Although two-minute headways are theoretically achievable, the quality and reliability of services is decreased and it therefore becomes a less attractive mode for passengers. This reflects a theoretical capacity greater than the practical average capacity. Due to this undesirable impact, it is prudent to assume that surface routes cannot be operated at a frequency greater than a vehicle every three minutes.

Streetcar route capacities for the routes that travel through the study area with the new LFLRVs in service are summarized in **Table 5-4** for two possible service frequency scenarios:

- 1. Assuming existing service frequencies
- 2. 3-minute headways for all routes

Table 5-4: Streetcar Capacity Assumptions

Streetcar Number	Streetcar Description	Capacity with Existing LRVs at current service frequencies*	Capacity with New LRVs at current service frequencies*	New LRVs at 3 Minute Headways**
501	Queen	1,250	1,560	2,600
502 / 503	Downtowner / Kingston Rd	750	1,300	2,600
504/508 EB	King / Lake Shore	2,440	3,900	2,600
504 WB	King	1,630	2,110	2,600
505	Dundas	850	1,430	2,600
506	Carlton	1,270	2,080	2,600
510	Spadina	1,780	3,120	2,600

*Capacities in the Existing LRVs and New LRVs columns are based on existing (2012) headways

**The capacity for the new LRVs with 3 minute headway is based on a 130 load standard

In January 2015, all-door boarding began on the King Streetcar to reduce dwell times. This practice is now in place on all streetcar routes.

While the Relief Line South may defer the need for additional streetcar purchases as it may divert demand from the area adjacent to the downtown core from streetcar services to the Relief Line South, this may not always be the case. Passengers have specific origins and destinations along their original streetcar line and the inconvenience factor with taking a north-south transit service or walking to access the Relief Line South may outweigh the benefits of a slightly faster or more reliable east-west trip. Therefore, it is likely that the future streetcar network will complement the Relief Line South, serving finer-grained trip patterns and further strengthening Toronto's transit network in the downtown core and communities adjacent to it.

Bus routes due to their local nature and minimal impact on transit capacity in the downtown area have not been included in this discussion as existing service levels are relatively low and they can be adjusted based on local demand.

Regional Express Rail

Regional Express Rail (RER) is Metrolinx's program to transform the GO rail network from a primarily rush hour commuter service to frequent, two-way, all-day service on most corridors, with electrified service in core sections of the GO rail network. Every area of the GO rail network will see improvements, whether through more two-way, all-day service, or more rush-hour train trips. The RER program includes:

- Electric trains running every 15 minutes or better, all day in both directions, within the most heavily travelled sections of the network;
- Four times the number of trips outside of weekday rush-hour periods, including evenings and weekends; and
- Twice the number of trips during weekday rush-hour periods.

RER involves track improvements (i.e. grade separations, adding tracks), electrified service (i.e. installation of electrification infrastructure, introduction of electrified rolling stock) and station improvements (i.e. Union Station renovation, state of good repair works at existing stations, new stations).

As part of RER, two new stations are planned in the City of Toronto on the Barrie rail corridor:

- Bloor-Lansdowne; and
- Spadina-Front.

SmartTrack

The City of Toronto's SmartTrack initiative uses the existing GO rail network to provide additional transit options within Toronto. SmartTrack builds upon the RER program and includes planned rapid transit service along three GO rail corridors (Kitchener, Lakeshore East and Stouffville) and along Eglinton Avenue West (Eglinton West LRT). SmartTrack will include six new rail stations and LRT service along the Eglinton Avenue West corridor from Mount Dennis to the Mississauga Airport Corporate Centre and Pearson Airport.

New Stations

SmartTrack includes six new stations on the Kitchener, Lakeshore East and Stouffville GO rail corridors as follows, and as shown in **Figure 5-4**:

- Finch-Kennedy and Lawrence-Kennedy Stations on the Stouffville corridor;
- Gerrard-Carlaw and East Harbour Stations on the Stouffville/Lakeshore East corridors; and
- King-Liberty and St. Clair-Old Weston Stations on the Kitchener rail corridor.

The EPR for the New SmartTrack Stations was filed on July 19, 2018.

SmartTrack/Relief Line South rapid transit hubs will emerge at two locations – East Harbour and Gerrard-Carlaw. Planning and design for these stations for both projects is being collaborated on. The Gerrard-Carlaw Station for SmartTrack and the Gerrard Station for Relief Line South are being designed to share a primary entrance at the northeast corner of Gerrard Street East and Carlaw Avenue.

Eglinton West LRT

The SmartTrack project concept includes the Eglinton West LRT from Mount Dennis to the Mississauga Airport Corporate Centre and into Pearson International Airport. This westerly extension of the ECLRT will close a gap in the regional and local transit network and provide continuous rapid transit access to communities across the City and the airport. Planning for the project is underway for the Toronto Segment (from Mount Dennis to Renforth Station/Commerce Boulevard) and the Airport Segment (from Renforth Station to Pearson International Airport).

The Eglinton West LRT will connect the Airport Employment Zone to Downtown Toronto and other key regional destinations through direct connection to the Regional Express Rail network and Mississauga Transitway. As a local transit improvement, the Eglinton West LRT will provide local communities with more reliable, higher-capacity, faster service to replace existing local buses.

Figure 5-4: Existing and Proposed GO/SmartTrack Stations (SmartTrack, 2018)



LRT Expansion

Three LRT lines located in the inner suburbs of Toronto have received funding from the Province of Ontario and are expected to open by the 2031 horizon year. All lines will have direct connections to the TTC subway network and have direct impacts on transit demand entering the downtown. These LRT lines include:

- Eglinton Crosstown LRT (ECLRT)
- Finch West LRT (FWLRT)
- Sheppard East LRT (SELRT)

Six other new LRT lines and the Eglinton Crosstown extension to the airport have been proposed, but have not yet received provincial funding and their associated environmental assessment work has been put on hold. These include:

- Don Mills LRT
- Jane LRT
- Eglinton East LRT (formerly Scarborough Malvern LRT)
- Eglinton West LRT
- Sheppard East LRT from Morningside to Meadowvale
- Waterfront LRT

All LRT lines presented above are illustrated in **Figure 5-5**. A brief description of each follows.

Figure 5-5: Future Network Map from TTC’s Corporate Plan 2018-2022 (Toronto Transit Commission, 2018)



The **Eglinton Crosstown LRT (ECLRT)**, scheduled for 2021 operation, is a roughly 19 km LRT line between Mount Dennis Station (Weston Road) in the west and Kennedy Station in the east. The portion of the line between Keele Street and Brentcliffe Road will be completely underground with direct connections to Line 1 at Eglinton and Eglinton West stations. The ECLRT east of Brentcliffe Road to Kennedy Station is proposed to be in a semi-exclusive right-of-way in the median of Eglinton Avenue East. The underground section of the route presents an opportunity to divert some ridership from the Bloor-Danforth subway to the ECLRT for some trip patterns, including those destined to downtown.

Phase 1 of the **Finch West LRT line (FWLRT)**, scheduled for 2023 operation, is an 11 km long LRT line between Humber College (Highway 27) in the west and the Finch West subway station on the Spadina Subway Extension. Like the ECLRT at-grade section, the FWLRT will operate in a semi-exclusive right-of-way in the median of Finch Avenue West. The FWLRT is expected to direct transit riders to the western leg of the Yonge-University-Spadina subway line. Phase 2 of

the FWLRT, between Finch West subway station and Finch subway station on the Yonge subway line has not yet been funded.

The **Sheppard East LRT (SELRT)** is a 14 km long LRT line between Don Mills Station in the west and Meadowvale Road in the east. It is proposed to operate in a semi-exclusive right-of-way in the median of Sheppard Avenue East, similar to the ECLRT and FWLRT. The project is currently on hold. Originally, Phase 1 from Don Mills Station to Morningside Avenue was funded, and was expected to be operational before 2031. Phase 2 from Morningside Avenue to Meadowvale Road was not funded. The SELRT would connect with the Eglinton East LRT at Morningside Avenue.

The **Don Mills LRT** is an 18km proposed LRT route along the Don Mills Road corridor between Steeles Avenue East in the north and Danforth Avenue in the south (Line 2) “with options for providing continuous service to downtown.” This route was in the Environmental Assessment process before being put on hold in December 2010. No funding has been secured and there is no timeline for completion.

The **Jane LRT** is a proposed 16.5km LRT route along the Jane Street corridor between Steeles Avenue East in the north and Bloor Street West in the south (Line 2). This route was also in the Environmental Assessment process before being put on hold in December 2010. The route is currently unfunded with no timeline for completion, however it is included in the Metrolinx Draft 2041 Regional Transportation Plan Proposed 2041 Frequent Rapid Transit Network, and the City of Toronto’s recommended rapid transit to be built within the next 15 years network.

The **Eglinton East LRT** (formerly the Scarborough Malvern LRT) would be an extension of the ECLRT from east and north from Kennedy Station to the Malvern community. Up to 19 stops are planned to serve five Neighbourhood Improvement Areas, and a major hub at the University of Toronto, Scarborough and the Toronto Pan Am Sports Centre. The LRT will be at-grade, except for an underground connection to Kennedy Station and an underground segment through the busy Kingston Road, Lawrence Avenue East and Morningside Avenue area. North of Highway 401, the line would interline with the future SELRT and would serve the area around the Malvern Town Centre via Neilson Road.

The **Eglinton West LRT** is discussed above as part of SmartTrack.

Waterfront LRT

Over the next twenty years and beyond, the eastern section of Toronto’s waterfront will be re-developed as a major mixed-use area with both residential and employment lands just to the southeast of the Financial District and downtown core. Major emerging precincts including the Port Lands, Villiers Island, Unilever Precinct, Lower Yonge, and East Bayfront will be designed to be “transit oriented” communities with high quality transit service connecting these new communities with the downtown core.

The City of Toronto, in partnership with the Toronto Transit Commission and Waterfront Toronto, undertook a Waterfront Transit “Reset” study, including a comprehensive assessment of needs and options for transit improvements for the waterfront area, to plan for the transit to

support this growth. The scope of the Reset included the Waterfront West LRT, which was previously planned as a standalone project from Union Station to Long Branch.

Phase 1 was completed in 2016, which recognized the need for comprehensive planning of transit along the waterfront. It developed a vision “to provide high quality transit that will integrate waterfront communities, jobs, and destinations, and link the waterfront to the broader City and regional transportation network.” Phase 1 identified a gap in transit services planned along the waterfront that coincided with major future population and employment growth, and recommended advancing to Phase 2 of the study.

Phase 2 was completed in January 2018, and recommended a series of streetcar infrastructure projects that will support a range of route and service options that will allow different future demands to be served. This included a new exclusive streetcar right-of-way from Exhibition Place to serve the Humber Bay Shores, improving the underground transit link between Union Station and Queen’s Quay, and implementing the previously-approved South of Eastern and Port Lands transit network. Phase 2 did not come to a conclusion on the preferred solution for the connection to Union Station.

City Council endorsed the overall Waterfront Transit Network Plan from Long Branch to Woodbine shown in **Figure 5-6**, and directed staff to proceed with more detailed follow up planning and design studies for elements of the plan. This work is currently underway.

Figure 5-6: Waterfront Transit Network (City of Toronto, 2018i)



5.1.3 Road Network

The existing road network in the study area is generally a dense grid network composed of major and minor arterial roads, collector roads and local streets as illustrated in **Figure 5-7**. **Table 5-5** provides a brief description for each road classification. Both major and minor arterials carry significant volumes of all forms of traffic and all vehicle types including automobile, truck and transit (bus and streetcar); with Richmond and Adelaide Streets being the preferred east-west route for most downtown bound non-transit vehicles since they are higher speed, higher capacity one-way arterials.

While it is unlikely that the Relief Line South would impact the volumes on arterial and collector roads in the long term, careful consideration will be placed on the construction impacts of the Relief Line South on the road network.

The Don Valley Parkway (DVP) is an expressway running parallel to the Don River that roughly bisects the eastern and western sections of the study area. The Gardiner Expressway runs along the southern boundary of the study area and interchanges with the DVP and Lake Shore Boulevard East at the mouth of the Don River. This interchange, along with the Eastern Avenue interchange at the DVP may pose some issues for at-grade or above-grade structure crossing of the Don Valley. A realignment of the Gardiner Expressway between approximately Lower Jarvis Street to just east of the DVP at Logan Avenue and Lakeshore Boulevard has undergone an Environmental Assessment (EA). The EA was approved by the Minister of Environment and Climate Change on November 22, 2017.

Figure 5-7: Road Classification System (City of Toronto, 2013)



Table 5-5: Road Classification Summary

Road Classification	Function	Daily Traffic (Vehicles per Day)	Other Features	Examples
Local Road	Access to properties	< 2,500	No transit routes Sidewalk on at least on side of the roadway	Degrassi Street, Ontario Street
Collector	Access to properties Some traffic movement	2,500 – 8,000	Local transit routes Sidewalk on both sides of the roadway	Logan Avenue, Cherry Street
Minor Arterial	Traffic movement Some access to properties	8,000 – 25,000	Secondary transit corridor Sidewalk on both sides of roadway Bike lanes may be provided May have curbside parking at off-peak times	Gerrard Street, Front Street, Pape Avenue
Major Arterial	Traffic movement Limited access to properties	> 25,000	Major transit corridor Sidewalk on both sides of roadway Bike lanes may be provided Subject to access controls May have curbside parking at off-peak times	Queen Street, King Street, Jarvis Street
Expressway	Traffic movement No access to properties	> 100,000	Grade separated No transit service	Gardiner Expressway, Don Valley Parkway

5.1.4 Cycling Network

A comprehensive bikeway network for the City, including a strong network in the downtown area, illustrated in **Figure 5-8**, has been developed as part of the City of Toronto's Cycling Network Plan. The bike network presents opportunities to capitalize on multi-modal connections such as integrated Relief Line South station locations. Proposing dedicated, safe cycling facilities promotes connectivity and continuity within the study area, thereby promoting active transportation as a mode of transportation. Improved cycling infrastructure within the study area includes:

- Cycle track on Sherbourne Street;
- Bike lanes along Dundas Street East and Shuter Street;
- Bike routes and bike lanes along Carlaw and Logan Avenues;
- Separated bike lanes along Richmond, Adelaide, and Simcoe Streets in the downtown core;
- Bike lane along Sumach and River Streets linking future waterfront developments with Sumach Street and King/Queen Street East corridors;
- Bike route along The Esplanade and Front Street East; and
- Off-road path along Lake Shore Boulevard East.

A network of approved and funded bike infrastructure was approved by Toronto City Council in 2016.



Figure 5-8: City of Toronto Cycling Network Plan (City of Toronto, 2016)

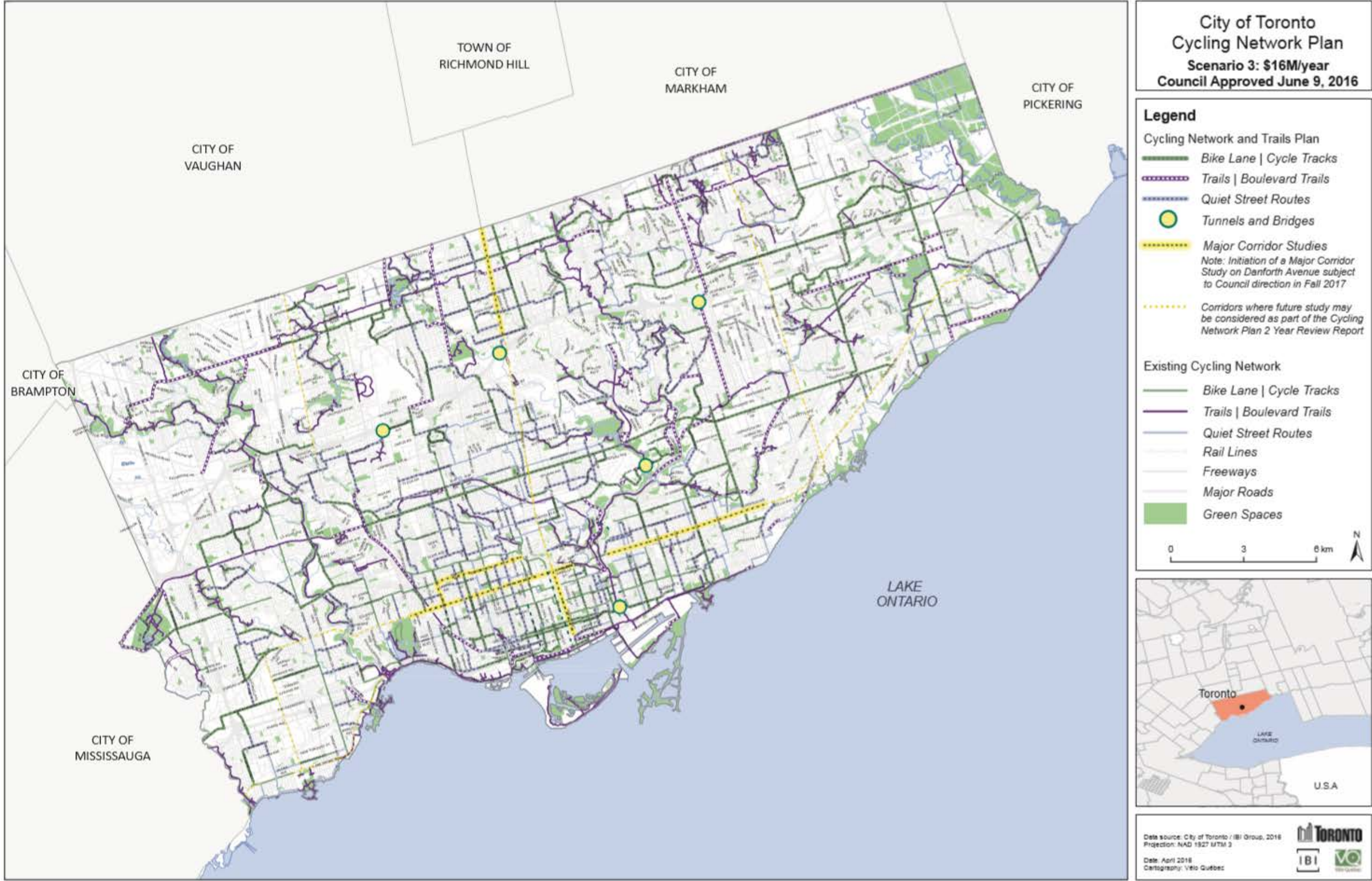
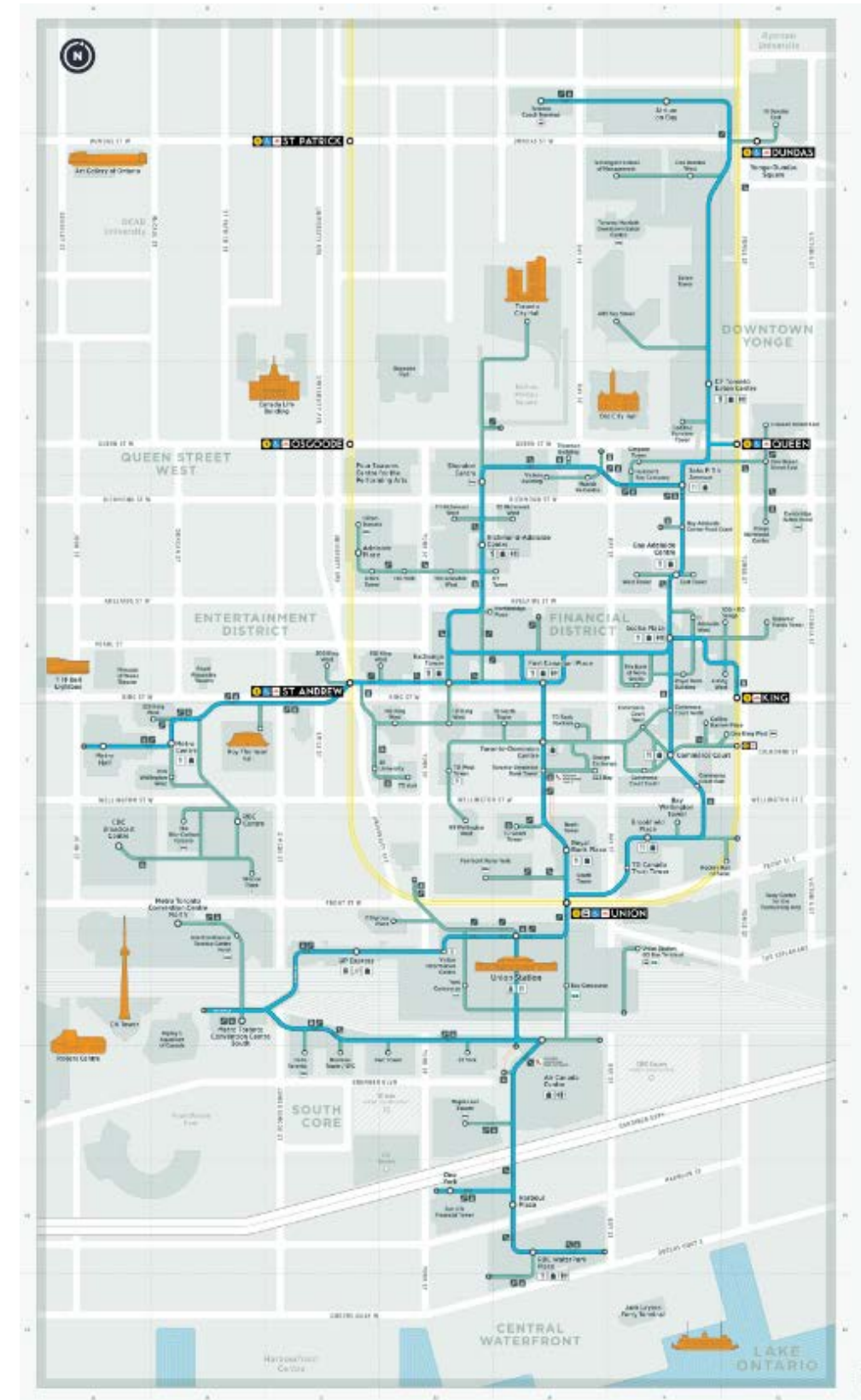


Figure 5-9: PATH Network (City of Toronto, 2018b)

5.1.5 PATH Network

A network of underground pedestrian tunnels, elevated walkways, and at-grade walkways (PATH) is shown in **Figure 5-9**. The network is more than 30 kilometres long and includes points of interest such as shopping, services, and entertainment. In 2014, the network was expanded closer to the Toronto waterfront making its most southerly point the Waterpark Place on Queens Quay.

The PATH Network crosses Queen Street West at two locations. There is an underground PATH connection from the Sheraton Centre Hotel to the Nathan Phillips Square parking garage and City Hall just east of York Street. There are two PATH connections from the Hudson's Bay Company building to the Eaton Centre just west of Yonge Street: an underground connection through an entrance to the existing Queen Station, and an above-grade pedestrian passageway at the second storey.



5.1.6 Railway Corridors

Existing railway corridors that cross the study area are illustrated below in **Figure 5-10** with characteristics of each listed in **Table 5-6**. Three major railway corridors are operational, mainly for passenger rail services. There is also a GO Train storage yard located at the foot of the Don River, used to store GO Trains when not in service during mid-day.

Figure 5-10: Existing Railway Corridors

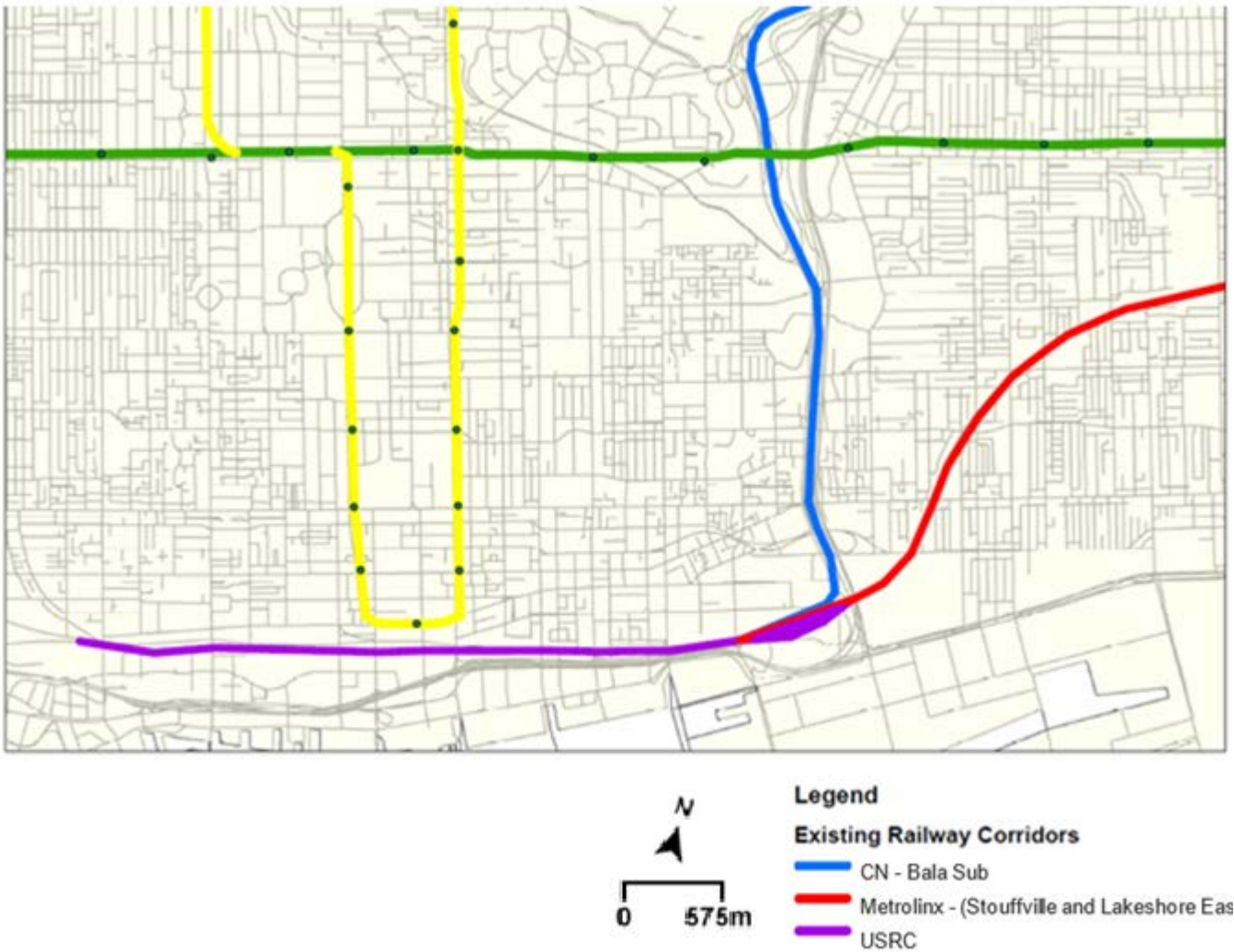


Table 5-6: Railway Corridors within the study area

Railway Corridor	Owner	Limits	Existing Number of Tracks	Future Number of Tracks
Union Station Rail Corridor (USRC)	Metrolinx	Don River to Strachan Avenue	16 tracks in train shed; number varies further from Union Station	16 tracks in train shed; number varies further from Union Station
Kingston Subdivision (Stouffville and Lakeshore East)	Metrolinx (previously CN)	Pickering to USRC	3	4
Bala Subdivision	Metrolinx/CN	Metrolinx owns the line from USRC to Doncaster (Richmond Hill); CN owns the line beyond this point	1	1

Metrolinx, as part of its ongoing improvement works, including RER and electrification, has identified track improvements required to implement the GO Reference Network. The study area of the electrification project for the Lakeshore East corridor is shown in **Figure 5-11**. Additional tracks are planned for both the USRC and Kingston Subdivision within the study area, as illustrated in **Figure 5-12** and **Figure 5-13**.

Figure 5-11: Lakeshore East Electrification Study Area (Metrolinx, 2010)



Figure 5-13: Lakeshore East Don River to Scarborough GO Station New 4th Track Location (Metrolinx, 2016b)

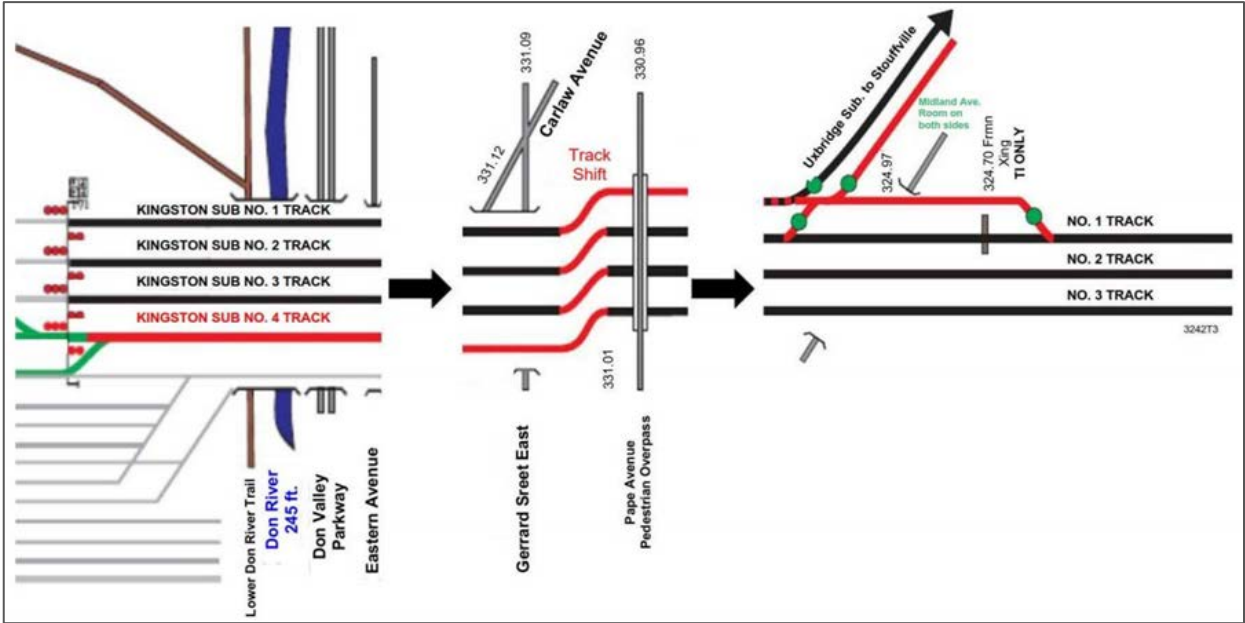
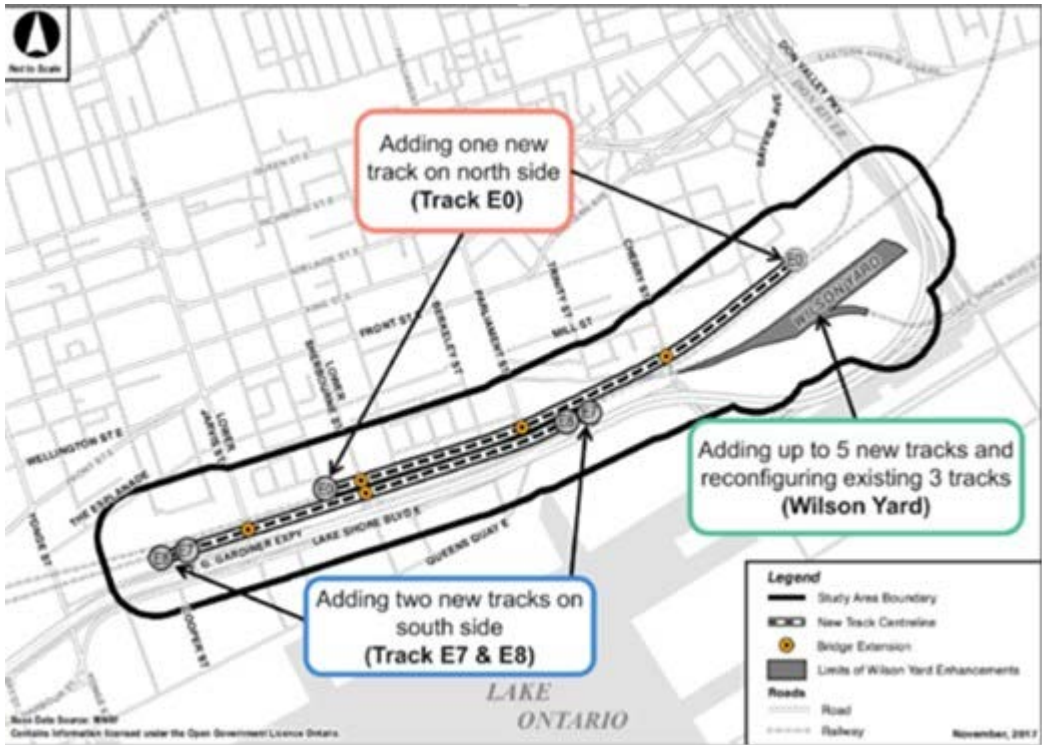


Figure 5-12: Union Station Rail Corridor East Enhancements Project Study Area and Proposed Work (Metrolinx, 2017)



5.2 Socio-Economic Environment

As part of the Relief Line Project Assessment (RLPA), a review of existing and future conditions within the study area was undertaken. A summary of the socio-economic context of the study area, with a focus on neighbourhood characteristics, key destinations, business and recreation areas, and natural and cultural heritage features as they relate to the Relief Line South corridors under consideration, is detailed below.

Building from the City's GIS data, neighbourhood profiles, ward profiles, and priority areas, the following socio-economic categories were explored:

- Neighbourhoods and communities
- Business activity (including employment areas, large businesses, and BIAs)
- Recreational features and key cultural, arts or religious destinations
- Green spaces, natural heritage systems and environmentally sensitive areas

Business Improvement Areas (BIAs) within the study area are illustrated in **Figure 5-14**. This map indicates areas where business owners are officially active in the enhancement and promotion of the local commercial environment.

Major destinations defined as significant cultural, community and institutional attractions were mapped for the entire study area, as shown in **Figure 5-15**. A number of additional local destinations and features that fall within a 500 metre radius (or 5 minute walk) from each potential station area were also identified to show the locations of various schools, community uses, places of worship, supportive housing, institutional facilities, employment areas, and other landmarks and amenities. In understanding the socio-economic characteristics and community features within various parts of the study area, strategic consideration can be given to enhancing transit connections to key neighbourhoods and destinations.

Green features are significant contributors to quality of life in urban areas. They provide space for recreation, contribute to environmental health, and beautify neighbourhoods. In some cases, they also affect local development potential (and related residential or employment opportunities). Green spaces, natural heritage systems, and environmentally sensitive areas within the study area are mapped in **Figure 5-16**.

Figure 5-14: BIAs within the study area (City of Toronto, 2018j)

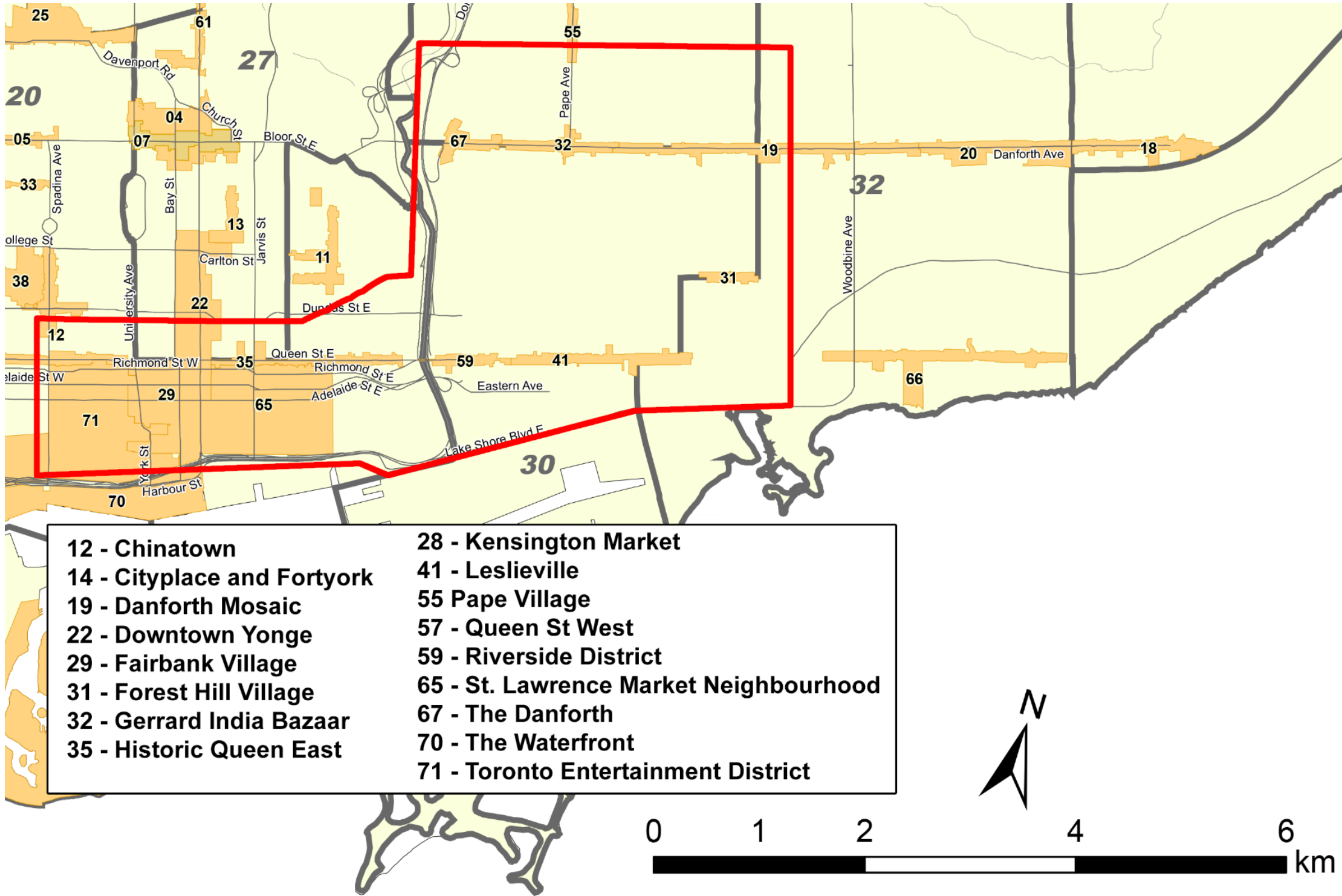


Figure 5-15: Key destinations in the study area

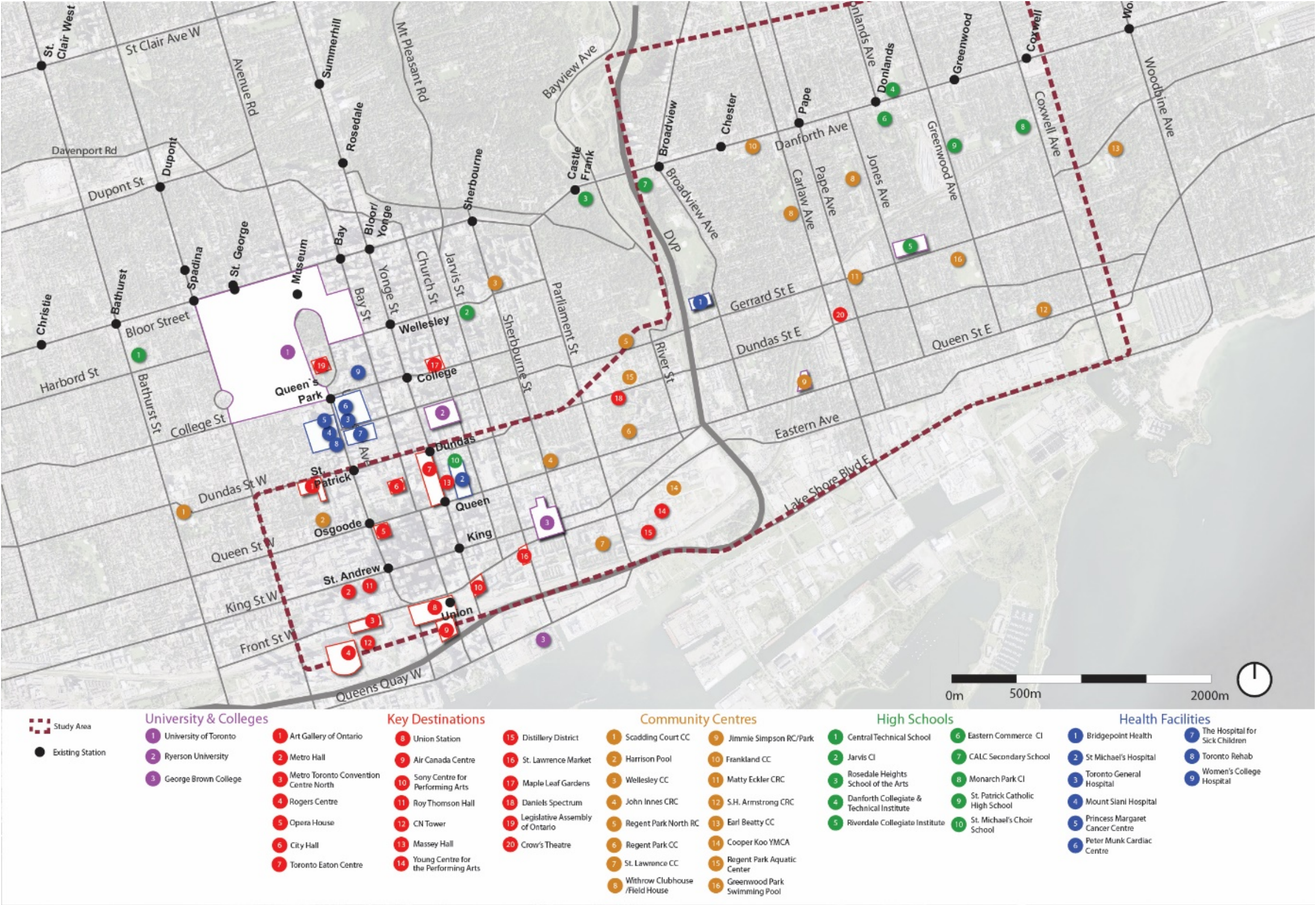
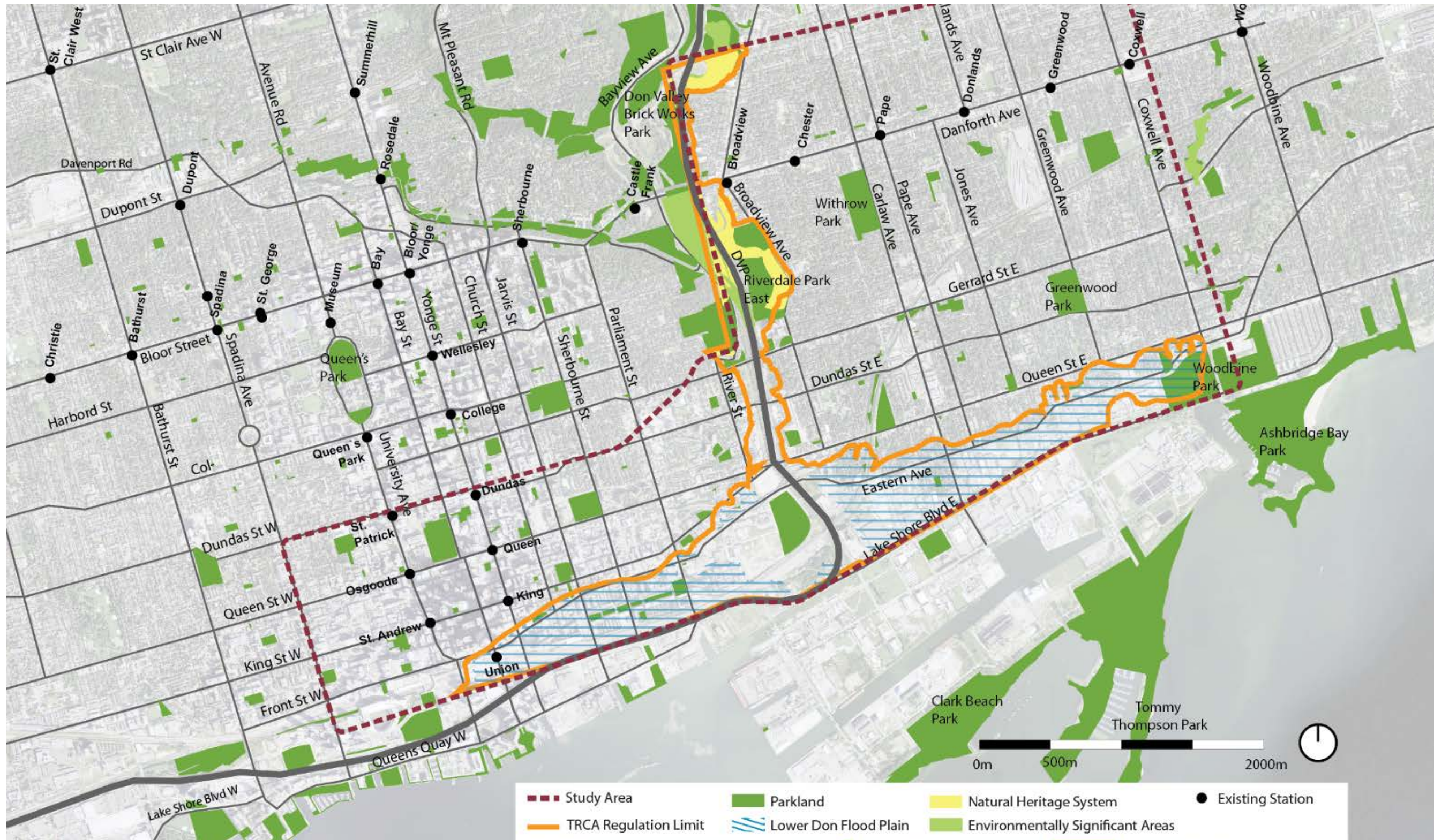


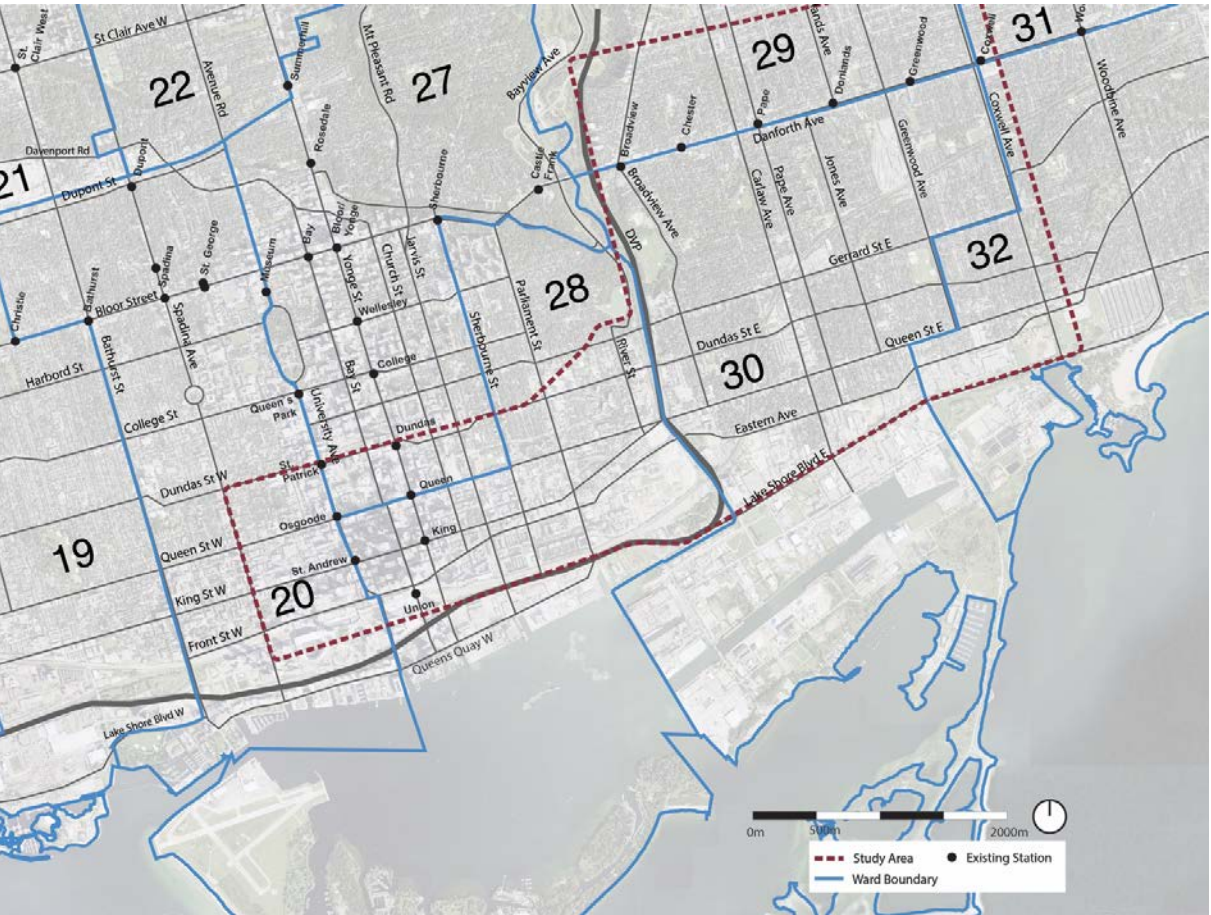
Figure 5-16: Parkland, natural heritage systems and environmentally significant areas in the study area (Data Source: City of Toronto, 2018d)



A neighbourhood profile analysis by ward was conducted to provide insights on the social-economic characteristics of the various station areas. In understanding these distinct demographic, district and neighbourhood qualities, the RLPA study process aimed to strategically align the corridor in a way that enhances access to important community amenities, destinations and nodes.

The wards that comprise the largest part of the Study Area are Wards 20, 28 and 30. The City's Planning Division has compiled population profile information for each ward, based on data from the 2016 Census of Canada and historical data. A summary of community characteristics for Wards 20, 28 and 30 is provided below. Wards 27, 29 and 32 make up a smaller portion of the Study Area and therefore information from these wards is not included. Ward boundaries within the study area are shown in **Figure 5-17**.

Figure 5-17: Ward Boundaries within the Study Area (Data Source: Toronto Open Data, 2014)



Ward 20

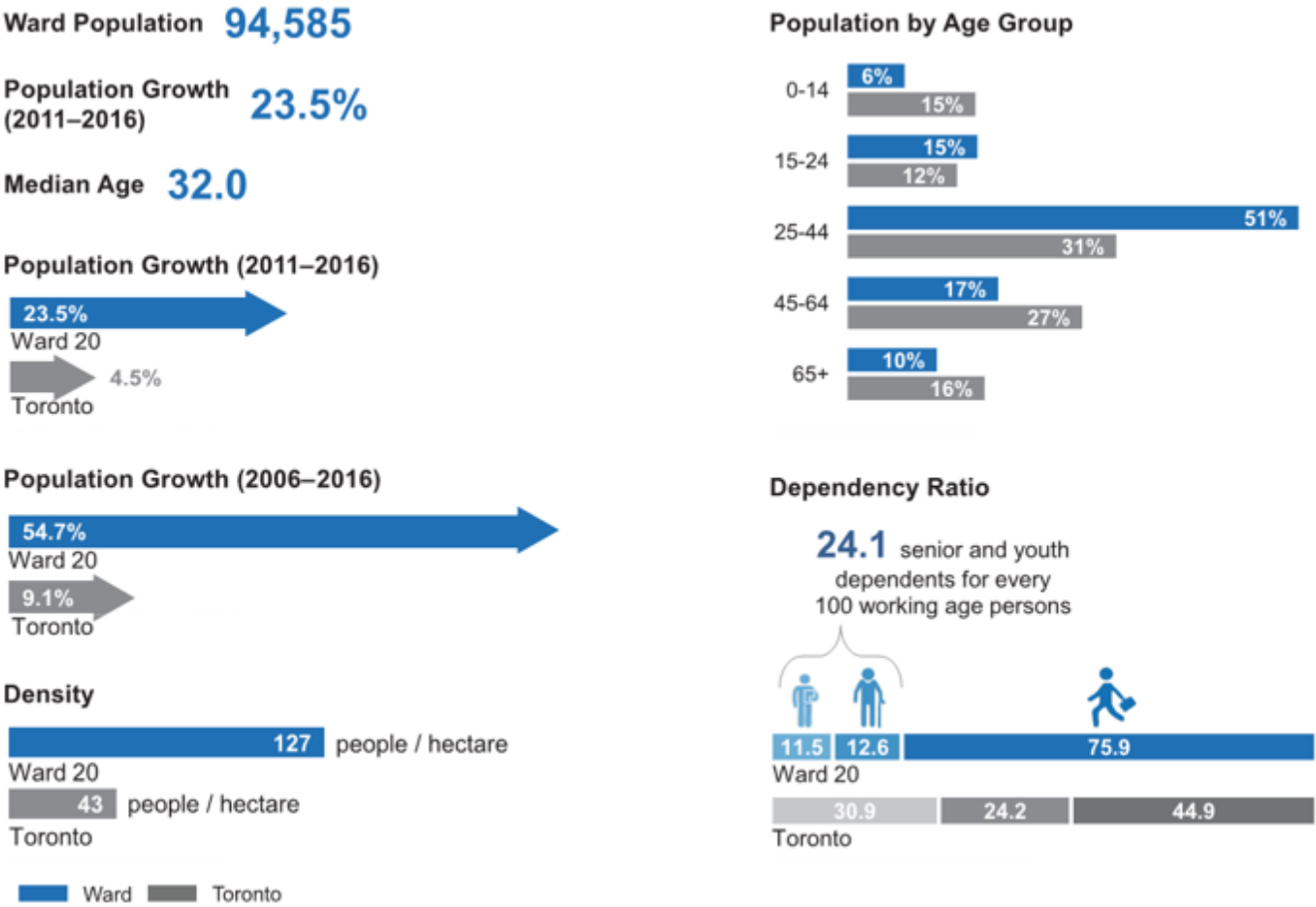
Ward 20 is bounded approximately by Bathurst Street, University Avenue, Dupont Street, and Lake Ontario, and includes the western side of the Downtown Study Sub-Area. Between 2011 and 2016, the population increased by 23.5%, rising to 94,585 persons. The population density is 127 people per square hectare, which is significantly higher than the City-wide density of 43

persons per hectare. The median age is 32 years, compared to 39 years in the City as a whole. The population characteristics correspond to the ward's location in the downtown core and the intense high-rise condominium development activity that has occurred in the area.

Ward 20 contains a lower share of immigrants compared to the rest of the City, with 43% of the population born outside Canada, as compared to 51% in Toronto as a whole. The immigrant group most highly represented is Chinese (6.6%). Visible minorities comprise 42% of the population, with the three largest visible minority groups consisting of Chinese (16.5%), South Asian (7.3%), and Black (4.7%).

Socio-economic data highlights that the population tends to be more highly educated than the rest of Toronto. The unemployment rate of 6.2% is lower than the municipal average of 8.2%, with a large share of the labour force employed in professional, scientific and technical services (21.3%), and finance and insurance (13.9%). The average household income of \$104,119 is slightly higher than the City average. An extract from the City of Toronto ward 20 profile for 2016 is shown in **Figure 5-18**.

Figure 5-18: Extract from the City of Toronto Ward 20 profile, 2016 (City of Toronto, 2018b)



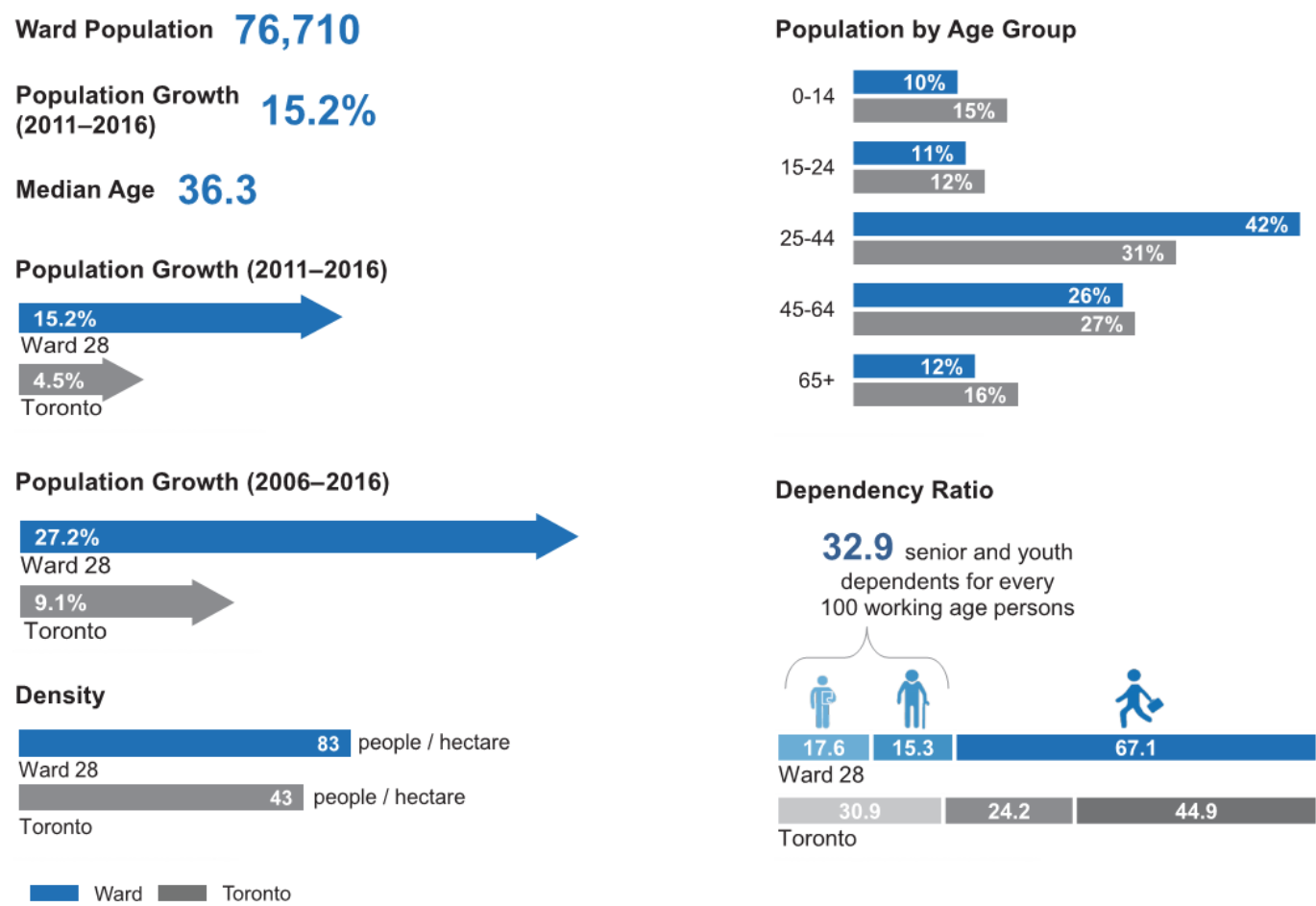
Ward 28

Ward 28 comprises a large portion of the study area, including the eastern side of the Downtown Sub-Area and the potential Inline station areas to the west of the Don Valley Parkway. The population in ward 28 has increased by 15.2 % between 2011 and 2016, to 76,710 persons. The population density is 83 persons per hectare which is significantly higher than the City average of 43 per hectare. The age profile in Ward 28 shows that over 42% of residents are aged 25 to 44, compared to 31% in the City as a whole. The median age of the population is 36 years.

Ward 28 contains a lower share of immigrants compared to the rest of the City, with 47% of the population born outside Canada but the highest percentage within the study area. The four largest immigrant groups consist of Filipino (4.6%), Chinese (3.4%), Indian (2.3%), British (2.1%), and Sri Lankan (1.6%) migrants. The proportion of visible minorities is on par with rest of the City, at 51%. The largest concentrations of visible minority groups are South Asian (13.6%), Black (10.3%), Chinese (9.0%) and Filipino (5.8%).

In ward 28, 90.1% of the population holds a certificate, diploma or degree, and 50.4% of individuals hold a bachelor degree or higher (compared to 32.9% for the rest of the City). The unemployment rate of 8.5% is lower than the City average. As in Ward 20, the largest shares of the population are employed in professional, scientific and technical services (18.0%) and the finance and insurance industry (13.0%). Despite a workforce that is higher educated than the rest of the City, the average household income of \$90,911 is lower than the City as a whole. An extract from the City of Toronto Ward 29 profile for 2016 is shown in **Figure 5-19**.

Figure 5-19: Extract from the City of Toronto Ward 28 profile, 2016 (City of Toronto, 2018b)



Population by Age Group

0-14	10%	15%
15-24	11%	12%
25-44	42%	31%
45-64	26%	27%
65+	12%	16%

Dependency Ratio

32.9 senior and youth dependents for every 100 working age persons

17.6

15.3

67.1

Ward 28

30.9

24.2

44.9

Toronto

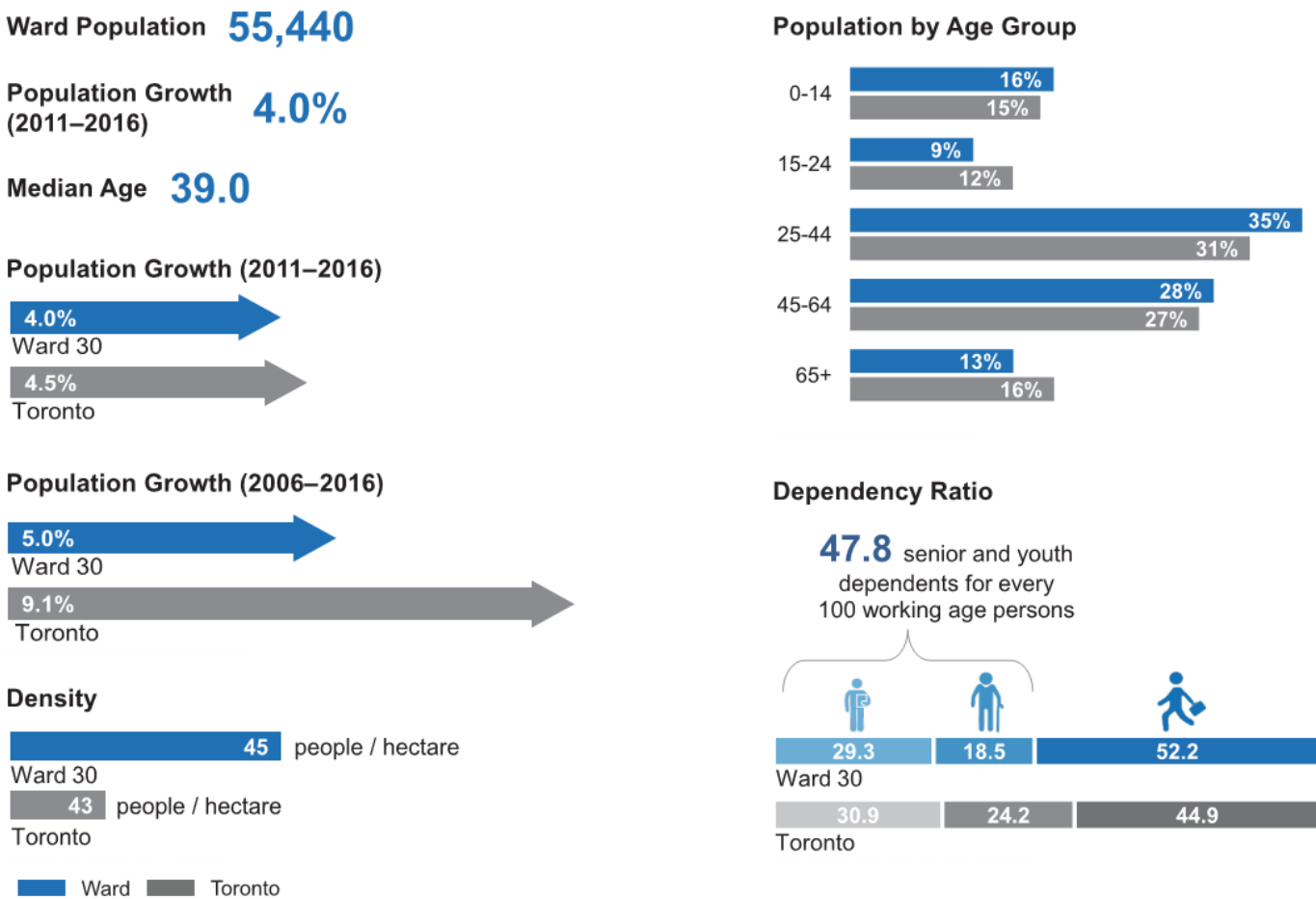
Ward 30

Ward 30 is located to the east of Ward 28, and will include the Inline Relief Line South stations located to the east of the Don Valley Parkway, as well as the neighbourhoods to the south of Danforth Avenue. The population in Ward 30 increased slightly from 2011 to 2016, resulting in a population of 55,440 persons. The population density is lower than that in Wards 20 and 28, with 45 persons per hectare. The median age is 39 years, in line with the rest of Toronto. The population by age group statistics shows a higher percentage of individuals younger than 15 years and between 25 and 44 years of age than in the rest of the City.

About 30% of Ward 30 residents are immigrants, many of Chinese (7.7%), Vietnamese (2.1%) or British (2.1%) descent. The proportion of visible minorities is 37%, lower than the rest of the City. The three largest visible minority groups consist of Chinese (17.1%), Black (5.9%) and South Asian (4.8%).

The socio-economic status of residents in Ward 30 is varied. Approximately 16.1% of the population aged 15 and over does not hold a certificate, diploma or degree, although 42.7% of individuals hold a bachelor degree or higher. The unemployment rate of 6.6% is lower than the City average, with the largest shares of the population employed in professional, scientific and technical services (15.1%) and educational services (9.7%). The average household income is \$105,059, slightly higher than the City average. An extract from the City of Toronto Ward 30 profile for 2016 is shown in **Figure 5-20**.

Figure 5-20: Extract from the City of Toronto Ward 30 profile, 2016 (City of Toronto, 2018b)



Relevance/Implications

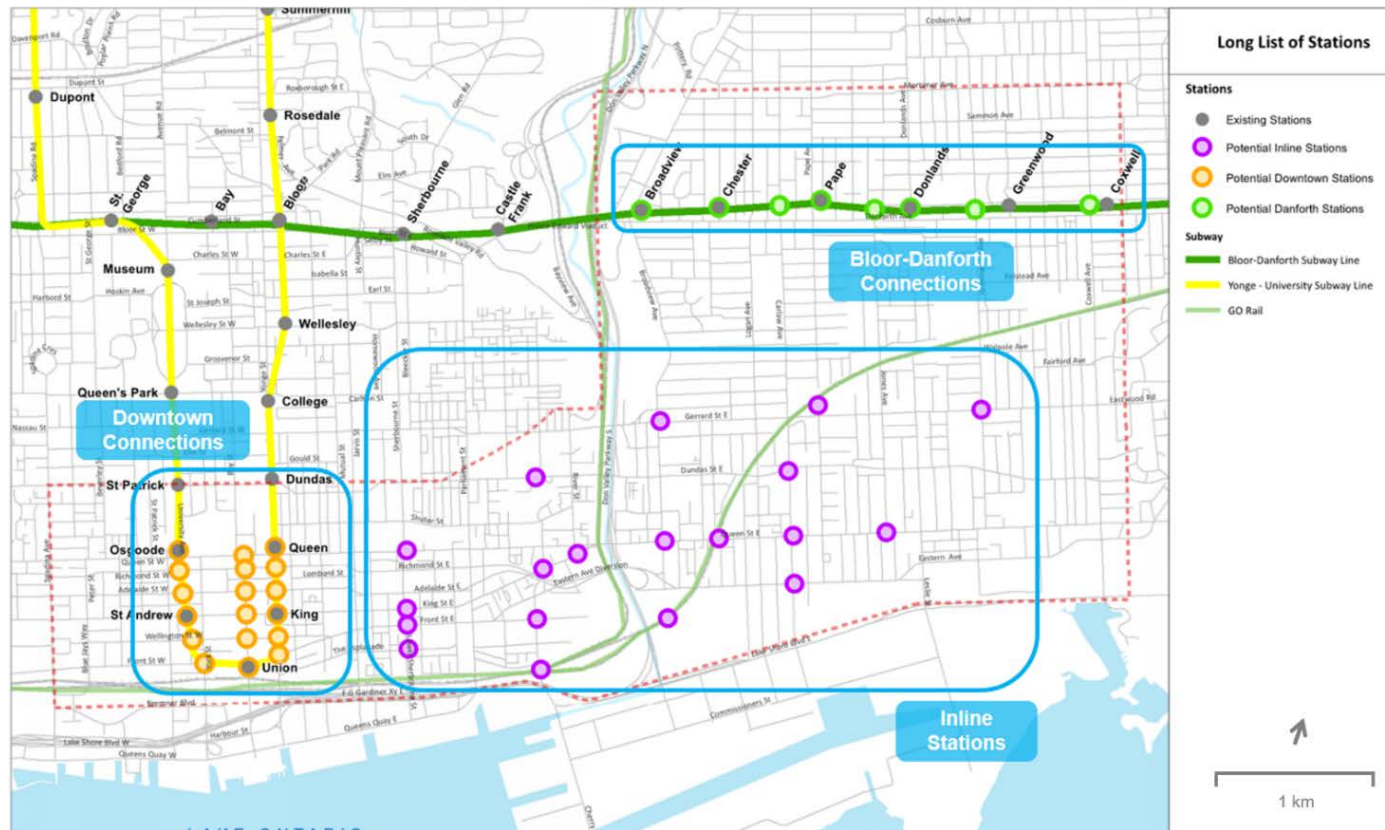
The community profile data for Wards 20, 28 and 30 highlight the varied character of the Study Area, which features an ethnically and socio-economically diverse population. The data highlights the significant population increases that have occurred downtown, and the high population densities to the west of the Don Valley Parkway. Areas with higher densities and a younger age profile are typically more amenable to public transit use. The high employment rates throughout the Study Area suggest that new transit infrastructure can support commuting and the trip to work. Ward 28, which includes Regent Park and the St. Lawrence neighbourhood, contains the highest immigrant population among the three wards.

The review of ward profile data indicates that significant growth has occurred downtown, and that the highest population densities are in areas to the west of the Don Valley Parkway. These should serve as focus areas for transit service expansion. Connecting to the various employment clusters within the study area will also be important, as employment areas draw transit users from across the city. Institutional uses such as schools and major health facilities are also seen as generating increased transit ridership. In disadvantaged communities that are targeted for improvement, introducing new transit service to these areas has the potential to expand opportunities for employment, shopping and recreation for these residents. Overall,

improving connections to key destinations and neighbourhoods in need can help increase transit use and support broader community-building and economic development objectives.

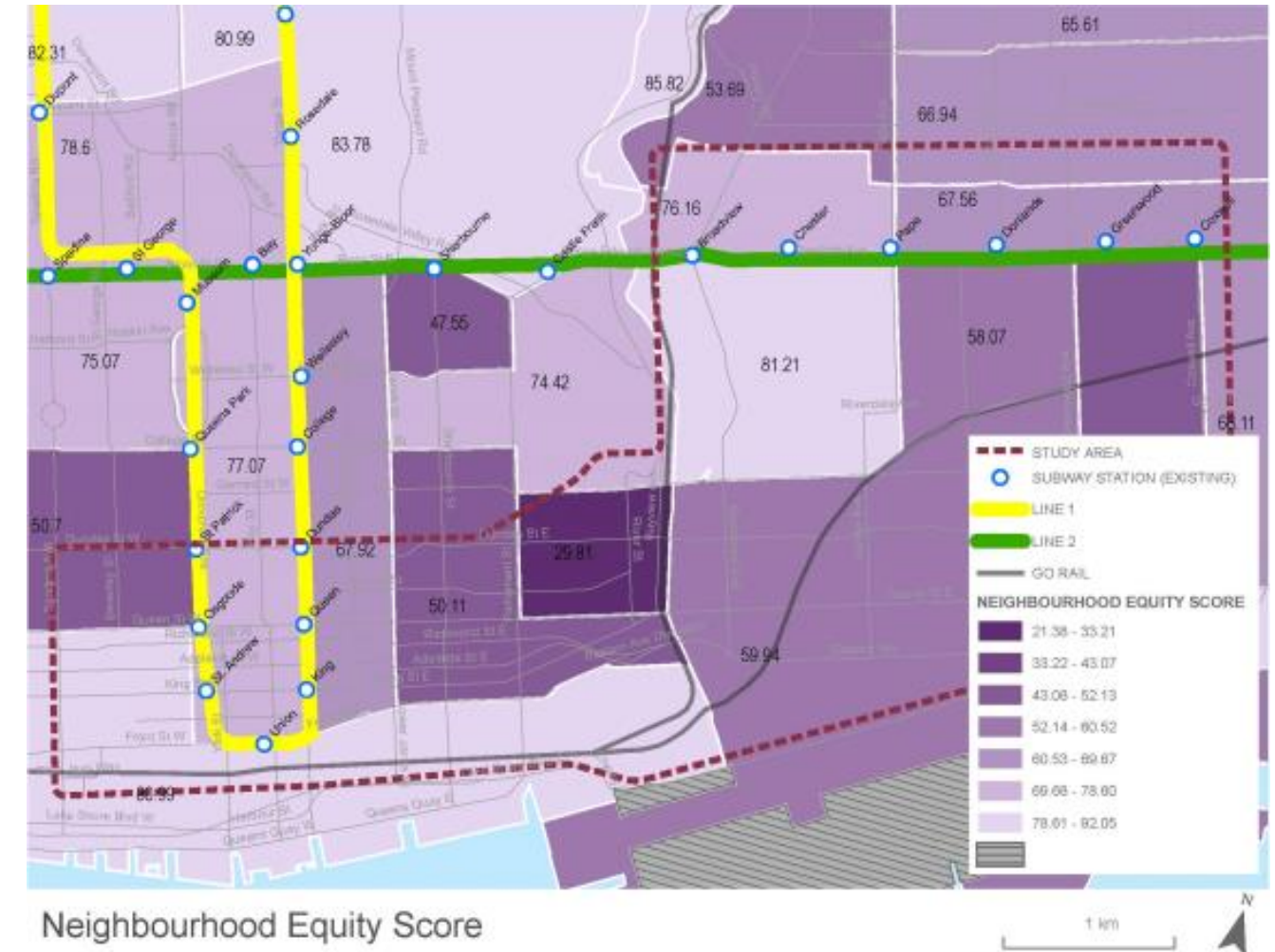
The three RLPA Study Sub-Areas, shown in **Figure 5-21**, feature distinct locational, socio-economic and environmental characteristics. A review and analysis of key features, destinations and economic conditions is provided below.

Figure 5-21: RLPA Study Sub-Areas



These assessments are based in part on the City of Toronto's Neighbourhood Equity Scores, which combine ratings for economic opportunity, social development, health, participation in decision-making and physical surroundings. The social equity scores for the study area are mapped in **Figure 5-22**, with darker shades indicating lower scores, representing less equity in the region.

Figure 5-22: Map of Social Equity Scores in the Study Area (Data Source: City of Toronto Open Data, 2014)



Downtown Study Area

The Downtown portion of the study area includes the City's urban core and central business district. The Downtown core plays a vital role in the regional economy as the largest employment centre in the Greater Toronto Area (GTA). The area encompasses the Financial District, a key office node with a focus on finance-related corporate headquarters and high-value business activities. The Downtown is a destination in and of itself, accommodating tens of thousands of jobs and residents, with recent growth and reinvestment expected to continue into the future. BIAs cover the entirety of the Downtown portion of the study area, indicating far-reaching local involvement on the part of participating business owners.

The Downtown area contains the highest concentration of key destinations and attractions, including City Hall, Metro Hall, the CN Tower, the Rogers Centre, the Air Canada Centre, and the Toronto Eaton Centre. A cluster of cultural facilities also exists Downtown, including the Sony Centre for the Performing Arts, Roy Thompson Hall, Massey Hall and the Princess of Wales Theatre. A number of institutional facilities are also located within the Downtown area,

including Ryerson University, St. Michael's Hospital, and a cluster of health facilities along University Avenue just north of Dundas Street.

The Downtown is the most transit-accessible part of the City and is well-served by seven Yonge-University subway stations, with Union Station functioning as a major transportation hub and regional transit interchange. The PATH network extends across the Downtown, providing connections to and from subway stations, office complexes and major institutions and destinations. Cycling is a popular mode of travel within the Downtown, in part due to the well-integrated network of dedicated bicycle lanes that is available in and around the core. The high levels of accessibility and the overall appeal of the City's vibrant urban core have led to rising property values. Higher household incomes around the Downtown station areas correspond with demand for downtown living and the premium placed on good connectivity and potentially shorter commute times.

The Downtown area is a long-established urban centre and has very few large green spaces, though Nathan Phillips Square is a large public amenity in the area. There are no recognized natural heritage features in the area. Much of the area east of York Street and south of King Street West to the waterfront is within the defined Lower Don Flood Plain, with associated Toronto and Region Conservation Authority (TRCA) regulation zones. This may affect development in this area, though there has been no apparent dampening effect on development activity there to date.

The areas within and around the Downtown area generally have higher Neighbourhood Equity Scores relative to other parts of the study area, as shown in **Figure 5-22**. The areas south of Front Street, southeast and southwest of Union Station have very high scores, while the areas west of University Avenue have scores that are on the lower end of the spectrum. The scores within the centre and south of Downtown are likely buoyed by the neighborhood's high walkability and easy access to transit, as well as the high-value housing and degree of employment opportunities available within a compact urban environment with many amenities. There are no City-defined Neighbourhood Improvement Areas (NIAs) within the Downtown sub-area.

Considerations for the Relief Line South Planning Process

The planning for the Relief Line South considered the fact that downtown is among the most vibrant areas of the City, and that the Relief Line South should further enhance access to the many destinations and business activities within the area. In particular, it considered how the Relief Line South could complement existing and planned TTC and GO transit service to enhance access to the many important destinations north of Union Station.

Inline Stations Study Area

The Inline Station Study Sub-Area encompasses a wide geographic area and therefore includes a number of community centres, arts and entertainment facilities, places of worship, retail destinations and employment areas, many which have the potential to attract high transit use.

A range of business activities can be found throughout the area. There are several office buildings in the King Street and Parliament Street area, and a significant warehouse incubator on Carlaw Avenue. Business Improvement Areas (BIAs) extend along Queen Street East and in the St. Lawrence neighbourhood, where retail and services are clustered. There is also a BIA on Gerrard Street East between Greenwood and Coxwell Avenues, as seen in **Figure 5-14**. Another major neighbourhood service node is located near Gerrard Street East and Pape Avenue, where the Gerrard Square and Riverdale Shopping Centres are located. In the future, the proposed redevelopment of the East Harbour precinct near Eastern Avenue and Broadview Avenue has the potential to become a major employment node.

Institutional destinations within the Inline area include the Bridgepoint Active Healthcare facility located near Gerrard Street and Broadview Avenue, as well as George Brown College at Sherbourne and King Streets. There are several significant parks and public facilities within the area that are located near potential station areas, including Greenwood Park, Jimmie Simpson Park and Recreation Centre, and the new Corktown Common near Eastern Avenue and the Don River. The Regent Park neighbourhood features several parks, an aquatic centre, and an athletics field. Cycling lanes and multi-use trails are available throughout the Inline Station Sub-Area, including along Greenwood Avenue, Dundas Street, River Street, and alongside the Don River.

There is reasonable access to surface transit routes west of the Don Valley, especially along Queen Street East, King Street East, and Parliament Street. Surface transit is somewhat more dispersed east of the Don Valley, though the streetcar routes on Gerrard Street East, Queen Street East and Broadview Avenue provide high connectivity for people living and working along those routes. These different linkages provide connections to and from these important public destinations.

The Inline Sub-Area includes several cultural clusters that attract residents, workers and visitors. The Distillery District is a vibrant former industrial district with a mix of cultural, retail, entertainment and residential uses. The St. Lawrence neighbourhood is another district that serves as an arts and cultural attraction. The St. Lawrence Centre for the Arts houses the Canadian Stage Company, while other smaller theatre spaces offer opportunities for local stage performances. In Regent Park, the Daniels Spectrum serves as a cultural hub for the community. The recent completion of Crow's Theatre has also established a new cultural destination in the Queen-Carlaw loft district.

Like the Downtown area, there are no recognized natural heritage features in the Inline area west of the Don Valley. The area south of King Street West towards the waterfront is within the defined Lower Don Flood Plain, with associated TRCA regulation zones. The areas closest to the Don River, including the West Don Lands, are in proximity to TRCA Flood Lines, and may be at greater risk of flooding than other areas. This will likely influence development in this area, though it is nonetheless emerging as vibrant area of residential and commercial uses. The same environmental conditions exist in the Inline areas east of the Don Valley, with the additional presence of recognized natural heritage features along the east edge of the Don Valley, to the west of Broadview Avenue. That area of natural heritage forms a green amenity

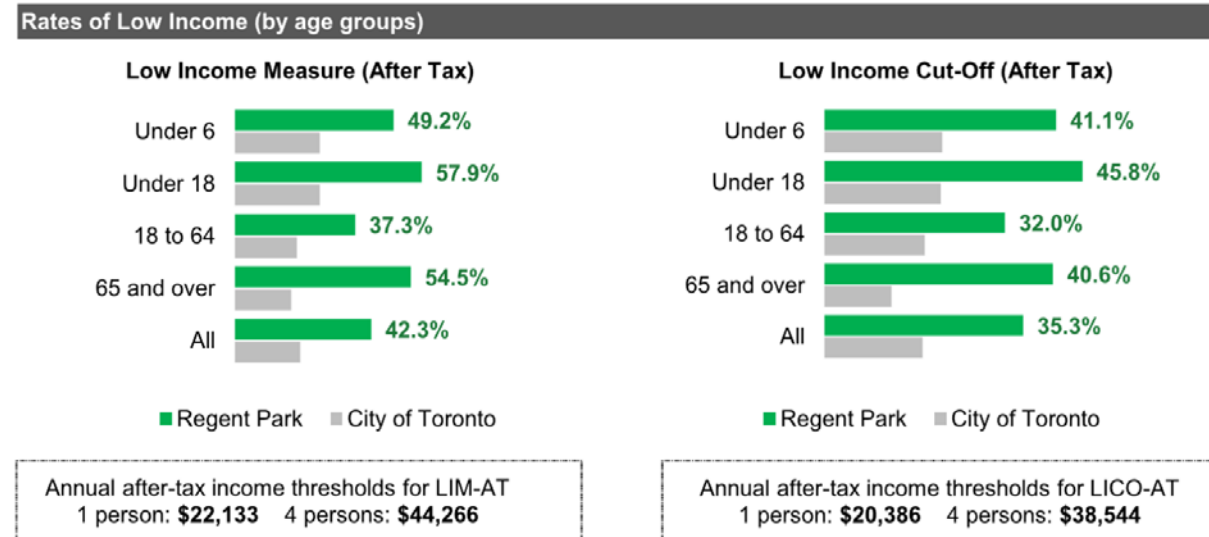
space in the area, but also limits the potential for new development. Development immediately east of the mouth to the Don River may also be limited or complicated by the potential for flooding in that area. This may impact the future development of the former Unilever site, and therefore the associated jobs that are projected to be created on that site.

Certain neighbourhoods within the Inline Study Sub-Area are among the lowest income areas across the overall study area, particularly the neighbourhoods near Gerrard Street and Parliament Street. The City of Toronto has identified 31 NIAs that are recognized as communities that require special attention based on rates of low income, unemployment, and other socio-economic measures. Within the study area, Regent Park is the only NIA. This community is one that could benefit greatly from increased transit connectivity, as improved service would enhance access to employment opportunities and other community facilities and services. Regent Park currently has lower than average rates of educational attainment and lower rates of employment compared with the city average. The neighbourhood demographic estimates for Regent Park are shown in **Figure 5-23**.

Figure 5-23: Extract from the City of Toronto's Neighbourhood Profile of Regent Park, 2016 (City of Toronto, 2017)

2016 Preliminary Neighbourhood Census Profile

72. Regent Park



Neighbourhood Equity Scores in the Inline sub-area are in the mid- to low-end of the scale, as seen in **Figure 5-22**. There are virtually no areas with high scores, suggesting that the Relief Line South has the ability to enhance transit service to areas of socio-economic need that currently have limited transit access. Within this sub-area the Regent Park neighbourhood stands out as having the lowest Neighbourhood Equity Score.

Considerations for the Relief Line South Planning Process

New transit services should enhance connections to major facilities, services and destinations throughout the Inline Study Sub-Area. In reviewing the socio-economic qualities of the potential station areas, the Sherbourne Street and King Street neighbourhood emerges as a dense cluster of employment uses, institutions and community destinations that could benefit from increased transit services. The Relief Line South study process recognized that certain neighbourhoods require special attention, and opportunities should be considered to support investment and community improvement. Regent Park is one such neighbourhood within the study area that stands out as a neighbourhood in need. West of the Don Valley, Relief Line alignments that are further north were identified as having greater potential to serve Regent Park. In determining the appropriate station locations, opportunities to connect to future employment destinations and emerging mixed-use neighbourhoods should also be considered.

Bloor-Danforth Study Area

The Bloor-Danforth Area generally consists of established residential neighbourhoods, and therefore is not a key location of major destinations or institutional facilities. Instead, the potential station areas contain local schools, parks and places of worship. Near Donlands Avenue and Greenwood Avenue, there is a cluster of elementary and high schools. Rosedale Heights School of the Arts and City Adult Learning Centre at Broadview Avenue are magnet schools that draw students from across the city. Several large parks are located along the Danforth. Monarch Park and Withrow Park are both situated south of Danforth Avenue and within walking distance of the potential stations. Similarly, Riverdale Park is a significant green space and recreational destination located off of Broadview Avenue.

South of Danforth Avenue and west of Broadview Avenue there is a recognized natural heritage feature, which may simultaneously provide a green amenity space while limiting adjacent development.

There are three BIAs along Danforth Avenue within the study area, seen in **Figure 5-14** indicating local involvement by business owners within a focused retail and commercial corridor.

There are several neighbourhood health facilities in the Bloor-Danforth area, including a large medical office building at Broadview Avenue and Danforth Avenue. The established character of the neighbourhoods in the area means that there is a high proportion of seniors living in the community who may need to regularly access these health facilities.

Connectivity is generally high in this sub-area because of the subway stations along Danforth Avenue and streetcar service along Broadview Avenue. There is relatively low bicycle route connectivity in the area compared to downtown.

Within the Bloor-Danforth sub-area the Neighbourhood Equity Scores are mixed, as seen in **Figure 5-22**. South of Danforth Avenue and west of Pape Avenue there is a large area of relatively high scores. The scores decrease moving east from Pape Avenue. Likewise, the Neighbourhood Equity Scores decrease north of the Danforth and again north of Fulton

Avenue. It appears that the neighborhoods closest to the transit service and amenities along Danforth Avenue and particularly near Broadview Avenue offer the best conditions with respect to neighbourhood equity. The Relief Line South has the potential to improve transit access and encourage new development east of Pape Avenue, which may result in higher neighbourhood equity scores in that area in the future. If future phases of the Relief Line South extend service northward, Neighbourhood Equity Scores north of the Danforth may improve as well.

Considerations for the Relief Line South Planning Process

The established neighbourhoods around the Bloor-Danforth Sub-Area feature smaller-scale, community-based amenities such as schools, parks and health facilities. Compared to other parts of the study area, the Relief Line South will not significantly enhance access to key destinations in the City, especially since the existing Bloor-Danforth subway line already supports access to these amenities. Nevertheless, Relief Line South planning has taken into account the substantial cluster of schools around Donlands Avenue and Greenwood Avenue, as well as the magnet schools, healthcare facilities and major park spaces located near Broadview Avenue. Relief Line South planning has also considered the potential to enhance transit access for the concentration of seniors within the area.

5.2.1 Land use

This section discusses existing and future land use and development context of the study area.

Land Use Patterns

Table 5-7 to Table 5-10 summarizes the existing and planned context in terms of land use and development. The result is a high level overview of the existing and emerging urban structure and built form of the city in three Study Sub-Areas- the Downtown Terminus, Inline Stations, and Bloor-Danforth Terminus.

Table 5-7: Summary of Land Use Patterns by Sub-Study Areas (1/4)

Study Area	Existing and Planned Land Uses	Major Development Activity
Downtown Terminus	• high-density mix of commercial, retail, entertainment, residential, institutional and employment uses • primarily designated as Mixed Use Areas • key destinations around the potential Downtown stations include City Hall, the Toronto Eaton Centre, Union Station, St Michaels Hospital, Ryerson University and numerous office complexes within the Financial District • located within the Downtown and Central Waterfront part of the urban structure, this area will continue to function as a major employment and prestige business node within the GTA, and be supported by a range of complementary commercial, residential and other uses	• significant development along King Street and to the south and west of Union Station within the former railway lands • noticeably less redevelopment, with the exception of a few office, commercial and hotel projects within the Downtown core • this core area has limited lands available for redevelopment

Table 5-8: Summary of Land Use Patterns by Sub-Study Areas (2/4)

Study Area	Existing and Planned Land Uses	Major Development Activity
Inline Stations	• contains a broad mix of uses, neighbourhoods and activities • areas to the west of the Don Valley Parkway are located within the Downtown and Central Waterfront which feature relatively high residential densities and a mix of apartments, retail and employment uses along major streets and to the south of Queen Street • Regent Park is undergoing a major transformation that will create a new mixed-use, high density neighbourhood. This neighbourhood has the highest population density across the Relief Line South Study area • stable residential neighbourhoods in the areas to the east of the Don Valley Parkway with modest population densities (low-rise housing, schools, parks, and other community amenities), such as Leslieville and Riverdale • greater mix of residential, retail and commercial uses can be found along the major arterial streets and <i>Avenues</i> in the area, including Gerrard Street and Queen Street	• development west of the Don Valley Parkway is more oriented towards higher-density land uses • proposed two-tower residential project would add up to 1,300 new units to the northeast corner of Sherbourne Street and The Esplanade • redevelopment of residential uses and supporting retail and services is ongoing in Regent Park • significant residential waterfront redevelopment is also underway or planned for the East Bayfront and Keating Channel Precincts • the east side of the Don Valley Parkway has not exhibited the same intensity of development compared to the west • a significant increase in employment densities is anticipated with the proposed redevelopment of former Unilever site

Table 5-9: Summary of Land Use Patterns by Sub-Study Areas (3/4)

Study Area	Existing and Planned Land Uses	Major Development Activity
Inline Stations	• a substantial cluster of industrial and employment uses is located in the South of Eastern area, while a mix of employment and higher-density residential uses are situated within the Carlaw Loft District • South of Eastern Strategic Direction study is also being undertaken in order to develop a planning framework for this large employment district	• south of Eastern Strategic Direction study is also being undertaken in order to develop a planning framework for this large employment district • select opportunities for significant infill along key mixed-use streets and on low-density retail sites, including Gerrard Square and Riverdale Shopping Centre and lands around the northwest corner of the Dundas and Carlaw neighbourhood

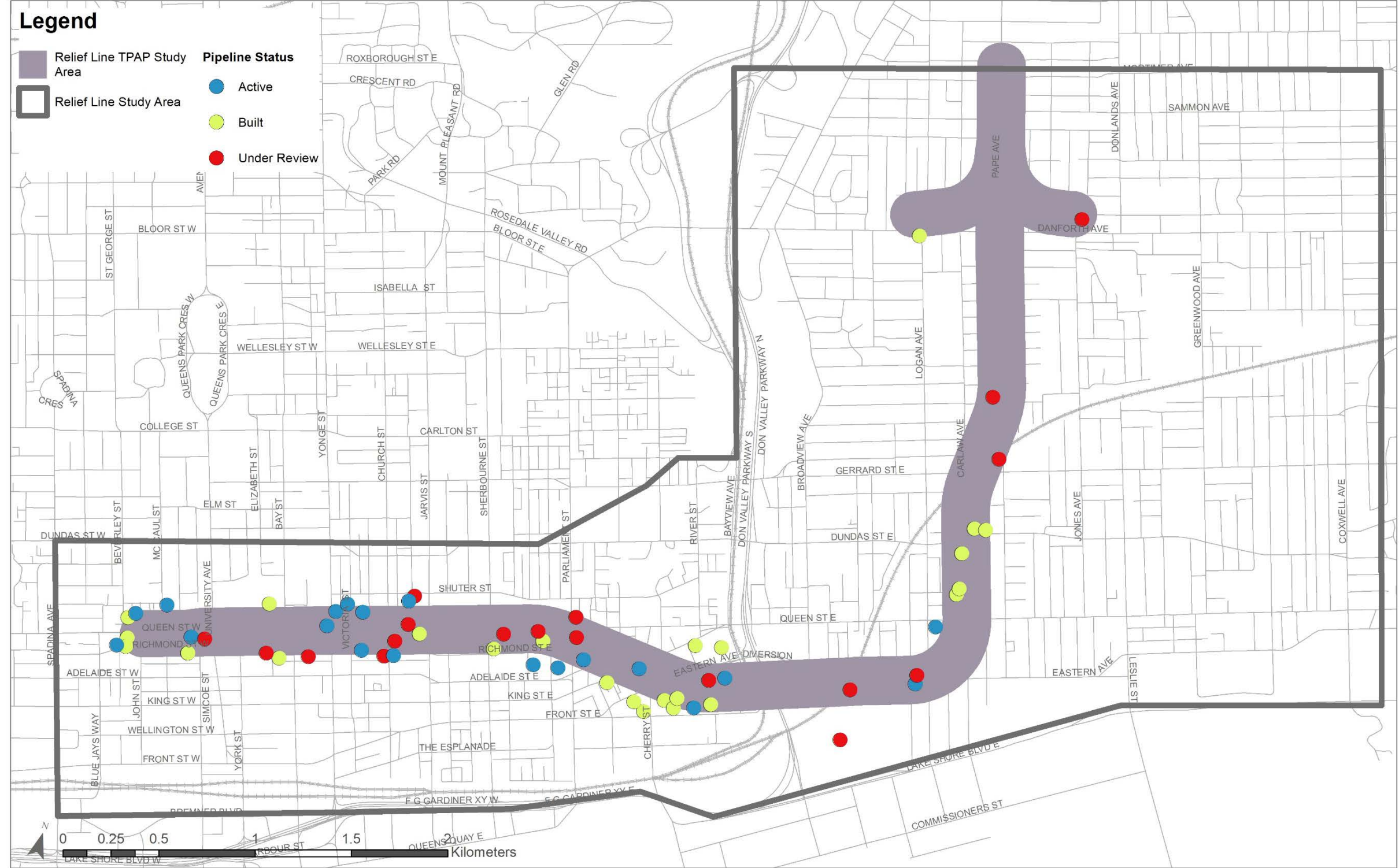
Table 5-10: Summary of Land Use Patterns by Sub-Study Areas (4/4)

Study Area	Existing and Planned Land Uses	Major Development Activity
Bloor-Danforth Terminus Study Area	• Station areas along Bloor-Danforth terminus are anchored by Danforth Avenue, an <i>Avenue</i> that contains a mix of retail, commercial and residential apartment uses • <i>Neighbourhoods</i> close to Danforth Avenue are highly stable communities that contain primarily low-rise housing, schools, parks, places of worship, and other public facilities • Population and employment densities are moderate, although there are pockets of somewhat higher residential densities near Chester, Pape and Greenwood • Area is well-served by existing transit services, as Line 2Line runs beneath Danforth Avenue and offers connections to the east and west. The Greenwood Subway Yard is located on Greenwood Avenue south of Danforth Avenue • There are significant land areas that are along <i>Avenues</i> in the study area, and mixed-use areas where new housing and job opportunities are being directed. Smaller scaled main street areas in close proximity to established <i>Neighbourhoods</i> means that much of this sub area will remain relatively stable	• Opportunities for development are limited due to the highly stable residential <i>Neighbourhoods</i>, shallow lot depths along Danforth Avenue, and the difficulties associated with assembling properties to create a sufficiently large site for redevelopment • In the east end, there are some surface parking lots, single-storey retail strips, and other underutilized sites near Greenwood Avenue and Coxwell Avenue that are suitable for new smaller-scale mid-rise infill development • At the western end near Broadview Avenue, there is greater potential for larger-scale redevelopment, with the Loblaws site to the south of Danforth Avenue presenting a significant intensification opportunity • There are a series of City-owned surface parking lots north of Danforth Avenue, above the Line 2 subway corridor. These sites may be able to contribute to new developments or additional transit station infrastructure in the future, but their position directly above subway infrastructure and their proximity to residential buildings constrains and limits their development potential

The locations of the development applications and identified soft sites within the Study Area are mapped in **Figure 5-24** and **Figure 5-25**. Soft sites include vacant lots, surface parking lots or potential sites for significant redevelopment.



Figure 5-24: Pipeline development projects January 1, 2013-June 30, 2018 (Source: City of Toronto, 2018)

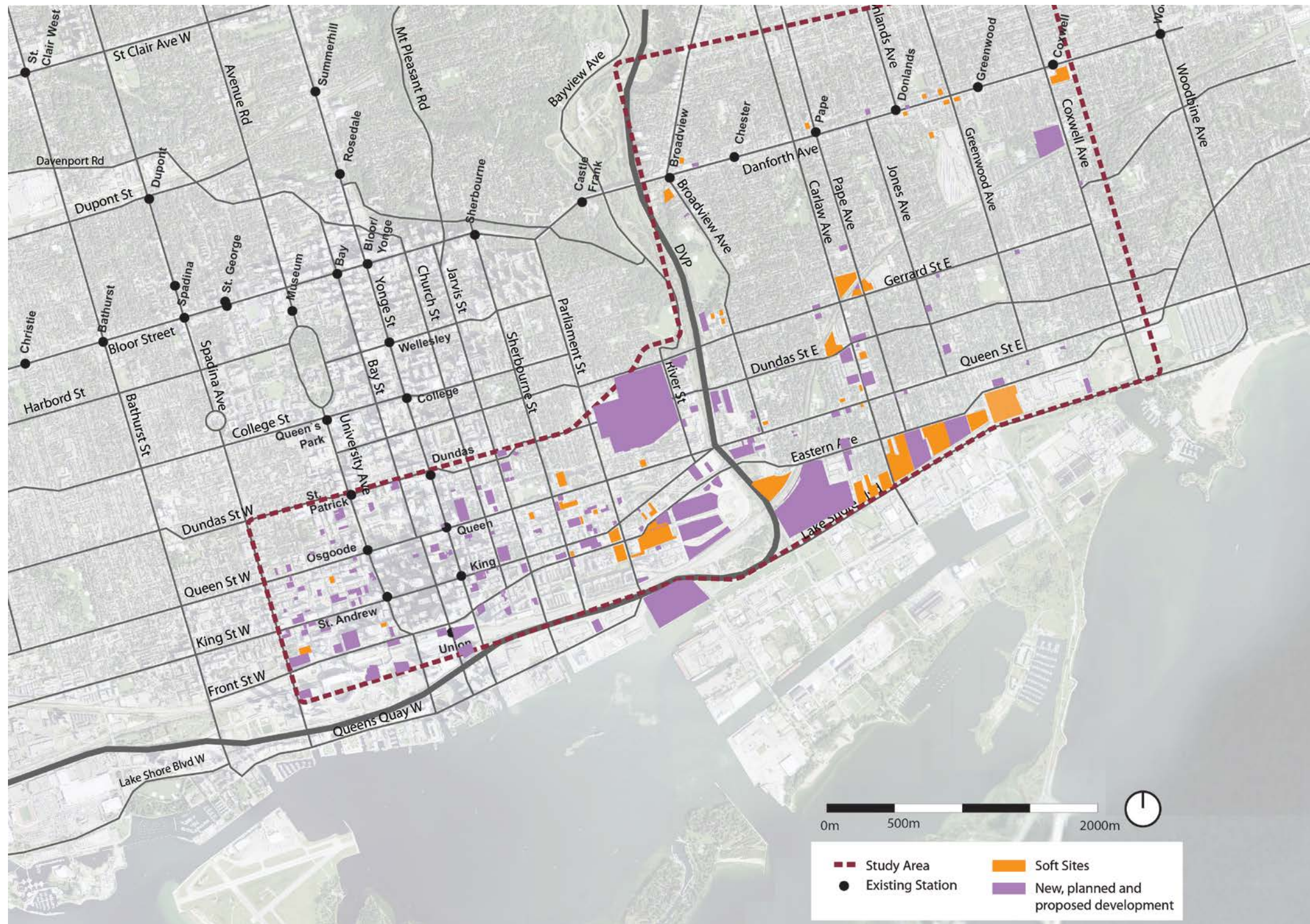


Contains information licensed under the Open Government Licence – Toronto

RELIEF LINE

8/12/2018

Figure 5-25: Map of soft sites and new, planned, and proposed development within the study area*



*Soft sites as of June 2018. Proposed development includes on projects received January 1, 2018 to June 30, 2018.

Land Use Studies

The planning and policy frameworks generally support increased mobility, intensification and regeneration in areas throughout the Study Area. However, it is important to note that the policy objectives, current character and potential for change vary significantly between the Study Sub-Areas. The Inline Station areas currently lack rapid transit service, despite the significant redevelopment that is occurring. In these areas, the primary goal is to provide high-order transit services to support the high-density residential and employment growth outside of the Downtown. Conversely, a key objective of the Downtown and Bloor-Danforth stations will be to enhance connections to existing transit infrastructure, and to strategically consider how these stations can facilitate future Relief Line South extensions into other parts of the City. An evaluation of the potential station areas will therefore need to consider not only the overall policy directions set out through the various land use and transportation planning initiatives, but also other strategic, operational and infrastructure considerations, including potential extensions to the north and west.

Many of the proposed station areas support key provincial and municipal planning objectives. Integrating transit investments with urban growth is a key policy objective that supports transit access, sustainable and mixed-use development, and efficient use of public infrastructure. Many of the potential stations are aligned with high-density neighbourhoods and emerging growth areas, including West Don Lands, Regent Park, Unilever Precinct, South of Eastern Employment District, Dundas/Gerrard and Carlaw/Dundas Loft District, and the waterfront communities. These key intensification areas should be regarded as potential focus areas for Relief Line South stations, given that they have the greatest potential to capitalize upon future growth and intensification.

Land use studies articulate area-specific visions, principles and development guidelines and may provide further policy direction as they are completed. Relevant land use initiatives have been reviewed for their potential to influence future development around the Relief Line South station areas. This will allow for an assessment of which station locations best support the provincial and municipal planning framework, and which station areas are most aligned with key planning policies and objectives.

5.2.2 Future Planned Land Use and Development

While the Downtown currently has the highest densities within the Study Area, as seen in **Figure 5-26** and **Figure 5-27**, future development opportunities within this section of Study Area are more limited than other areas, given the existing built-up context. Among the limited opportunities for large-scale redevelopment is the continued development of the South Core Financial District that is bringing significant amounts of new office and employment uses to the south side of Union Station and the railway corridor. Planning for new transit services in the Downtown has considered opportunities to enhance access to significant employment clusters and emerging office nodes, and consider potential connections beyond the Downtown Core where significant change is occurring. Overall, there is the potential to introduce rapid transit

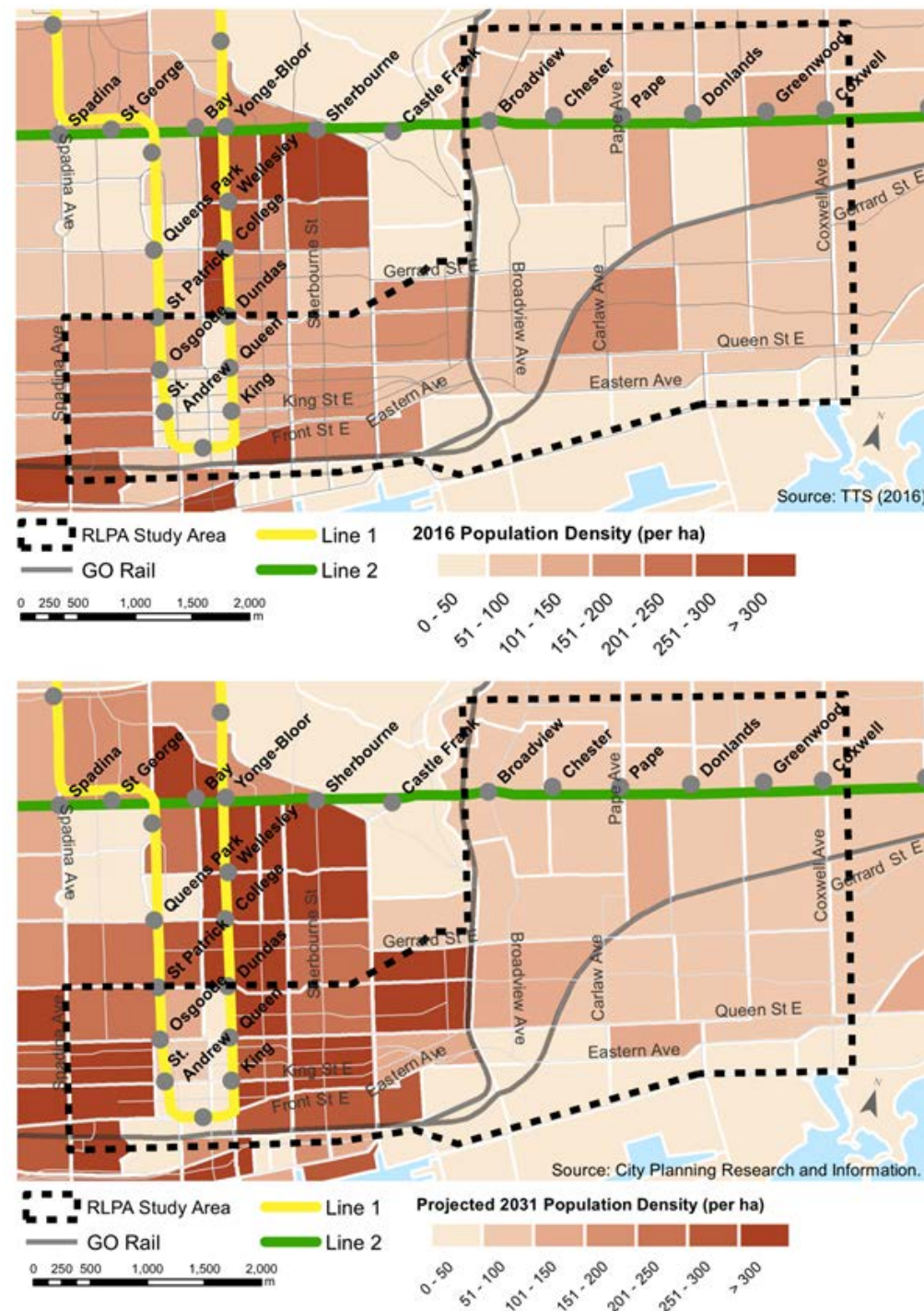
service that improves access to the emerging clusters of new employment areas and residential development to the east, west and south of the Downtown core.

A review of existing and planned land use activities in the Inline Stations sub-area highlights the types of neighbourhoods and urban environments that could benefit most from new transit investments. This review helps determine where possible new transit services should be located to serve the highest density neighbourhoods or those areas which have the greatest potential for population and employment growth. Within the Inline Station sub-area, the existing mixed-use corridors and major regeneration or employment districts are the areas experiencing the most significant amount of growth and redevelopment. Specific areas of focus include the Regent Park neighbourhood, the West Don Lands, the former Unilever site, the evolving South of Eastern Employment District, the King and Sherbourne community, the mixed-use Dundas-Carlaw Loft District, and Gerrard Square. There is less opportunity for infill and transit-oriented redevelopment within the more established residential neighbourhoods.

The Inline Area offers the greatest redevelopment and city building potential among the three sub-areas. The many large-scale planning projects underway have the potential to create new neighbourhoods and generate substantial clusters of residents and jobs. Consideration should be given to aligning new transit service to the southern portion of the Inline Area, where the most intensive development is taking place, including the East Harbour precinct, the West Don Lands, the Keating Channel precinct and the Port Lands. Similarly, station areas with large underutilized sites nearby should also be prioritized, since they provide an opportunity for increased population and employment. The introduction of rapid transit to these key redevelopment areas creates the potential to ensure that future growth prioritizes transit-supportive built form and contributes to broader city building and place-making objectives. These developments will attract new residents, employees and visitors, and will serve as a major source of ridership for the Relief Line South. The Relief Line South planning process considers the potential for connecting the Inline Area and nearby neighbourhoods to key destinations such as the Downtown and the waterfront.

The Relief Line South planning process considers the current and planned land uses, recent development patterns, and broader strategic planning objectives within the Bloor-Danforth Terminus Study Sub-Area. The surrounding neighbourhoods are highly stable and already have good access to high-order transit service. Given this context, a new subway station in this area is not likely to stimulate significant redevelopment. Emphasis was therefore given to the relationship to existing transit infrastructure and an evaluation of how new stations can be linked to Line 2 and to the Greenwood Yard. In addition, there was consideration for how potential future extensions of the Relief Line South could provide connections to destinations and transit services farther north, including potential to serve the Broadview and Pape Avenues, Thorncliffe Park, Flemingdon Park, the 60-acre Celestica site redevelopment, and the Eglinton-Crosstown LRT.

Figure 5-26: Existing and projected population densities in the Study Area (City of Toronto, 2016d)



* The population densities shown in this map make use of the low population projection scenario developed for the SmartTrack project as described in the report EX13.3 Developing Toronto's Transit Network Plan: Phase 1 (City of Toronto, 2016d).

Figure 5-27: Existing and projected employment densities in the Study Area (City of Toronto, 2016d)



* The employment densities shown in this map make use of the medium employment projection scenario developed for the SmartTrack project as described in the report EX13.3 Developing Toronto's Transit Network Plan: Phase 1 (City of Toronto, 2016d).

Each of the three Study Sub-Areas features distinct qualities and opportunities that can be capitalized upon with the introduction of new rapid transit service. Where possible, stations should be located to serve the highest density neighbourhoods or those areas which have the greatest potential for population and employment growth. In other areas that are more stable or where redevelopment opportunities are limited, it will be important to consider the relationship with existing transit services and infrastructure, and potential connections to neighbourhoods and destinations beyond the Relief Line South corridor.

5.3 Natural Environment

A review of the natural environment in the study area was conducted to inform planning decisions affecting the preferred configuration and alignment of Relief Line South. The full Natural Environment Assessment report is provided in **Appendix 5-1**.

Key findings are summarized in the following sections with regards to landform, soils, Geology, designated natural areas, vegetation, wildlife and aquatic resources as well as species at risk (SAR) within the study area.

5.3.1 Landforms, Soil and Geology

The study area is located within the Don River watershed and specifically contains the reaches of the lower Don River often referred to as the “Don Narrows” (TRCA 2009a). The Don River watershed encompasses 358 square km (km²) of southern Ontario, of which the primary land use is urban (TRCA 2013). The headwaters of the Don River begin in the Oak Ridges Moraine and travel approximately 38 km to drain into Lake Ontario (TRCA 2009a). The watershed is composed of four primary physiographic regions, with the study area encompassing sand, silt and clay deposits in the region immediately north of Lake Ontario (TRCA 2009a).

Approximately 14% of the Don River watershed has natural cover (TRCA 2013). The majority of natural vegetation cover is contained in narrow strips of riparian forest, and in meadow or successional lands located near industrial areas. Managed golf courses and parklands also provide vegetated habitat throughout the watershed (TRCA 2009a).

The lower Don River subwatershed begins downstream of the confluences of three other subwatersheds at Don Valley Parkway and Don Mills Road, and travels approximately 8.5 km to discharge into the Keating Channel. Some sections of the lower Don River are engineered or channelized (TRCA 2009c). Historically the lower Don River was straightened and widened to allow the establishment of heavy industrial uses along the banks and to facilitate the movement of ships up the river to these new industrial facilities. In addition, stormwater discharge into the lower Don River coincided with this growth in urban development. Beginning in the 1940s and continuing into the 1960s, the Don River also experienced a large increase in sediment loads during construction of the Don Valley Parkway (TRCA 2011).

The “Don Narrows”, the portion of the Don River in the study area, is disconnected from its floodplain by a narrow vegetated riparian strip along the west bank containing primarily invasive species such as Japanese knotweed, Manitoba maple and crack willow (TRCA 2009a). The

Don Mouth Naturalization and Port Lands Flood Protection Project has designs for many improvements to the lower Don River within the study area, including instream habitat structures, backwater wetlands and riparian plantings. Opportunities to integrate the design ideas and proposed habitat improvements in the Don Narrows should be further investigated and coordinated with the planned crossing of the Don River for the Relief Line South.

5.3.2 Designated Natural Areas

Environmentally Significant Areas

There are no Environmentally Significant Areas (ESAs) in the study area. The nearest Environmentally Significant Area to the study area is the Don Valley Central ESA which is located approximately 1 km to the north of the study area, and approximately 0.5 km to the west.

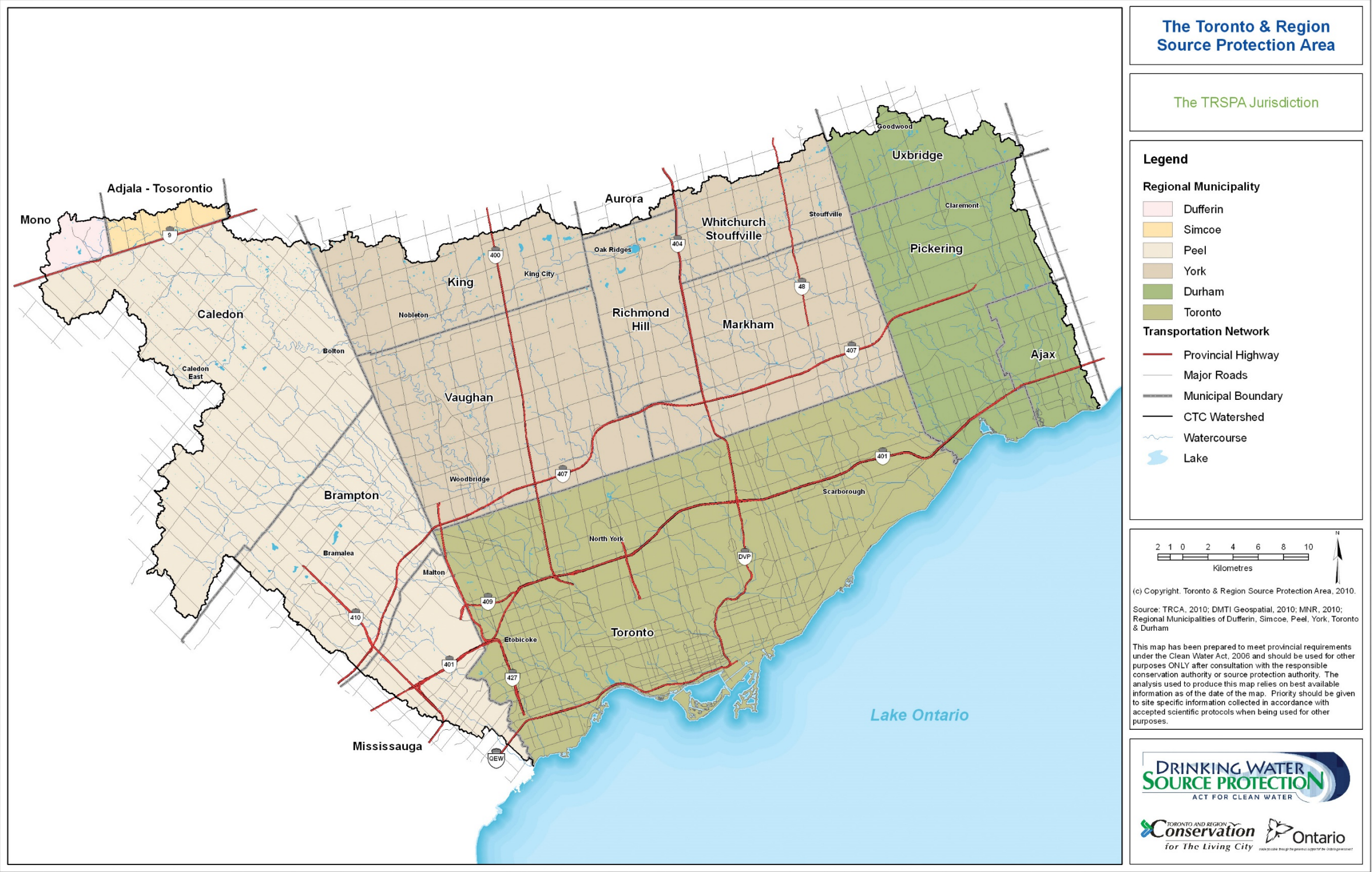
Other Designated Natural Features

There are no Areas of Natural or Scientific Interest, Provincially Significant Wetlands or other natural areas designated by the City of Toronto in the study area.

Source Protection Area

The study area is located within the Toronto and Region Source Protection Area (TRSPA), shown in **Figure 5-28**. The TRSPA is in the CTC Source Protection Region (CTC SPR), and falls under the CTC Source Protection Plan (CTC SPP). In 2006, the Clean Water Act (CWA) was introduced to promote source water protection. Source water protection is considered the first step in the multi-barrier approach to ensuring safe drinking water. Subsequent barriers address treatment, distribution, monitoring, and responses to emergencies. The Clean Water Act, 2006, ensures communities are able to protect their municipal drinking water supplies by developing collaborative, locally driven, science-based protection plans. Communities will identify threats to local water sources and take mitigation measures to combat these threats. Since the study area falls within the TRSPA, it is subject to the regulations set out by the CWA.

Figure 5-28: Toronto and Region Source Protection Area Jurisdiction (TRSPA, 2010)



5.3.3 Vegetation Resources

Regional Setting

The study area is located in the Great Lakes – St. Lawrence Forest Region and the Niagara sub-region. These regions are characterized by deciduous species, composed mainly of beech (*Fagus sylvatica*) and sugar maple (*Acer saccharum*) in association with basswood (*Tilia americana*), red maple (*Acer rubrum*), red oak (*Quercus rubra*) and white oak (*Quercus alba*). The Niagara sub-region also contains a variety of deciduous species consistent with the Carolinian Forest of the east-central United States, such as tulip-tree (*Liriodendron tulipifera*), pin oak (*Quercus palustris*), chinquapin oak (*Quercus muehlenbergii*), blue ash (*Fraxinus quadrangulata*), cucumber-tree (*Magnolia acuminata*), pawpaw (*Asimina triloba*), red mulberry (*Morus rubra*) and sassafras (*Sassafras albidum*) (Rowe 1977).

Soils underlying the Niagara sub-region are primarily glacial deposits over limestone and shale along with some clay and sand. Soils have developed into fertile gray brown luvisols and humic gleysols (Rowe 1977). Given the location of the study area within the urban center of Toronto, the soils are likely brought in from outside sources to create areas of parkland within the study area.

Vegetation Communities

Plant community mapping for the Don River corridor was provided by the TRCA and was based on the Ecological Land Classification system for southern Ontario (Lee et al. 1998). The mapping indicates the primary plant communities that occur in the study area are disturbed cultural communities, such as cultural meadow and cultural savannah. A small patch of deciduous forest is mapped just west of the Don River. Additional isolated patches of deciduous forest are mapped in the southern portion of the Don River corridor; however, they are outside of the study area. Based on the site reconnaissance conducted along the Don River corridor in 2017, the plant communities were confirmed to be similar types of cultural communities characterized primarily by non-native, and invasive plant species. The deciduous forest (FOD8-1) identified by the TRCA was observed to be cleared and developed for commercial use.

The lower Don River subwatershed has a total natural coverage of 428 ha (representing 9% of the total area occupied by the subwatershed), of which 71% is woodland, 28.5% is meadow, and 0.5% is wetland (TRCA 2009a). The two main forest communities in the City of Toronto are deciduous sugar maple associated with beech, oak and ash, and mixed forests of hemlock, white pine, sugar maple and oak (TRCA 2009a). Within the Don River watershed, interior forest habitat covers less than 1% of the area and does not occur within the study area (TRCA 2013). In general, the habitat quality in the Don River watershed is classified as poor due to the small, narrow patches of existing natural cover (TRCA 2009a). These communities are also isolated from other natural features, which further diminish the quality of available habitat (TRCA 2009a). Natural communities along the lower Don River also suffer from high levels of disturbance from trampling/trails, dumping and invasive species (TRCA 2009d).

Vascular Plants

Records provided by the TRCA indicate the native plant species located along the lower Don River within the study area are secure and common in Ontario and globally (S4 or S5; G4 or G5). As the above described vegetation communities suggest, much of the flora located along the lower Don River are exotic or invasive species. Native species that were identified by the TRCA as occurring in the Don River corridor include red maple, silver maple (*Acer saccharinum*), black ash (*Fraxinus nigra*), bur oak (*Quercus macrocarpa*), red oak, shining willow (*Salix lucida*), black willow (*Salix nigra*), pin cherry (*Prunus pensylvanica*), ninebark (*Physocarpus opulifolius*), Baltic rush (*Juncus balticus*), common three-square (*Schoenoplectus pungens*) and hedge bindweed (*Calystegia sepium*).

Based on field surveys conducted along the Don River corridor in 2017, the majority of plant species identified are non-native and invasive ground cover and shrub species. Canopy cover in the riparian corridor at the proposed crossing is minimal. In the adjacent public park (i.e. Corktown Common), where there have been efforts to create naturalized habitats, canopy cover is higher and there is a higher proportion of native species.

Correspondence with the Aurora District Ministry of Natural Resources and Forestry (MNRF) SAR Biologist indicated the presence of Butternut (provincially threatened species) in the vicinity of the study area (MNRF 2017). The potential for this species is discussed further in Section 3.3.6. No butternut, or other SAR or rare plants, were identified during field surveys

5.3.4 Wildlife Resources

Breeding Birds

Due to its proximity to Lake Ontario, the City of Toronto (including the study area) is an annual stopover location for thousands of migratory birds (Dougan and Assoc. 2009). Although sites along the Lake Ontario shoreline are most frequently used as stopover locations, migrants have also been observed using inland areas with natural cover associated with the Don River (Dougan and Assoc. 2009).

Due to high levels of human disturbance in the urban environment, the breeding bird communities that use available natural spaces in the City tend to be characterized by shrub and canopy-nesting birds, such as gray catbird, brown thrasher, indigo bunting, red-eyed vireo, and Baltimore oriole over ground-nesting birds (City of Toronto 2011). As well, certain bird species that often use man-made structures as nesting habitat may be found breeding within the study area.

Correspondence with the Aurora District MNRF SAR Biologist indicated the potential for barn swallow (*Hirundo rustica*), chimney swift (*Chaetura pelagica*) and peregrine falcon (*Falco peregrinus anatum*) in the vicinity of the study area. Barn swallow and chimney swift are both listed as threatened provincially and peregrine falcon is listed as special concern provincially. Based on records between 1990 and 2007, the provincially endangered prothonotary warbler (*Protonotaria citrea*) and provincially threatened Louisiana waterthrush (*Parkesia motacilla*)

have been recorded at stopover locations within the study area during migration (Dougan and Assoc. 2009).

Historical bird surveys conducted in habitats approximately 1 km west of the study area along the Don River indicate species ranked as L3 by the TRCA occur there (TRCA 2001). L3 species are considered relatively sensitive in terms of habitat needs, are sensitive to development and may decline in urban settings. Some of these L3 bird species also have the potential to inhabit the study area.

A total of seven bird species were observed along the Don River corridor during field surveys in 2017. All of the bird species observed are ranked S4 or S5 (apparently secure or secure and common), or SNA (not applicable – species is not a target for conservation). No bird SAR were observed in the study area during the field surveys. One species, double-crested cormorant, is designated L3 by the TRCA.

Wildlife and Wildlife Habitat

The naturally vegetated habitat in the study area is limited to urban parks, residential yards and the narrow strip of riparian buffer on the west side of the Don River which also contains a walking/biking trail. Continuous corridors of natural vegetation and cover which provide for the movement and distribution of wildlife are lacking in the study area. Therefore, the wildlife inhabiting the study area are those species that are highly adapted to urban environments such as raccoon (*Procyon lotor*), gray squirrel (*Sciurus carolinensis*) and coyote (*Canis latrans*).

Of the wildlife species ranked as L3 in the Toronto area that occur to the northwest of the study area, noteworthy are the mammals: hairy-tailed mole (*Parascalops breweri*), meadow jumping mouse (*Zapus hudsonicus*); and the herpetofauna: gray tree frog (*Hyla versicolor*), smooth green snake (*Opheodrys vernalis*) and Blanding's turtle (*Emydoidea blandingi*) (TRCA 2001). Due to the limited amount of natural habitat in the study area, it is unlikely that the study area supports the above listed mammal and herpetofaunal species.

Based on the site reconnaissance, the Don River corridor within the study area was assessed to provide limited wildlife habitat due to the extensive urban development, limited natural cover and low connectivity to other natural features or parks. The Don River may function as a movement corridor for wildlife, but due to the low riparian cover and narrow riparian corridor width, it is most likely to support small to medium sized wildlife within the study area.

The public park (i.e. Corktown Common) adjacent to the Don River contains small pockets of urban forest cover and marsh habitat, which may support wildlife adapted to these types of open, urban-influenced environments.

One arthropod species designated special concern under the Endangered Species Act, monarch (*Danaus plexippus*), was observed along the Don River corridor during field surveys in 2017. Common milkweed (*Asclepias syriaca*), the host plant for monarch, was also observed along the Don River and in Corktown Common within the study area during the site reconnaissance in 2017, and could support monarch larvae.

5.3.5 Aquatic Resources

Surface Watercourses and Waterbodies

The only surface watercourse in the study area is the Don River. The Don River, particularly the portion within the study area known as the Don Narrows, has been altered by urbanization since the mid-1800s. Planning is underway for the rehabilitation and revitalization of this portion of the river (TRCA 2009a). Existing conditions of the river, taken from the Don River Watershed Plan (TRCA 2009a) are generally poor quality based on the measurement indicators (e.g. surface water quality and quantity, aquatic natural heritage and terrestrial natural heritage).

High nutrient and bacteria levels in the Lower Don River are an ongoing problem that is significantly influenced by effluent discharges from the North Toronto Wastewater Treatment Plant as well as combined sewer overflows (i.e. combined sanitary and stormwater sewers) into the Don River (TRCA 2009a). Flooding and erosion issues have also impacted the terrestrial habitat, resulting in a loss of natural cover and riparian habitat. This pollution, combined with a loss in riparian and wetland habitats have resulted in low biodiversity of all aquatic species and poor in-stream habitat in the Lower Don River. Pressure from intensive urban development has resulted in highly disturbed terrestrial and aquatic habitats that facilitate invasion by non-native plants which threaten the natural ecosystems (TRCA 2009a).

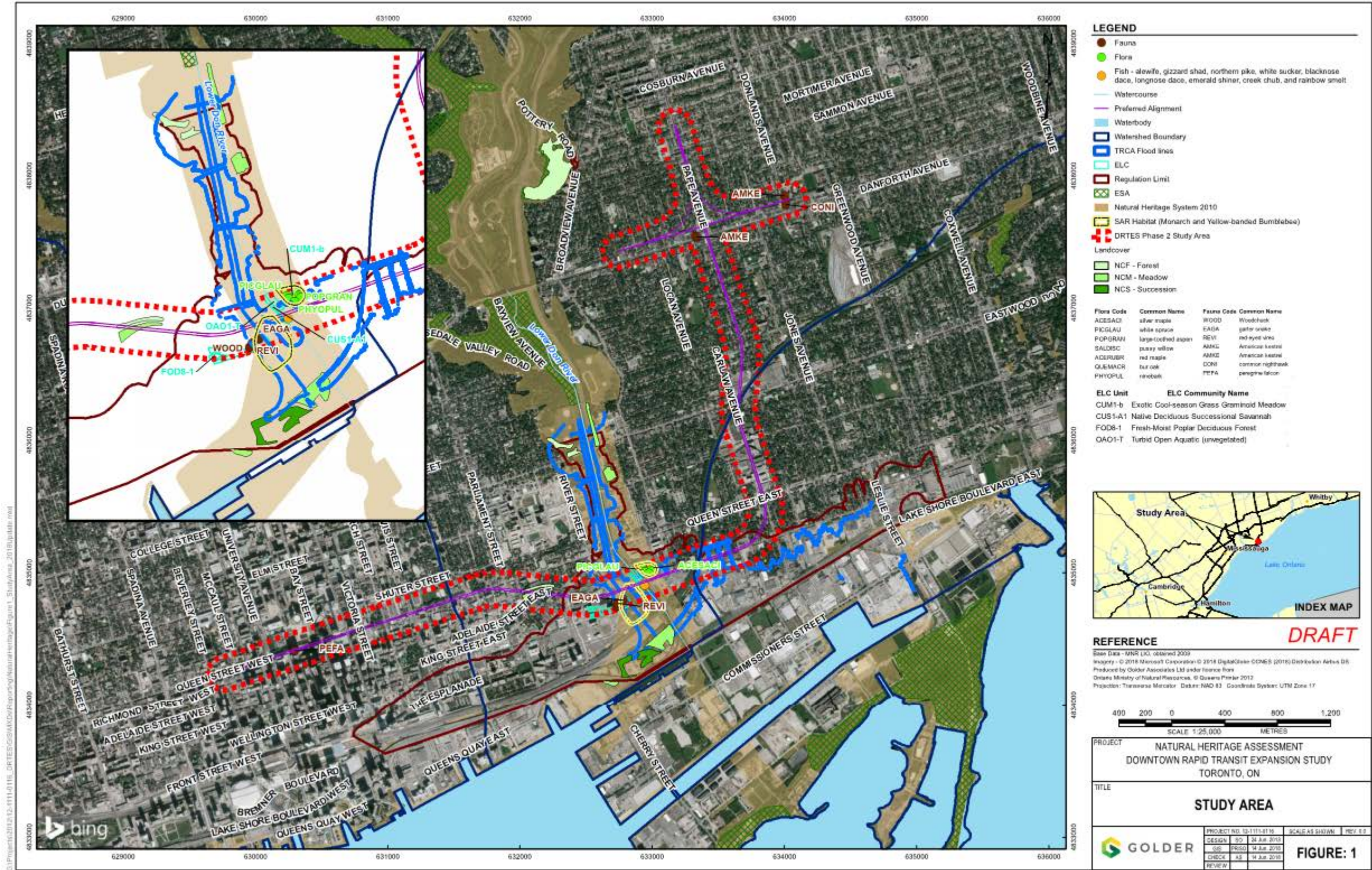
Flooding in the Lower Don River is attributed to its broad, unconfined floodplain and intensive development within the watershed. The narrow, deep valley of the upper reaches of the river expands to form the historical Lake Ontario shoreline in the lower reaches of the river (TRCA 2005). According to available floodplain mapping (TRCA 2010; 2018), the floodplain of the Don River extends approximately 85 m from the river on the western side, and approximately 390 m to the east (up to the main railway corridor). This is illustrated in **Figure 5-29**.

As part of the updates to the Greenbelt Plan, the Don River has been designated as Urban River Valley. Key river valleys in urban areas adjacent to the Greenbelt provide opportunities for additional connections to help expand and integrate the Greenbelt and its systems into the broader southern Ontario landscape. The Urban River Valley designation provides direction to those areas where the Greenbelt occupies river valleys in an urban context. These urban river valleys may be the setting for a network of uses and facilities, including recreational, cultural and tourist amenities and infrastructure, which are needed to support urban areas.

For lands falling within the Urban River Valley, the Greenbelt Plan notes that all existing, expanded or new infrastructure which is subject to and approved under the Environmental Assessment Act, or which receives a similar approval, is permitted provided it supports the needs of adjacent settlement areas or serves the significant growth and economic development expected in southern Ontario and supports the goals and objectives of the Greenbelt Plan.

Through the scope of this project, planning approaches have been taken to minimize and mitigate adverse impacts associated with any potential impacts to the Don River. Commitments for future work have been included in order to assure mitigation of impacts on fish habitat, soil and bedrock assessment, and flood protection.

Figure 5-29: Relief Line South Study Area- Natural Environment Features (Ontario Ministry of Natural Resources, 2012)



Wetlands

No wetlands or headwater features are mapped within the study area based on the background review. However, small pockets of marsh habitat have been created as part of the urban park in Corktown Common, within the study area.

Fish and Fish Habitat

The section of the Don River travelling through the study area (known as the Lower Don River) is classified as estuarine in the City of Toronto Natural Heritage Study (TRCA 2001). Estuarine habitat is described as having slow moving, turbid water with a low slope. Typical fish species found in this habitat, including trout, salmon and white sucker (*Catostomus commersoni*), are transient species passing through on the way to and from spawning habitats upriver. In addition, the TRCA (2001) identified the portion of the Don River in the study area as being of poor stream quality for fish habitat.

There are currently 21 species of fish known to occur in the Don River watershed, of which 81% are native. The most common species sampled in the watershed are pollution tolerant generalists, such as creek chub (*Semotilus atromaculatus*), longnose dace (*Rhinichthys cataractae*), blacknose dace (*Rhinichthys atratulus*), fathead minnow (*Pimephales promelas*), bluntnose minnow (*Pimephales notatus*) and white sucker. Although stocking efforts have introduced Chinook salmon (*Oncorhynchus tshawytscha*), brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) to rivers in the watershed, they are not naturally sustaining populations (TRCA 2009a).

The portion of the Don River in the study area is part of Fish Management Zone 5, as defined by the TRCA, and is characterized by a tolerant warm water fish community. This fish community has been highly impacted by urbanization, inadequate stormwater control, and sewer overflows (TRCA 2009a).

A 2005 survey of the lower Don River subwatershed identified only nine fish species: alewife (*Alosa pseudoharengus*), gizzard shad (*Dorosoma cepedianum*), northern pike (*Esox lucius*), white sucker, blacknose dace, longnose dace, emerald shiner (*Notropis atherinoides*), creek chub, and rainbow smelt (*Osmerus mordax*). Alewife, gizzard shad, northern pike, and rainbow smelt are lake-based species that are found in habitat at the mouth of the Don River (TRCA 2009b).

Based on the results of the site reconnaissance in 2017, the Don River within the study area is defined by slow flowing, flat habitat with turbid water. The banks are reinforced with steel support walls along the left downstream bank. Both banks have a narrow band of riparian vegetation. Bankfull width averages approximately 40 m and wetted width is an average of approximately 36 m. The bankfull height is approximately 2 m.

5.3.6 Species at Risk

According to correspondence from the MNRF (2017), there are records of occurrence for four species at risk (SAR) within the study area: barn swallow, chimney swift, peregrine falcon, and butternut. In addition to these SAR, seven species were identified through the desktop SAR screening as having a moderate to high potential to be found in the study area: western chorus frog (*Pseudacris triseriata*), monarch (*Danaus plexippus*), yellow-banded bumble bee (*Bombus terricola*), chimney swift (*Chaetura pelagica*), little brown myotis (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*) and white wood aster (*Eurybia divaricata*). Rankings were applied based on known occurrence records and the presence of suitable habitat determined through air photo interpretation and/or field surveys.

Based on the results of the desktop review and field surveys, SAR with potential to be directly impacted by the Project include monarch and yellow-banded bumble bee. While there is potential habitat for other SAR within the study area, it is outside of the development footprint and not expected to be directly impacted. Implementation of best management practices during construction will also prevent adverse indirect impacts to these habitats.

5.4 Cultural Environment

5.4.1 Built Heritage Resources and Cultural Heritage Landscapes

To identify all cultural heritage resources potentially impacted by the Relief Line South, the Cultural Heritage Assessment Report CHAR, see **Appendix 6-5**), completed on June 28, 2018, defined study areas around the proposed station locations, all above-grade project components, and areas of the Relief Line South corridor where below-grade tunnelling is predicted to exceed acceptable vibration limits. All parcels proposed for project components, as well as all adjacent parcels to the project component parcels, were included in the analysis. In some cases, additional parcels were included if they were determined to be particularly susceptible to excavation or construction vibration, or if they included built sections that were structurally connected to buildings adjacent to project parcels. Sections of the Relief Line South corridor where impacts from tunnelling are predicted to be well below accepted vibration thresholds were excluded from the analysis – this constituted the majority of the parcels adjacent to underground tunnels. The study area used for this EPR will be confirmed at later design phases when the location of above and below-grade facilities, construction methods, and construction plans are confirmed. Additionally, during the preparation of the City of Toronto Vibration Control Form prior to construction, alternative vibration criteria for older buildings may be considered, as appropriate.

The study areas from west to east are: Osgoode Station (Interchange), Queen Station (Interchange), Sherbourne Station, Sumach Station, Broadview Station, Carlaw Station, Gerrard Station, and Pape Station (Interchange). The Sumach Station Study Area includes a section of the below grade corridor where tunnelling is predicted to exceed acceptable vibration limits during construction.

Within these study areas the CHAR identified a total of 112 known and potential cultural heritage resources. Fifty are protected heritage properties, of which two are national historic sites (also

municipally designated), one is a Provincial Heritage Property, and 11 are designated under Part IV of the *Ontario Heritage Act*. The west portion of the Queen and Osgoode Stations (Interchanges) includes 39 protected heritage properties within the Queen Street West Heritage Conservation District, designated under Part V of the of the *Ontario Heritage Act*.

Also identified were one property with intention to designate under Part IV of the *Ontario Heritage Act*, 9 properties listed on the City of Toronto Heritage Register, and 49 properties with structures 40 or more years old that were evaluated to have potential cultural heritage value or interest.

5.4.2 Archaeological Resources

The Project Area of the Stage 1 Archaeological Assessment is determined by a 120 metre buffer around the subterranean track centrelines of the linear Relief Line South Corridor. The project area under assessment includes the new above ground infrastructure components for the eight proposed Relief Line South stations and associated substations as well as the below ground Relief Line South alignment tunnel and associated platforms. In addition to these infrastructure components, ground surface disturbances are also anticipated for the open-cut launch and extraction shafts as well as the cut-and-cover construction areas along the alignment.

Areas of Archaeological Potential

The Stage 1 archaeological assessment has determined that there is no potential for the presence of significant archaeological resources to be preserved within the following portions of the Relief Line South corridor project area:

- Osgoode Interchange Station: all above ground infrastructure footprints (see Map 19-A of Appendix 6-4)
- Queen Interchange Station: all above ground infrastructure footprints (see Map 19-B of Appendix 6-4)
- Subterranean Tunnel and Stations: corridor alignment and station infrastructure tunneled 25-40 metres below ground except where open-cut shafts or cut-and-cover construction areas are proposed at ground surface level above (see Maps 19-A–I of Appendix 6-4)

As such, it is recommended that these areas have no archaeological potential and may be considered free of further archaeological concern. No further archaeological assessment of these portions of the project area is required.

The Stage 1 Archaeological Assessment has also determined that there is potential for the presence of archaeological resources to be preserved within all or part of the following portions of the Relief Line South corridor project area:

- Sherbourne Station: above ground infrastructure footprints encompassing greenspace/paved area northwest of where Sherbourne Street and Queen Street East intersect as well as paved area in northeast corner of Seaton Street and Queen Street East (see Map 19-C of Appendix 6-4)

- Sumach Station: above ground infrastructure footprints encompassing greenspace northeast of King Street East and Sackville Street (Sackville Park) as well as greenspace west of the Richmond Street East/Eastern Avenue merger (see Map 19-D of Appendix 6-4)
- Broadview Station: all above ground infrastructure footprints (see Map 19-E of Appendix 6-4)
- Carlaw Station: above ground infrastructure footprints encompassing paved area in southwest corner of Carlaw and Colgate Avenues as well as greenspace in southwest corner of the schoolyard for Morse Street Junior P.S. (see Map 19-F of Appendix 6-4)
- Gerrard Station: above ground infrastructure footprints in paved area north (1) and northeast (2) of Riverdale Shopping Centre (see Map 19-G of Appendix 6-4)
- Pape Interchange Station: above ground infrastructure footprint (northern street entrance) west of Pape Avenue (see Map 19-H–I of Appendix 6-4)
- Cut-and-cover construction areas: ground surface (pavement) disturbances located along Pape Avenue (encompassing Launch Shaft 3 and Extraction Shafts 2 and 3), along Queen Street West (encompassing Extraction Shaft 1), as well as within Queen Street East encompassing the subterranean station footprint for Sherbourne Station and within Carlaw Avenue encompassing the subterranean station footprint for Carlaw Station (see Map 19-A–I of Appendix 6-4)
- Launch Shafts 1 and 2: ground surface (pavement) disturbances located within the Broadview Station subterranean station footprint (see Map 19-E of Appendix 6-4)
- Wye track connections: ground surface (greenspaces and residential structures on periphery) disturbances located within Logan Avenue and Langford Parkettes (see Map 19-H of Appendix 6-4)

As such, it is recommended that these areas have archaeological potential requiring further archaeological assessment in the form of Stage 2-3 property survey and assessment as described in the Stage 1 Archaeological Assessment. The Stage 1 Archaeological Assessment can be found in **Appendix 6-4**.

5.5

Utilities

The major utilities located in the vicinity of the Relief Line South alignment have been identified through direct contact with the respective companies or providers and through a review of the Toronto Digital Map Owners Group (DMOG). At the time of this report, information for the West Don Land area was unavailable. These utilities examined in this report include:

- Municipal (City of Toronto) storm sewers, watermains, steam mains and sanitary sewers
- Bell Canada
- Rogers Communications
- TELUS
- Cogeco Data Services
- Group Telecom
- Toronto Hydro
- Hydro One

- Enwave Energy Corporation
- Beanfield Metroconnect
- Enbridge Gas Distribution Inc.
- Sun Oil Co Pipe
- Imperial Oil Co Pipe
- Trans Northern Pipe
- Metronet Water Main
- AT&T Canada Conduit.

Utilities were examined in the vicinity of the Relief Line South alignment and at station locations. The underground utilities with diameters greater than 600 mm that might have impact have been noted and indicated on the plan and profile drawings.

A thorough review of existing and proposed future utilities plans, as well as all necessary relocations or modifications will be undertaken during Detailed Design phase of the Relief Line South project to determine any permanent relocation requirements.

All other utilities can be relocated either prior to or during construction depending on the proposed relocation strategy. Utility impacts and relocation strategies will be confirmed during the detailed design phase of the project. Utilities shown on the DMOG in 2D (for example, streets north of Selkirk Street on Pape Avenue do not show vertical elevations) will be re-visited during the detailed design phase. The proposed tail track profile may be revised to avoid any possible conflicts with the existing large diameter sewer systems north of Selkirk Street on Pape Avenue.

Within the study area, utilities such as Bell and Rogers telecommunication lines, Enbridge gas lines, Sanitary Sewers, Storm Sewers, Combined Sewers, Watermains, and Toronto Hydro lines are present. The utilities are typically confined to existing road right-of-ways.

5.5.1 Municipal Sewer

Storm Sewers

The City of Toronto operates multiple storm sewer located within the study area. These include:

- 600mm reinforced concrete pipe (RCP) storm sewer crossing the proposed alignment at McCaul St.
- There is a 375mm RCP storm sewer running east-west along Queen Street W. The 600mm storm sewer on St Patrick Street ties in at Queen Street W. The 375mm sewer on Queen Street W turns into an 825mm RCP storm sewer that terminates at Simcoe St
- At Victoria St, a 1500mm concrete pipe (CP) storm sewer starts running along Queen Street E which turns into a 1650mm CP sewer at Dalhousie St. East of Sherbourne St, this sewer is 1500mm in diameter.

- The proposed subway alignment curves southeast away from Queen Street and crosses a 300mm RCP storm sewer on Parliament St, a 375mm RCP storm sewer on Power St, a 375mm CP storm sewer on Richmond Street E and a 375mm concrete storm sewer near Sackville Street / Adelaide Street E.
- The proposed subway alignment crosses a 1050mm RCP storm sewer at King Street E and a 375mm concrete storm sewer at Sumach St.
- The proposed subway alignment runs parallel with a 375mm vitrified pipe (VP) storm sewer which turns into 675mm RCP on Eastern Avenue and then it turns into a 750mm on Eastern Avenue. This storm sewer terminates at Bayview Avenue.
- On the east side of the Don Valley Parkway (DVP) / Don River, a 1200mm CRP storm sewer runs east-west along Sunlight Park Rd in line with the proposed subway alignment. This sewer then turns into a 600mm x 900mm egg shaped (ES) brick sewer at Broadview Avenue.
- Between Empire Avenue and Booth Avenue, there is a 450mm VP storm sewer and a 300mm VP storm sewer that tie into a 450mm VP storm sewer that runs north-south along Booth Avenue.
- The proposed alignment crosses a 450mm VP concrete sewer on Logan Avenue, a 450mm VP storm sewer on Morse St, a 300mm VP storm sewer in an alley between Morse Street and Carlaw Avenue, and crosses a 1650mm concrete storm sewer that runs along Queen Street E.
- There is a 1275mm x 1375mm concrete culvert storm sewer that runs down Carlaw Avenue in line with the proposed subway alignment. This terminates at Queen Street E.
- There is a 300mm VP storm sewer tie in to Carlaw Avenue from the sewer on Colgate Avenue and a 900mm barrel brick storm sewer servicing the low rise complex between Colgate Avenue and Dundas Street E that ties into the 1050mm x 1200mm concrete culvert storm sewer that runs down Carlaw Avenue
- East of Carlaw Avenue along Dundas Street E, there is a 600mm VP storm sewer crosses the proposed alignment and ties into the concrete culvert storm sewer on Carlaw Avenue.
- West of Carlaw Avenue along Dundas Street E, a 1350mm circular concrete storm sewer ties into the concrete culvert storm sewer on Carlaw Avenue.
- The 1275mm concrete brick storm sewer on Badgerow Avenue ties into the storm sewer on Carlaw Avenue.
- The proposed subway alignment turns northeast at the CN tracks/Gerrard St. At Langley Avenue, the proposed alignment crosses 300mm concrete storm sewer.
- At Riverdale Avenue, the proposed alignment is in line with Pape Avenue. Below Pape Avenue is a 1350mm concrete storm sewer that runs north-south.
- On the west side of Bain Avenue, there is a 1950mm concrete storm sewer tie in to the Pape Avenue storm sewer. On the east side of Bain Avenue, a 1350mm concrete storm sewer ties into Pape.

- There is a 375mm RCP storm sewer crossing at Dingwall Avenue and Frizzell Avenue.
- North of Frizzell Avenue, the storm sewer on Pape is 1500mm in diameter. There is a 450mm RCP storm sewer tie in at Wroxeter Avenue.
- At Strathcona Avenue, the 1500mm storm sewer on Pape Avenue turns onto Strathcona Avenue and runs in the east direction. A 750mm RCP storm sewer that is running south on Pape Avenue ties into this sewer.
- There is a 375mm RCP storm sewer crossing at Cavell Avenue and the sewer on Pape Avenue is 675mm to the north.
- There is a 300mm PVC storm sewer to the west on Harcourt Avenue and a 525mm RCP storm sewer east of Pape Avenue on Harcourt Avenue that crosses the alignment.
- There is a 525mm storm sewer that runs in the north-south direction north on Pape Avenue. This sewer turns east and into 450mm storm sewer that runs in the east direction on Hazelwood Avenue.
- There is a 1500mm x 1200mm horseshoe storm sewer that runs east-west along Danforth Avenue that crosses the proposed subway alignment.
- North of Danforth Avenue, there is a 1200mm circular concrete storm sewer that runs in the north-south direction on Pape Avenue. At Gertrude Pl, there is a 450mm RCP storm sewer tie in.
- There is storm sewer system incrementing from 600mm to 1050mm on Pape Avenue between Browning Avenue and Sammon Avenue, connecting to a 2400mm storm sewer network running in the east-west direction between Sammon Avenue and Mortimer Avenue.
- There is a 1500mm storm sewer that runs in the north-south direction, running northerly on Pape Avenue from Mortimer Avenue. At Westwood Avenue, there is a 450mm concrete storm tie in.

Combined and Sanitary Sewers

The City of Toronto operates multiple sanitary sewers and combined sewers located within the study area. These include:

- A 600mm circular brick combined sewer that runs along Queen Street W. Starting at the beginning of the proposed alignment at John St, this sewer ends at Duncan Street and then another circular brick combined sewer continues along Queen Street W. There is a 450mm circular brick sanitary sewer that connects to it at St Patrick St.
- At Simcoe St, the 600mm circular brick combined sewer heads south down Simcoe St. There is a 2000mm RCP sanitary sewer and a 1425mm circular brick combined sewer that runs north-south on Simcoe St. There is a 600x900mm ES brick combined sewer that ties into the 1425mm sewer and runs along the south of Queen Street W to University Avenue. On the north side of Queen St, there is a 1350x1295mm horseshoe concrete combined sewer that ties into the 1425mm that runs along Queen Street W to University Avenue, and then it turns

and runs north-south up University Avenue. Along the west side of Simcoe St, an abandoned 1295mm circular brick combined sewer that runs north-south on Simcoe Street crosses the proposed subway alignment.

- East of University Avenue, there is a 975mm RCP combined sewer on the north side of Queen Street W and a 600mm x 900mm ES brick combined sewer on the south side. A 600mm RCP combined sewer ties in at York St.
- On the west property limit of Nathan Phillips Square, there are multiple sanitary crossings/connections and several abandoned lines. Beyond that crossing, there is a 600mm VP combined sewer to the south.
- East of the multiple crossings and connections, there is a 600mm RCP combined sewer on the north side of Queen Street West, and a 600x900mm ES brick combined sewer along Queen Street West with an abandoned line on the south side. At Bay St, the 600mm RCP, 375x750mm ES brick and 1050mm circular brick combined sewers all run north. On the south side of Queen Street West, south on Bay Street, there is a 990mm RCP combined sewer that runs north-south.
- East of Bay Street along Queen Street West, there is a 600x900mm ES brick and 375mm VP combined sewers running east-west. At James Street, there is a 300mm VP combined sewer and a 675mm RCP combined sewer to the north that tie into the combined sewer on Queen Street.
- The 375mm VP on Queen Street W ends just west of Yonge St. There is a 600mm VP combined sewer that runs along the northern edge of Queen Street where the station box for the Yonge Subway Line is located below. A 525mm VP sanitary sewer ties in north on Yonge St. The 600mm VP combined sewer moves back into the middle of the street as a 600mm circular combined sewer.
- On Victoria St, there is a 1500mm ES concrete sanitary sewer and a 1500 x 1350mm concrete combined culvert over a 600mm VP combined sewer in the north-south direction. A 525mm x 900mm ES brick combined sewer continues to run along Queen Street E.
- There is an 800x1200mm ES brick combined sewer that runs north-south on Church St. The sewer on Queen feeds into it at this point.
- At Dalhousie St, a 600mm circular brick combined sewer feeds into an unconnected 525x900mm ES brick combined sewer on Queen Street E. A 300mm VP combined sewer from Mutual Street feeds into it. The sewer line along Queen Street then feeds into a 1050x1500mm ES brick combined sewer that heads south on Jarvis St.
- East of Jarvis St, a 600mm x 900mm ES brick combined sewer that runs along Queen Street feeds into a 600mm x 825mm ES brick combined sewer that heads south on George St.
- Just east of George St, a 900mm circular brick combined sewer (that is not connected to the previous combined sewer running south on George St) turns into a 600 x 900mm ES brick combined sewer. This sewer then turns south and connects into a 375mm VP sanitary sewer / 825mm RCP combined sewer on Sherbourne St.

- East of Sherbourne St, a 750 x 1125mm ES brick combined sewer (that is not connected to the previous combined sewer that runs down Sherbourne St) runs along Queen E. A 750 x 1125mm ES brick combined sewer from Seaton Street ties into it, and then the line on Queen Street crosses a 600x900mm ES brick and a 2325mm circular brick HL1 combined sewer on Ontario St.
- The proposed subway alignment curves southeast away from Queen Street and crosses a 975 x 1500mm ES brick combined sewer at Parliament St, a 300mm VP combined sewer at Power St, a 600x900mm ES brick combined sewer at Sackville St, a 600x900mm ES brick combined sewer on King Street E, and a 600x900mm ES brick combined sewer on Sumach St.
- On Eastern Avenue, there is a 300mm VP sanitary sewer and a 1500mm circular concrete sanitary sewer in line with the alignment. These sewers move north of Eastern at the DVP/Don River crossing in a 750mm CI pipe sanitary sewer. The 1650mm RCP sanitary sewer from this crossing realigns back south to Sunlight Park Road.
- At Broadview Ave/Sunlight Park Rd, there is a 300mm VP combined sewer and a 450mm VP combined sewer tie in. Along Eastern Avenue, there is a 300mmVP sanitary sewer and a 1650mm RCP sanitary sewer running east-west. A 300mm VP sanitary sewer from Lewis Street ties into the 300mm sanitary sewer on Eastern Avenue.
- On the other side of the CN tracks at Dibble St, the 300mm VP sanitary sewer runs along Eastern Avenue and then ties into the 1650mm RCP sanitary sewer on Eastern Avenue. A 300mm VP sanitary sewer from McGee Street turns east on to Eastern Avenue and then continues along in an east-west direction and ties-in 300mm VP sanitary sewers from Empire Avenue and Booth Avenue.
- The proposed subway alignment curves northeast and crosses a 300mm VP sanitary sewer at Logan and a 300mm VP sanitary sewer at Morse St. Along Carlaw Avenue, there is a 1800mm circular concrete sanitary sewer, a 1625mm x 1350mm concrete culvert combined sewer overflow, and a 450mm VP combined sewer that run north-south.
- There are a variety of abandoned pipes and crossings at Queen Street E. North of Queen St, a 600 x 900mm ES brick combined sewer and an 1800mm circular concrete sanitary sewer run along Carlaw Avenue. West of Carlaw Avenue on Queen Street E, there is a 300m VP sanitary sewer and a 700mm x 1050mm ES brick combined sewer ties into the 1625mm x 1350mm concrete culvert combined sewer overflow. On Queen Street E, east of Carlaw Avenue, there is a 975mm circular shape brick combined sewer ties in to the concrete culvert combined sewer on Carlaw Avenue and a 700mm x 1050 egg shape brick combined running easterly from Carlaw Avenue.
- The 1800mm sanitary sewer and 600mm x 900mm combine sewers on Carlaw Avenue sewers cross the 2700mm Brick Circular sanitary sewer at Dickens St. An 1825mm circular concrete san sewer ties into the 1800mm sewer on Carlaw Avenue. Along Carlaw Avenue, north of Dundas Street E, there is an additional 300mm VP combined sewer that runs north-south.

- A 450mm VP combined sewer on Badgerow Avenue ties in to the 600mm x 900 mm ES brick combined sewer along Carlaw Avenue.
- The alignment turns northeast and crosses a 300mm VP combined sewer and an 1800mm circular concrete sanitary sewer at Gerrard Street E and a 3000mm mid Toronto interceptor sanitary sewer.
- The alignment crosses a 300mm VP combined sewer at Langley Avenue. On Pape Avenue within the alignment, there is a 600 x 900mm ES brick combined sewer running north-south. From this sewer, there are 300mm VP combined sewer tie-ins from Withrow Avenue, Bain Avenue, Dingwall Avenue, Frizzell Avenue, Strathcona Avenue, and Hazelwood Avenue. There is a 450mm VP combined sewer in a 1500mm tunnel liner tie-in from Wroxeter Avenue, a 450mm RCP combined sewer tie-in from Harcourt Avenue, and a 450mm VP combined sewer tie-in at Danforth Avenue.
- North of Danforth Avenue, there is a 450mm VP combined sewer on Pape Avenue with a 300mm VP combined sewer with tie-in at Lipton Avenue and Gertrude Place.
- There is a concrete sanitary sewer network incrementing from 300mm to 1675mm running northerly on Pape Avenue, from Aldwych Avenue and continues north of Westwood Avenue. This 1675mm sanitary network collects sewage flow coming in from Aldwych Avenue, Fulton Avenue, Sammon Avenue, Kings Park Blvd, Mortimer Avenue, and Westwood Avenue.

5.5.2 Watermains

The City of Toronto operates multiple watermains within the RSL study area. These include:

- Starting at John St, there is a 300mm and 150mm watermains on Queen Street W with 150mm watermain tie-ins at St Patrick Street, McCaul Street and Simcoe Street.
- East of St Patrick Street on Queen Street W, the 150mm watermain turns into a 300mm watermain
- There is a 600mm watermain running north-south on Simcoe Street that turns east at Queen Street W and continues to run in the east direction along Queen Street.
- New sewer infrastructure will be built in the Relief Line South study area as part of the Don River & Central Waterfront wet weather flow system of connected projects. These projects are required for eliminating combined sewer overflows, increasing treatment of currently untreated stormwater runoff, and allowing for periodic maintenance of the Coxwell Trunk Sewer. The new Coxwell Bypass Tunnel will be built in the Don River valley and intersect with the Relief Line South study area, and includes an associated connection at Eastern Avenue.
- At the University Avenue / Queen Street W intersection, there are various connections and lines running through the intersection. East of University Avenue, two 300mm watermains continue along Queen Street W. There are 300mm watermain tie-ins from York St, the Nathan Phillips Square property, Bay Street north and Bay Street south, and a 150mm watermain connection from James Street.

- At Yonge St, two 300mm watermain run in the north-south direction, crossing the two 300mm watermain on Queen St. On the south side of Queen St, the 300mm watermain on Queen Street (east of Yonge St) is reduced to 150mm.
- A 150mm watermain crosses the alignment at Victoria St. East of this; the south watermain on Queen Street is then 200mm in diameter.
- There is a 150mm watermain tie in from Bond St.
- At Church St, one 300mm watermain crosses and continues south on Church St. Another 300mm watermain ties into the Queen Street watermain.
- There is a 150mm watermain tie-in at Dalhousie St, and a 150mm watermain tie in on Mutual St.
- On the north side of Jarvis St, 150mm and 300mm watermain tie into the 300mm watermain on the north side of Queen St. On the south side of Queen St, a 200mm and 300mm tie into the south Jarvis St.
- East of Jarvis St, there is a 300mm watermain on the north side of Queen Street E and 150mm on the south side of Queen Street E.
- A 1200mm watermain crosses the proposed alignment through Queen Street E near Moss Park.
- A 300mm watermain crosses Queen Street at Sherbourne St, and then there is a 100mm tie in at McFarrens Lane and a 150mm tie in at Seaton Street and 150mm tie in at Ontario St.
- The proposed subway alignment crosses 150mm watermain at Berkeley St, Parliament St, Power St, and Sackville St.
- The alignment then crosses a 300mm main at King Street E and 300mm and 600mm watermain on Sumach St.
- On Eastern Avenue, there is a 300mm watermain with 150mm tie in at St Lawrence Street, and a 300mm watermain connection south on Cypress Street.
- The 300mm Eastern Avenue watermain crosses the DVP and Don River and then it turns onto Sunlight Park Rd. The 300mm watermain along Sunlight Park Rd has a several water service connections.
- At Broadview Avenue, there is a 300mm watermain tie in, and 150mm watermain tie-ins at Lewis Street, Dibble Street, McGee Street, Empire Avenue, and a 150mm watermain crossing at Booth Avenue.
- The proposed subway alignment turns northeast and crosses 600mm, 150mm, and 300mm watermain on Logan Avenue, and a 150mm watermain on Morse Street.
- On Carlaw Avenue, there is a 150mm watermain on the west side and a 300mm and 150mm on east side of the street. The proposed alignment crosses 150mm and 300mm watermain on Queen Street E, and then the 150mm and 300mm watermain on Carlaw Avenue as it continues north.

- There is a 150mm watermain tie in at Colgate Avenue, and then a 300mm tie in at Dickens Street, a 200mm tie in on the east side of Dundas Street E. and a 1050mm watermain at Dundas Street E that crosses the alignment .
- There is a 150mm watermain tie in at Badgerow Avenue, and the 150mm watermain on the west side of Carlaw Avenue ties into the 300mm south of Gerrard Street E. The 200mm watermain from Gerrard Street E ties into 300mm watermain.
- A 150mm watermain crossing the proposed alignment at Langley Avenue.
- On Pape Avenue, there is a 150mm watermain on the west side of the road. There are tie-ins to this watermain from Riverdale Avenue (150mm watermain).
- The 600mm watermain from Withrow Avenue turns north onto Pape Avenue and then continues in the north-south direction, and a 150mm watermain crosses the proposed alignment at Withrow Avenue. There are 150mm tie-ins at Bain Avenue, Dingwall Avenue, Frizzell Avenue, Wroxeter Avenue, Strathcona Avenue, Cavell Avenue, Harcourt Avenue, and Hazelwood Avenue.
- The alignment crosses a 300mm watermain on Danforth Avenue, and then there are 150mm watermain tie-ins to the Pape Avenue watermain at Lipton Avenue, Gertrude Pl, Selkirk Avenue, Canning Avenue, Browning Avenue, Aldwych Avenue, Fulton Avenue, Sammon Avenue, Kings Park Blvd, Mortimer Avenue, and Westwood Avenue.

5.5.3 Bell Canada

Bell Canada has plant located throughout the study area in the following locations:

- A line that runs along Queen Street W, which includes lines that branch off onto all streets from John Street to Mutual Street.
- East of Mutual Street, there are crossings at Jarvis Street, Sherbourne Street, and Ontario Street. There are also crossings at Adelaide Street E near the Sackville playground and at Sumach Street.
- Bell conduits located along Eastern Avenue with branching/crossings at all streets that cross the proposed alignment along Eastern Avenue. There is no Bell plant located within the proposed alignment east of McGee Street.
- Crossing the proposed alignment at Logan Avenue.
- Along Carlaw Avenue, north of Queen Street E, which includes crossings/branches at streets crossing the proposed alignment.
- Crossing the proposed alignment at Carlaw Ave/Gerrard Street E, at Langley Avenue, Riverdale Avenue, and then running along Pape Avenue up to Danforth Avenue, including crossings/branchings at all streets that cross the proposed alignment.

5.5.4 Rogers Communications

Rogers has plant located throughout the study area in the following locations:

- Cable conduit crossing the proposed alignment at Bay Street.
- Cable conduit crossing the proposed alignment at Bond Street.
- Cable conduit crossing the proposed alignment across Carlaw Avenue at Colgate Avenue.
- Conduits crossing the proposed alignment at 245 Carlaw Avenue, at the property Line of 235 Carlaw Avenue and 233 Carlaw Avenue. This cable then runs along the west side of Carlaw Avenue from 250 – 276 Carlaw Avenue.
- Two cable conduit crossing the proposed alignment at Carlaw Ave/Dundas Street E.
- Cable conduit located on Cavell Avenue, at Pape Avenue.
- Cable conduit running from 701 Pape Avenue to the middle of Danforth Avenue.

5.5.5 TELUS

Telus Communications Inc. has plant throughout the study area. Plant does not run parallel with the alignment; however there are crossings at the following locations:

- Crosses alignment at Simcoe Street (Telus Cobuilt (GT WN WFI))
- Crosses alignment at University Avenue (Telus Cobuilt (AT&T GT WFIBELL))
- Crosses alignment at Bay Street (Telus Cobuilt GT AT&T Rogers)
- Crosses alignment at Gerrard Street E (and Carlaw)
- Crosses alignment at Langley Avenue

5.5.6 Cogeco Data Services

Cogeco Data Services has plant throughout the study area in the following locations:

- Crossing the proposed alignment at McCaul Street, then running along Queen Street W, and then turning north onto St Patrick Street.
- Cobuilt crossings at Simcoe Street, University Avenue, Bay Street and Victoria Street
- Proposed alignment crosses Cogeco south of Queen Street E.
- Crossing Queen Street E west of Victoria Street
- On the west side of Pape Avenue, north of Danforth Avenue. The plant runs south on Pape, and then west along Danforth Avenue.
- South of Hazelwood Avenue on Pape Avenue.

5.5.7 Toronto Hydro

Toronto Hydro has several Ontario Hydro (OH) cables located underground throughout the study area. There are three locations where the cables intersect with the proposed alignment:

- There is a OH cable in 750mm steel pipe that runs along York Street, turns east onto the south side of Queen Street West, crosses Queen Street West and continues north along the west side of the Nathan Phillips Square property. This cable will cross the alignment.
- There are 2 OH cables in 750mm steel pipes that run north-south along Bayview Avenue. These cables will cross the proposed alignment at the intersection of Bayview Avenue / Eastern Avenue.
- Two OH 115kV cables run along the north and south side of Dundas Street East near Carlaw Avenue. At the intersection on Carlaw Avenue, the cables turn north and run along the east and west sides of Carlaw Avenue. They terminate at the Toronto Hydro Electric Substation (Ontario Hydro building) located at 369 Carlaw Avenue, south of Gerrard Street East.

5.5.8 Enwave Energy Corporation

Many of the buildings in Toronto's downtown core utilize Enwave's Deep Lake Water Cooling system, which is an alternative to conventional air conditioning. This system uses water from Lake Ontario to drive an exchange system to cool large buildings such as office towers and hospitals. Enwave, in coordination with the City of Toronto, has a network of district cooling tunnels and steam systems that are in the vicinity of the Relief Line South alignment and proposed stations. The following are the locations of Enwave pipes within the area of the proposed alignment:

- 350mm steam main and 2100mm District Cooling tunnel crosses the proposed alignment at Simcoe Street
- 3500mm District Cooling tunnel starts at York and Queen W, along Queen to James Street
- 3500mm District Cooling tunnel crosses the proposed alignment at Bay Street
- 400mm steam main crosses the proposed alignment at James Street
- 600mm x 600mm steam crosses the proposed alignment at Yonge Street
- 350mm steam crosses the proposed alignment at Victoria Street

5.5.9 Enbridge Gas Distribution Inc.

Enbridge Pipelines owns and operates multiple gas mains along the Relief Line South corridor. Enbridge has indicated that there are plans for the Net Pipe Size (NPS) 30 Don River Replacement and NPS 20 Supply. The first segment will involve the replacement of the existing NPS 30 extra high pressure (XHP) steel natural gas main across the Don River Bridge from Bayview Avenue to Sunlight Park Road. Approximately 300 m of NPS 30 XHP steel main will be installed and approximately 250 m of the existing NPS 30 XHP gas main will be abandoned. The second segment involves replacing a portion of the NPS 20 HP pipeline which includes the installation of approximately 500 m of NPS 20 XHP main along Bayview Avenue to Mill Street, the installation of approximately 600 m of NPS 20 HP from Mill Street to Cherry Street, the installation of a feeder station in the vicinity of Cherry and Mill Street and the abandonment of approximately 1.6 km of NPS 20 HP gas main from Station B to Cherry Street (including NPS 20 bridge crossing of Don River). Construction is anticipated in 2019. The Enbridge gas mains currently in place,

from west to east, starting at John Street on Queen Street W and ending north of Pape Station, include:

- 200mm, 150mm and 200mm lines along Queen Street W from John Street to the east side of University Avenue. From this point at University Avenue to James Street, there is only a 100mm gas main and two abandoned lines along Queen Street W.
- East of James Street, there are two 100mm lines and abandoned lines to Victoria Street
- From Victoria Street to Bond Street: all gas mains on Queen Street E are abandoned
- Between Bond Street and Berkeley Street along Queen Street E, there is a 250mm gas main and 100mm gas main. At Berkeley Street, a 500mm and a 150mm gas main running north-south on Berkeley cross the proposed Relief Line South alignment.
- Gas mains crossing the proposed alignment at Parliament Street: a 500mm and 150mm gas main.
- Gas mains crossing the proposed alignment at Power Street: 75mm and 50mm gas main
- Gas mains crossing the proposed alignment at King Street E: 50mm gas main
- Gas mains crossing the proposed alignment at Sumach Street: 30mm, 50mm and 100mm gas mains
- The proposed alignment along Eastern Avenue has a 600mm gas main running overtop with several abandoned lines. There is a gas valve chamber at Bayview Ave
- On the east side of the DVP, a 750mm gas main is in line with the proposed Relief Line South alignment. There are multiple abandoned lines located in the vicinity.
- Along Sunlight Park Rd at Broadview Avenue, there is a 750mm and 500mm gas main on the north side of the street. These mains continue along the alignment. East of Lewis Street, there is also a 150mm gas main on the south side.
- West of Dibble Street, the 750mm main branches off and there is a 600mm crossing across the alignment. On the north side of Eastern Avenue there is still the 600mm line, however on the south side of Eastern Avenue, there is 600mm line and 300mm line.
- East of McGee Street, there is a 600mm gas main (reduces to 500mm), a 500mm and 300mm high pressure gas main to south along Eastern Avenue.
- The proposed alignment turns north, and there is a 300mm and 50mm gas main crossing at Logan Avenue and a 50mm crossing on Morse Street.
- Along Carlaw Avenue, there is a 100mm gas main that runs north-south. North of Colgate Avenue, the gas main is 150mm in diameter.
- At Dundas Street E, there is 100mm gas main line that crosses the proposed alignment. North of Dundas Street E, there is a 150mm line and 500mm BL gas main on Carlaw Avenue.

- The proposed Relief Line South alignment curves east, and crosses 30mm gas mains at Badgerow Avenue, 500mm gas main and 150mm gas main and 300mm gas main on Gerrard Street E
- The alignment crosses a 150mm gas main and two 100mm gas mains on Langley Avenue
- Along Pape Avenue, there is a 100mm gas main that runs north-south, which turns into 150mm north of Bain Avenue
- The proposed alignment crosses 100mm, 400mm and 300mm gas mains located on Danforth Avenue. North of Danforth Avenue, there are 150mm and 300mm gas mains located on Pape Avenue

5.5.10 Sun Oil Co Pipe, Imperial Oil Co Pipe, and Trans Northern Pipe

Sun Oil Co Pipe, Imperial Oil Co Pipe, and Trans Northern Pipe operates north-south high pressure pipelines in the study area. On the east side of the Don Valley Parkway, three oil pipelines run parallel to each other and parallel to the DVP alignment. There is a 200mm Sun Oil Co. pipe, 250mm Imperial Oil Co. pipe, and a 250mm Trans Northern pipe. The Relief Line South alignment crosses these pipelines at one point: south of the Eastern Avenue ramp to the DVP on Sunlight Park Road.

5.5.11 Metronet Water Main

Metronet owns a conduit that runs along a short distance on Bond Street and ends at Queen Street East.

There was a 300mm high pressure Metronet watermain located along Queen Street (from John Street to Church Street) which is now abandoned.

5.5.12 AT&T Canada Conduit

There is an AT&T conduit located at 198 to 222 Queen Street W. It then turns in the northerly direction on to St Patrick Street. The AT&T plant crosses the proposed alignment in the following locations:

- At University Ave
- At Bay Street
- There is a conduit located at the corner of Church Street and Queen Street E

5.6 Geotechnical

5.6.1 Overview

Golder Associates was retained by the Toronto Transit Commission (TTC) to conduct a preliminary geotechnical investigation in support of the planning and conceptual design for the Relief Line South from Pape and Osgoode stations. This work was completed in 2017. The

Conceptual Geotechnical Design Report is available in **Appendix 3-3**. This section summarizes the existing conditions from this report.

5.6.2 Geotechnical Reports for Conceptual Design

A Conceptual Geotechnical Design Report was prepared for the Relief Line Project Assessment in 2017 (Golder Associates Ltd., 2017). This report forms the basis of the conceptual design, as well as the relevant sections in the impacts, mitigation, and monitoring sections of the Environmental Project Report (EPR). Relevant geotechnical and geological information for the conceptual design of the proposed RLPA tunnel and stations was also obtained from the following reports and publications:

- “Contract DTRL1 – Geotechnical and Geo-Environmental Investigation, Downtown Relief Line Environmental Assessment, Pape Avenue”, Englobe Corporation, December 21, 2015.
- “Contract DTRL1 – Geotechnical and Geo-Environmental Investigation, Downtown Relief Line Environmental Assessment, Front Street East”, Englobe Corporation, February 10, 2016.
- “Contract DTRL1 – Geotechnical and Geo-Environmental Investigation, Downtown Relief Line Environmental Assessment, Queen Street East”, Englobe Corporation, February 10, 2016.
- “Geotechnical, Geo-Environmental and Hydrogeological Investigation Report, Geotechnical and Environmental Triennial Services, Proposed Downtown Relief Line, Environmental Assessment” Contract No. G85-343B, Golder Associates Ltd., September, 2017.
- The York Peel Durham Toronto (YPDT) database.
- Toronto Transit Commission (TTC) Conceptual Stratigraphic Drawing, “Downtown Relief Line, Alignment Section, Queen Street”, dated April 25, 2016.
- Toronto Transit Commission (TTC) Conceptual Stratigraphic Drawing, “Downtown Relief Line, Eastern Avenue Cross Section”.
- Toronto Transit Commission (TTC) Conceptual Stratigraphic Drawing, “Downtown Relief Line, Environmental Assessment, Pape Avenue. Cross Section”.

It should be noted that the information gathered to date has been deemed sufficient to inform the conceptual design process for the Relief Line South; however, further investigations will be required during the subsequent stages of design and planning.

5.6.3 Future Subsurface Explorations and Testing

During subsequent stages of design and planning, additional subsurface information will be required. A list of geotechnical challenges that are anticipated during the project is included in **Table 5-11**. The future investigation programs should particularly take into account these potential geotechnical challenges. Seismic conditions should also be considered during the preliminary and detailed design stages. All future explorations and testing should be carried out in accordance with TTC standards.

Table 5-11: Geotechnical Challenges

Geotechnical Challenges	Description of the Potential Challenge
Deep Bedrock Valleys and Mixed Face Tunnelling	Tunnelling through the Don River Bedrock Valley (between approximately Station 3+000 and 3+300) is expected to carry out within loose / soft to firm overburden and mixed-face tunnelling (soil-bedrock transition) should be expected.
Bedrock Shunts (Thrusts)	Bedrock shunts are believed to be related to ice movement (reactivation – stick slip shearing). They may partially occur along pre-existing weak surfaces/joints in the bedrock. The bedrock shunts may pose the risk of significant groundwater inflow into the tunnel and/or poor rock conditions possible with clay seams.
Naturally-occurring BTEX and Subsurface Gases	Naturally-occurring benzene, toluene, ethylbenzene, and xylenes (collectively BTEX) have been encountered within shale bedrock during recent tunnelling projects in the Toronto area. BTEX can impact tunnel spoil management and disposal options. Naturally occurring subsurface gases (methane, hydrogen sulphide and carbon dioxide) may also be present within the overburden and shale bedrock.
Water-Bearing Non-cohesive Zones/Groundwater Control	The tunnel is anticipated to be constructed below the groundwater table. Tunnelling and excavations for the construction of all stations are expected to extend below the groundwater level. Water-bearing non-cohesive soil zones are anticipated to be present within the overburden, and will need appropriate control, particularly when tunnelling within the overburden.
In Situ Stresses and Swelling of Shale Bedrock	Shale bedrock may experience swelling when stresses are relieved due to excavation or tunnelling. The swelling and in situ stresses in the shale bedrock may impact the temporary and permanent tunnel liner and station box design.
Presence of Cobbles and Boulders	The presence of cobbles and/or boulders may impact machine selection and adopted method for tunnelling through overburden and excavations at station locations. It should be assumed that cobbles/boulders are comprised of a variety of different lithology's including native bedrock but also glacial erratics from the Canadian Shield with a wide range in strengths.