Benchmarking, Planning, and Promoting Transit-Oriented Intensification in Rapid Transit Station Areas: Project Key Indicators

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McMASTER INSTITUTE FOR TRANSPORTATION & LOGISTICS

Ontario

Station Typology

Urban Commercial Core

Urban Mixed-Use Core

Inner Urban Neighbourhood

Urban Neighbourhood

Suburban Neighbourhood

Outer Suburban Neighbourhood

Exurban Neighbourhood

Suburban Centre

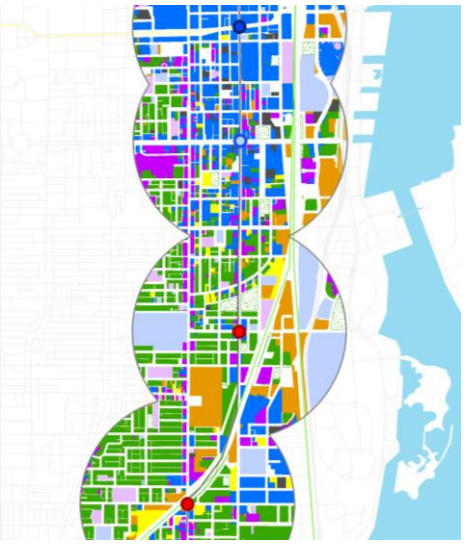
Outer Suburban Industrial Park

Airport

Station Typology

Methodology

- The typology distils *input* measures of transit-oriented development (TOD) into a classification of the 10 station types detailed below. These measures are development intensity and mix, land use mixing, pedestrian accessibility, and transit accessibility.
- After classification, we also see how the TOD inputs influence TOD *outputs* in terms of transit use, walking, and cycling, household travel, and demographics.
- Existing and future rapid transit services considered by the study include 8 Commuter Rail Transit (CRT) lines, 7 Heavy Rail Transit (HRT) subway lines and extensions, 13 Light Rail Transit (LRT) lines and extensions, and 3 Bus Rapid Transit (BRT) lines.



Urban Commercial Core

- Stations are located in the downtown core of the city, served by high-capacity subway and commuter rail rapid transit
- Primarily commercial and institutional land uses with some residential development
- Very high population and employment densities.
- Stations feature very high proportions of transit and alternative mode use
- Particularly appealing for the young and highly-educated

Urban Mixed-Use Core

- Stations with very high population and employment densities and a high mixing of uses
- Generally located just outside the urban commercial core in the city at key regional intensification hubs
- Very high population and employment densities.
- Stations feature very high proportions of transit and alternative mode use
- Particularly appealing for the young and highly-educated

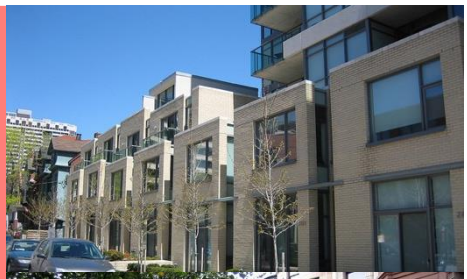
Station Typology

Inner Urban Neighbourhood

- Stations with high-density residential, commercial, and mixed uses with high levels of accessibility to employment and jobs due to their location close to the urban core
- A grid street pattern ensures good pedestrian accessibility
- High levels of transit and alternative mode use
- Appealing to the young and highly educated

Urban Neighbourhood

- Stations located in predominately residential neighbourhoods that feature higher densities and some commercial activity
- Station areas are older and well-established, feature a grid street pattern, and have good access to population and employment
- High levels of transit use, medium auto use
- Average appeal to different segments of the population



Suburban Neighbourhood

- Predominately residential areas with some commercial and institutional development but lower overall population and employment densities
- Located farther from employment centres and increasing use of cul-de-sac street layout
- Medium levels of transit use, little walking, medium levels of automobile use
- Average appeal to different segments of the population

Station Typology

Outer Suburban Neighbourhood

- Low-density residential suburban or exurban areas with some commercial and industrial development. Low pedestrian accessibility due to automobile-oriented urban design
- Large proportions of vacant land provide opportunities for future intensification
- Below-average levels of transit use, little walking, and higher levels of automobile use
- Average appeal to different segments of the population

Exurban Neighbourhood

- Low-density and automobile-oriented suburban and exurban areas. Predominately residential land use with some commercial and industrial development
- Vacant land may present opportunities for future intensification
- Low levels of transit and alternative mode use, high levels of household automobile use
- Average appeal to different segments of the population

Suburban Centre

- Station areas oriented to employment with high levels of commercial, industrial, and institutional land uses, but lower overall development intensity
- Stations are important secondary destinations along present and future rapid transit lines
- Below-average levels of transit use, above-average rates of automobile use
- Average appeal to different segments of the population

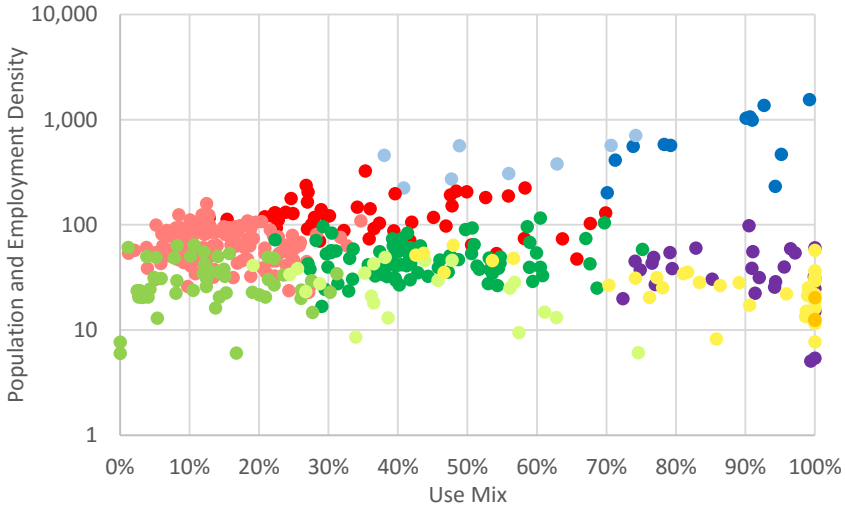
Station Typology

Outer Suburban Industrial Park

- Predominately automobile-oriented suburban and exurban industrial areas that feature low overall development intensity and low levels of pedestrian accessibility
- Stations are located along CRT corridors and future rapid transit lines
- Low levels of transit use, high levels of automobile use
- Average appeal to different segments of the population

Airport

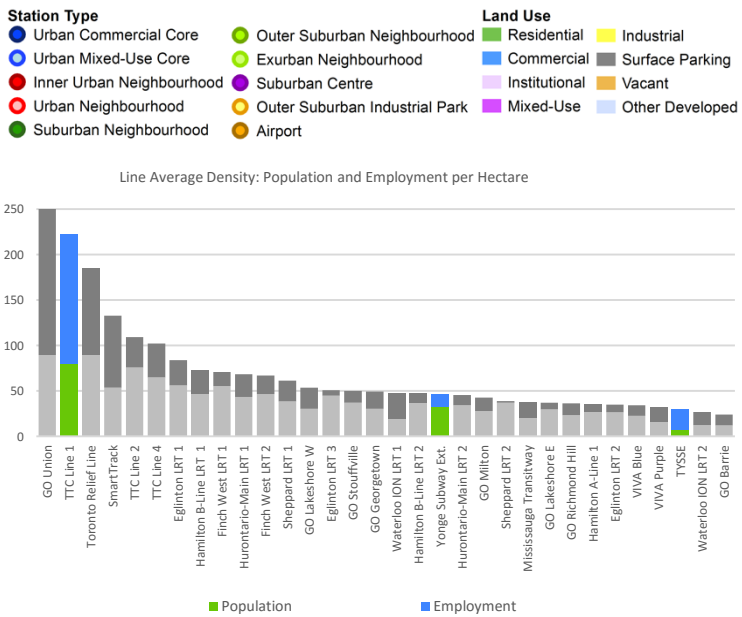
- Stations that service international/national airport(s) and its surrounding environs
- Stations feature low employment densities, but exist as important regional trip destinations
- No population located within each station area prevents calculation of TOD outcomes

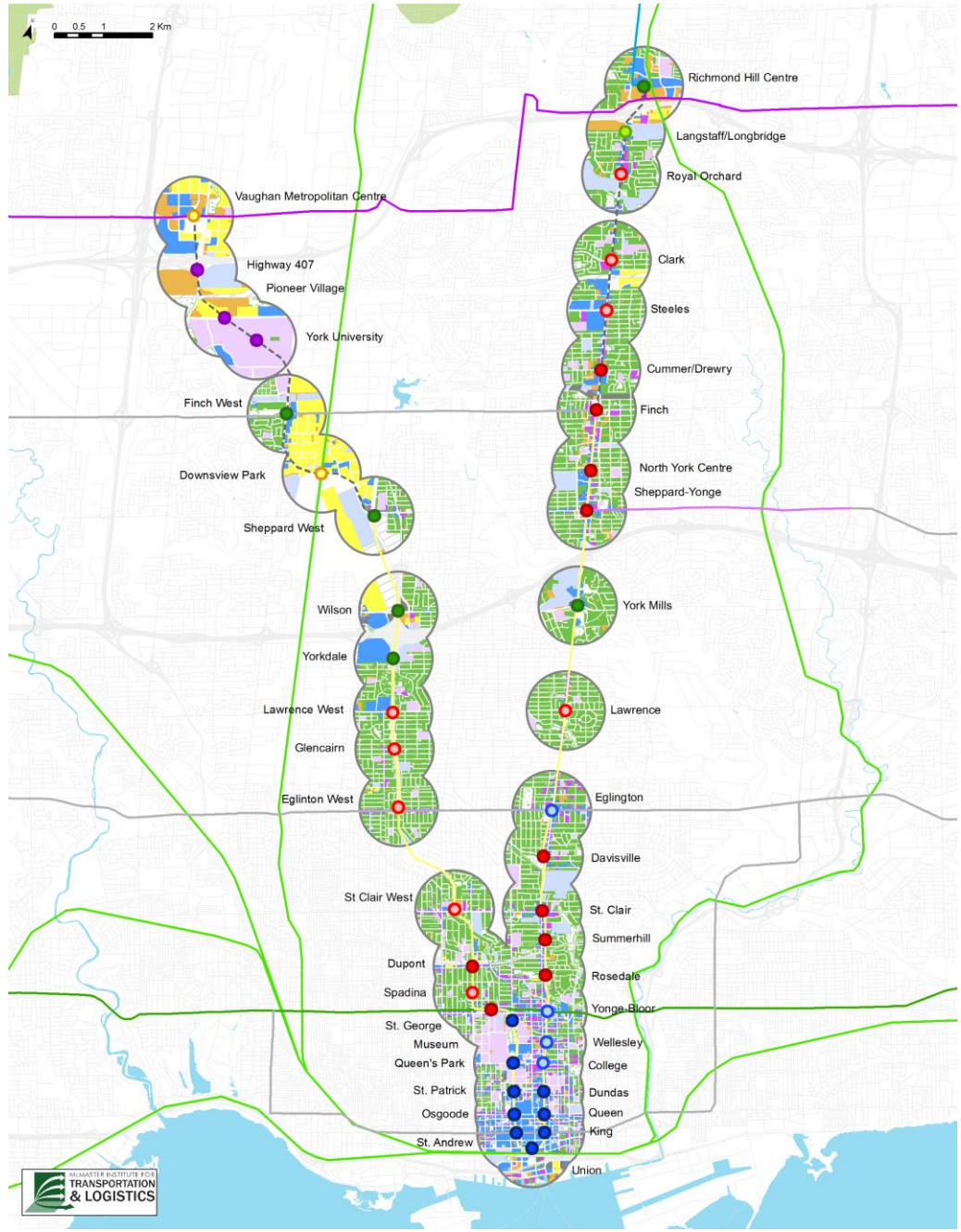


In the figure to the left, more urban stations are higher in density than their suburban counterparts. *Urban Commercial Core*, *Suburban Centre*, and *Outer Suburban Industrial Park* stations are oriented to employment uses while *Neighbourhood*-type stations are more balanced or oriented to residential uses. Note that this considers only two TOD measures. The typology model considers all of the variables simultaneously when classifying stations

TTC Line 1, TYSSE, and Yonge Ext.

The TTC's Line 1 subway is the region's oldest HRT line. With the Yonge segment opening in 1954, the line has been extended several times, including the addition of the University and Spadina segments in 1963 and 1978. At present Line 1 is 30km in length with 32 stations that connect many neighbourhoods in Toronto to the downtown core. The Toronto-York Spadina Subway Extension is an extension of the Spadina segment north from Sheppard West to Vaughan Metropolitan Centre and is presently under construction for a planned opening in 2017. This extension is 8km in length with 6 new stations. An extension of the Yonge segment of Line 1 has also been proposed. This would see a 7km extension of the line north from Finch station to Richmond Hill Centre. No funding for this extension has been secured at present.

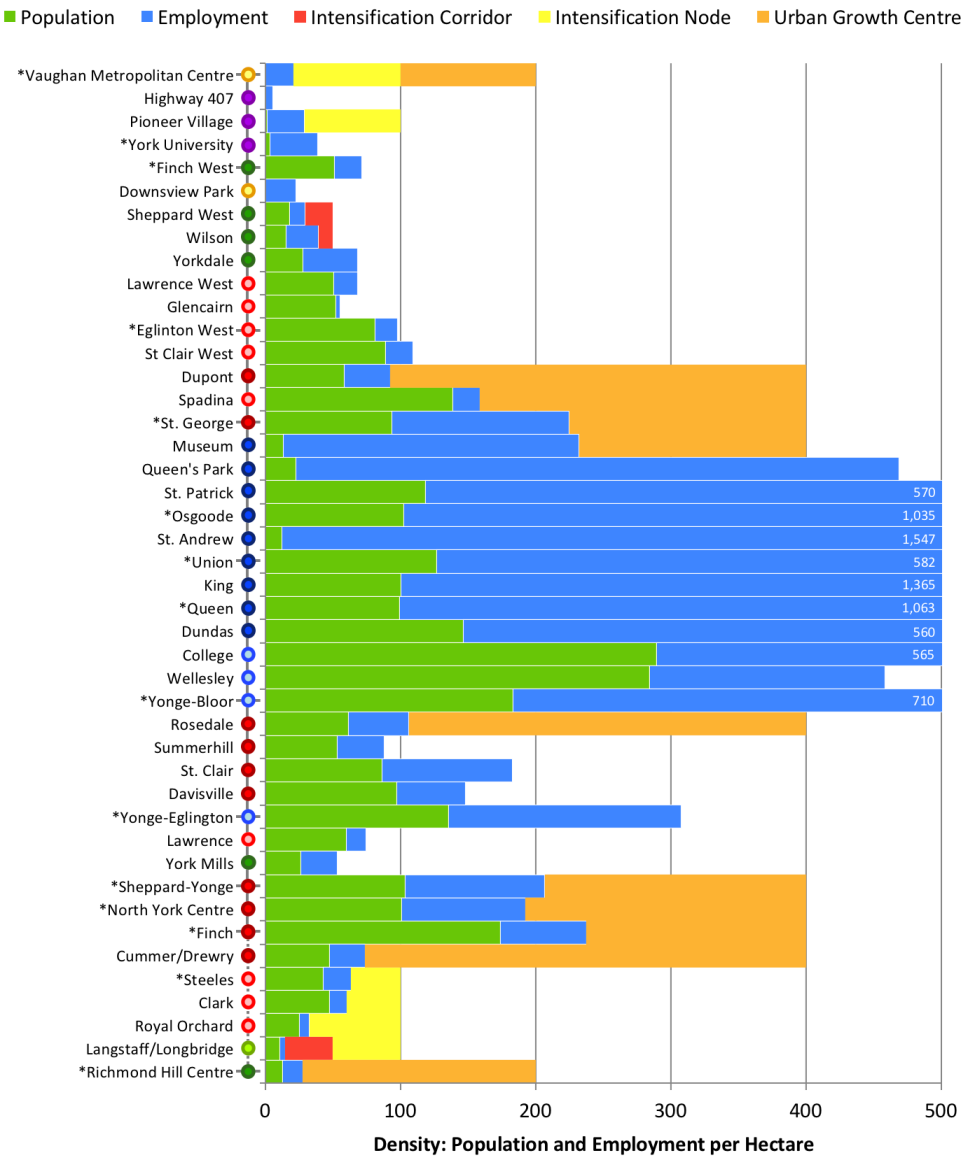




TTC Line 1, TYSSE, and Yonge Ext.

28%	Urban Commercial Core
13%	Urban Mixed-use Core
28%	Inner Urban Neighbourhood
19%	Urban Neighbourhood
13%	Suburban Neighbourhood

Station area contexts along the Line 1 subway vary dramatically. The central portion of the line services a number of very high density *Urban Commercial* and *Mixed-Use Core* stations, followed by many medium- to high-density *Inner Urban* and *Urban Neighbourhoods* in the City of Toronto. From this, the existing Line 1 subway is generally very transit-oriented, with high levels of development intensity, land use mixing, pedestrian accessibility, and access to people and jobs. The line's outer segments, including the TYSSE project, are much lower in development intensity, largely characterized by *Suburban* type stations that should seek to intensify to justify their high levels of transit service. To that end, some outer stations have intensification designations, but plans should ensure they intensify in the future to support and justify HRT service.



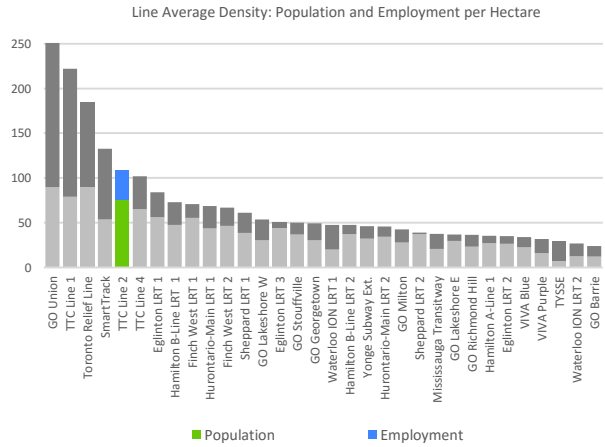
* Indicates station is identified by Metrolinx as a Mobility Hub. All route alignments, station locations, and names are conceptual.

TTC Line 2 and Scarborough Subway Extension

The Line 2 TTC subway, also known as the Bloor-Danforth Line, is the City of Toronto's second HRT line. Opening in 1966, the line has since been extended to encompass 31 stations from Kipling in the west to Kennedy in the east. The line is 26km in length and fairly high-density relative to others, connecting the City of Toronto's dense inner suburbs to the northern part of Toronto's central business district. A 1-stop extension to the Scarborough Town Centre and the future Sheppard East LRT has been proposed. Options for this alignment have changed over time, from LRT service to replace the aging TTC Line 3 to a 3-stop subway from Kennedy Station. However, the 1-stop option above is the City of Toronto's preferred solution at present due to synergies between it and the proposed SmartTrack line on the nearby GO corridor.

Station Type
- Urban Commercial Core
- Urban Mixed-Use Core
- Inner Urban Neighbourhood
- Urban Neighbourhood
- Suburban Neighbourhood
- Outer Suburban Neighbourhood
- Exurban Neighbourhood
- Suburban Centre
- Outer Suburban Industrial Park
- Airport

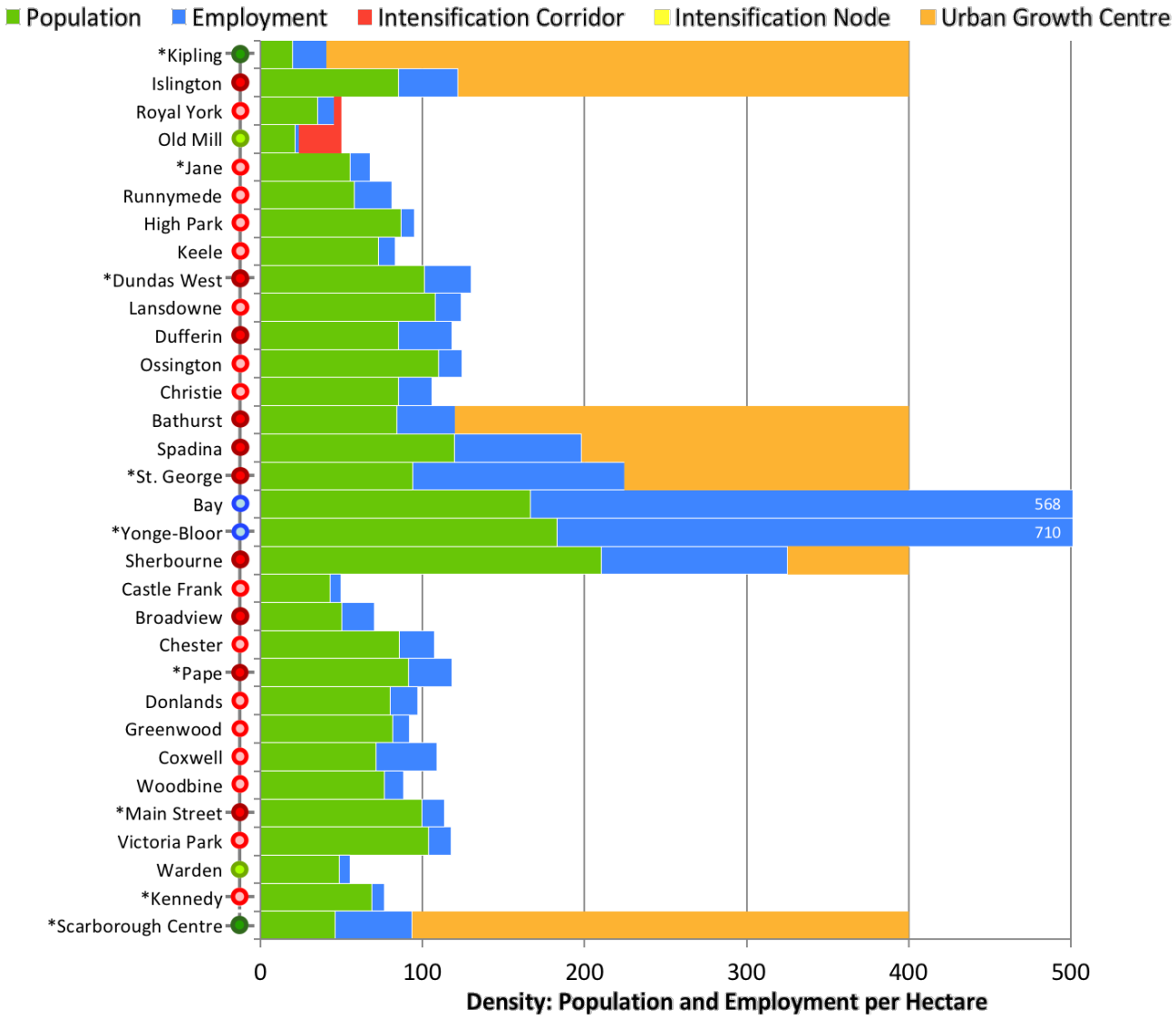
Land Use
- Residential
- Commercial
- Institutional
- Mixed-Use
- Industrial
- Surface Parking
- Vacant
- Other Developed



TTC Line 2 and Scarborough Subway Extension

Line 2 of the TTC Subway is very urban in character. Most stations are high-density, pedestrian friendly, and are balanced between population and employment. A few stations tend to be more suburban in their built form, and here improvements to their pedestrian environment and development intensity would be beneficial. The line also features some areas that are not meeting intensification targets, and Metrolinx has identified other key Mobility Hubs around which future TOD should be concentrated. The potential Scarborough Subway Extension is one of these stations, and although it is fairly high density already, its categorization as a *Suburban Neighbourhood* suggests it could benefit from future TOD.

6%	Urban Mixed-Use Core
32%	Inner Urban Neighbourhood
50%	Urban Neighbourhood
6%	Suburban Neighbourhood
6%	Outer Suburban Neighbourhood



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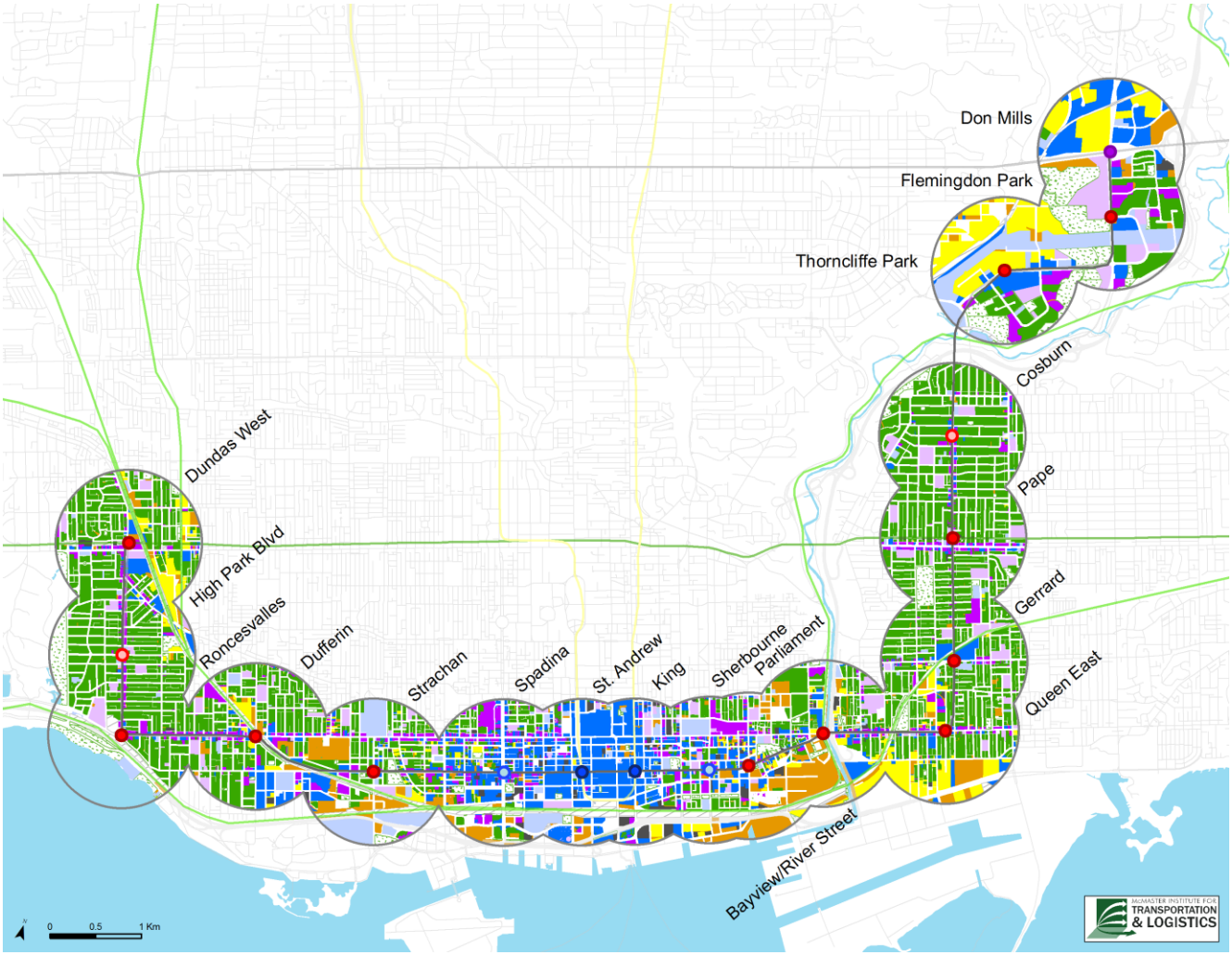
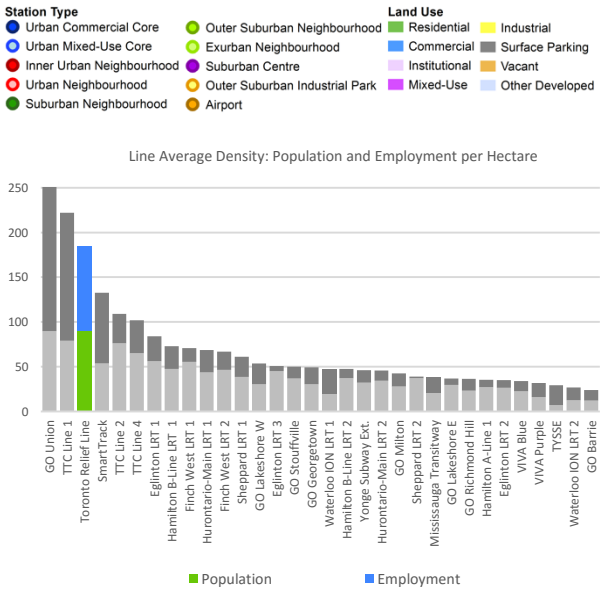
Toronto Relief Line



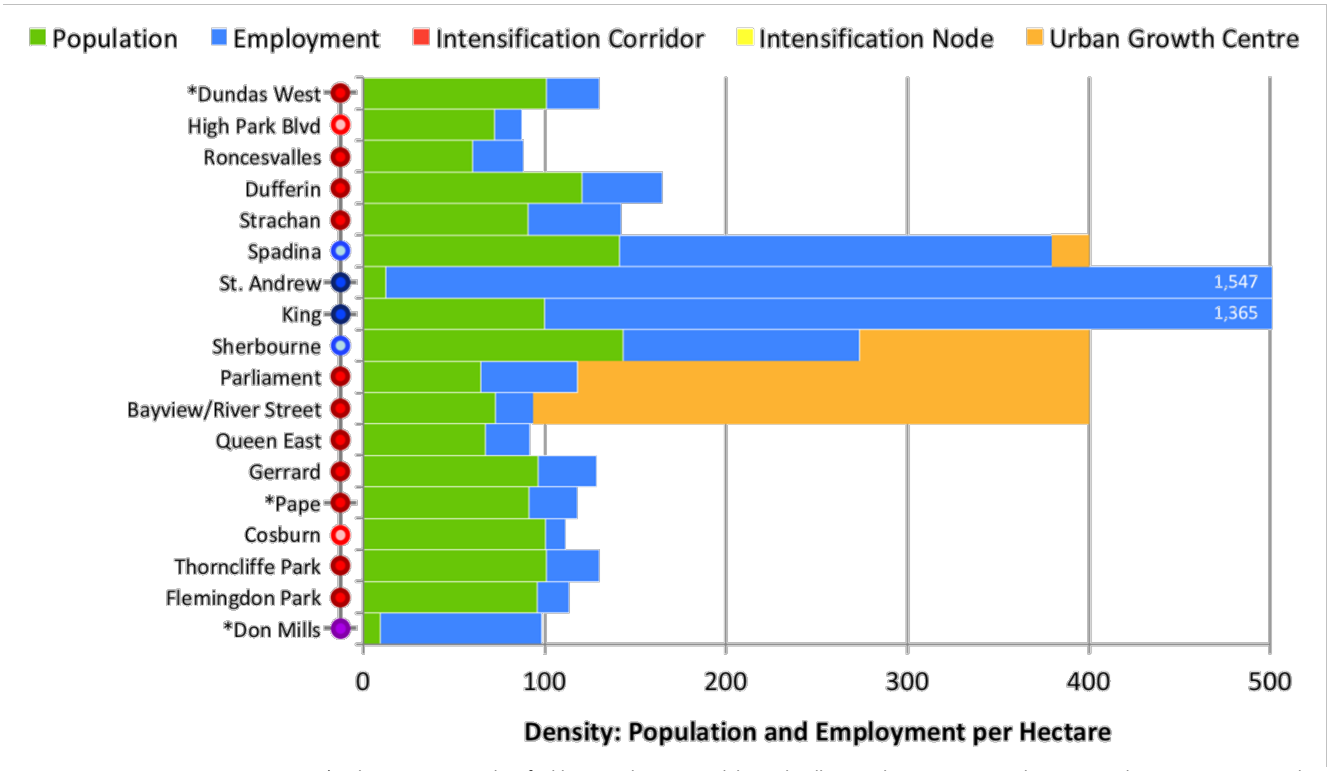
The Toronto Relief Line is a proposed HRT project in the City of Toronto. The line travels from the Dundas West station on the Line 2 subway to the central business district where it bisects the Line 1 subway. From there it travels to Pape station on Line 2 and terminates at Don Mills station on the future Eglinton Crosstown LRT Phase 1. As the name implies, the line is designed to reduce crowding on the Yonge portion of the Line 1 subway and Union Station. A preliminary benefits case analysis was completed by Metrolinx in 2012, which identified several different potential alignments for the line. For the present project we have assumed a full build-out of the 19km line with 18 stations. No funding decision has been made with regards to constructing the Relief Line, but it is listed as one of Metrolinx's top-15 priorities in the region.



Toronto Relief Line

The Relief Line as proposed runs through some of the region's highest-density areas. All stations feature densities of around 100 people and jobs per hectare, and those in the central business district are even higher. From this, the quality of space along the line is among the most transit-oriented of all the lines in the present study. Stations in the downtown core are either *Urban Commercial Core* stations or very high density and mixed-use *Urban Mixed-Use Core* stations. Stations located outside of the downtown core are mixed-use, pedestrian friendly, and amenity rich neighbourhoods. Don Mills station, while high density, it is generally oriented to employment with high proportions of commercial and industrial land uses. Thorncliffe Park station is similar in land use, but more balanced in development mix. In both cases, any under-utilized industrial lands may present ideal locations for future TOD projects. In terms of intensification, opportunities exist for the Parliament and Bayview stations, which are designated as part of the City of Toronto's Urban Growth Centre. Other important intensification nodes are at the Dundas West, Pape, and Don Mills stations, which are key Mobility Hubs.

11%	Urban Commercial Core
11%	Urban Mixed-Use Core
61%	Inner Urban Neighbourhood
11%	Urban Neighbourhood
6%	Suburban Centre



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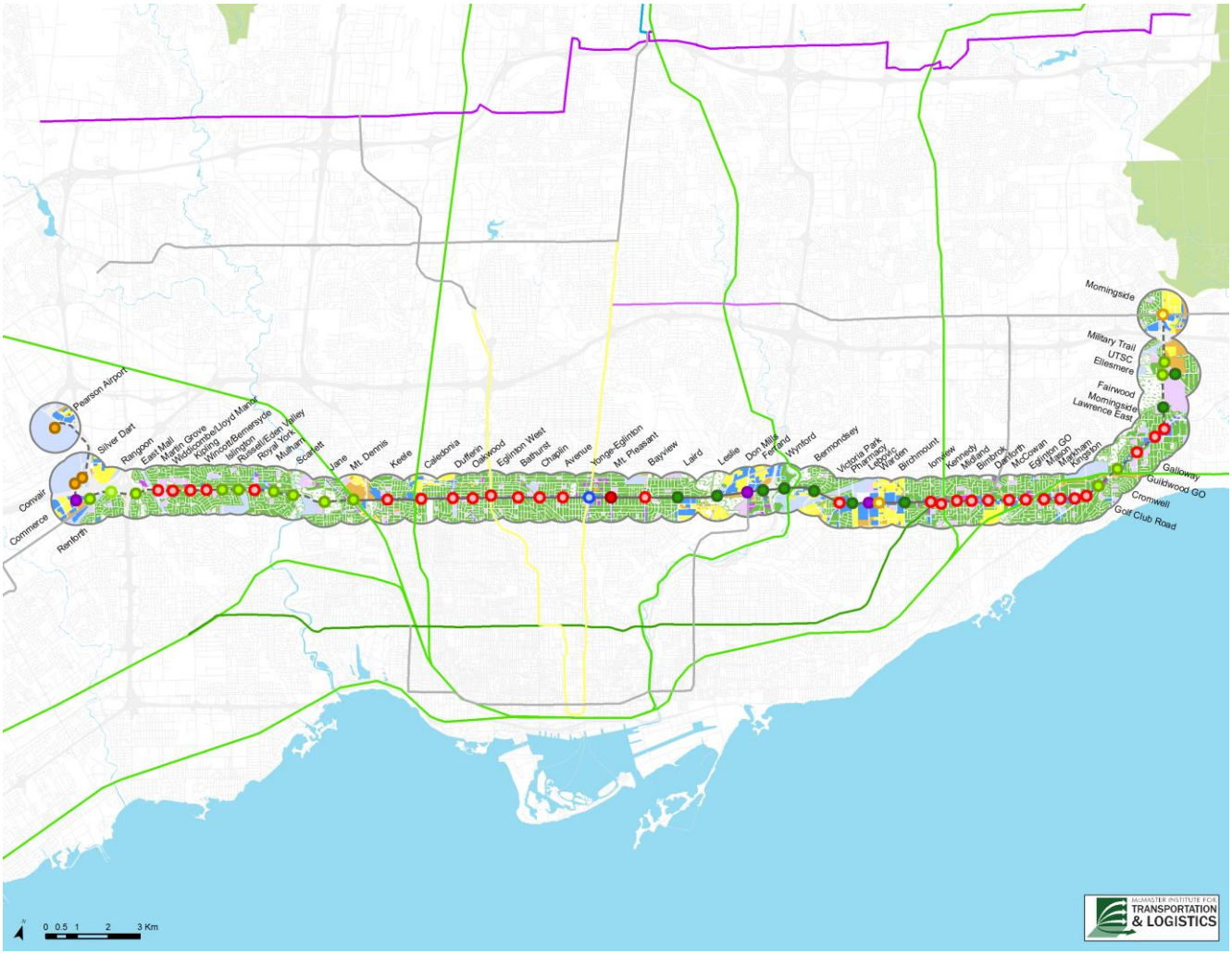
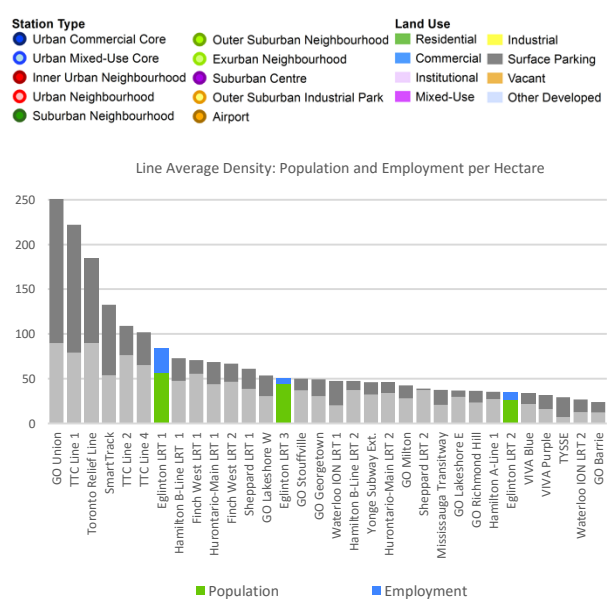
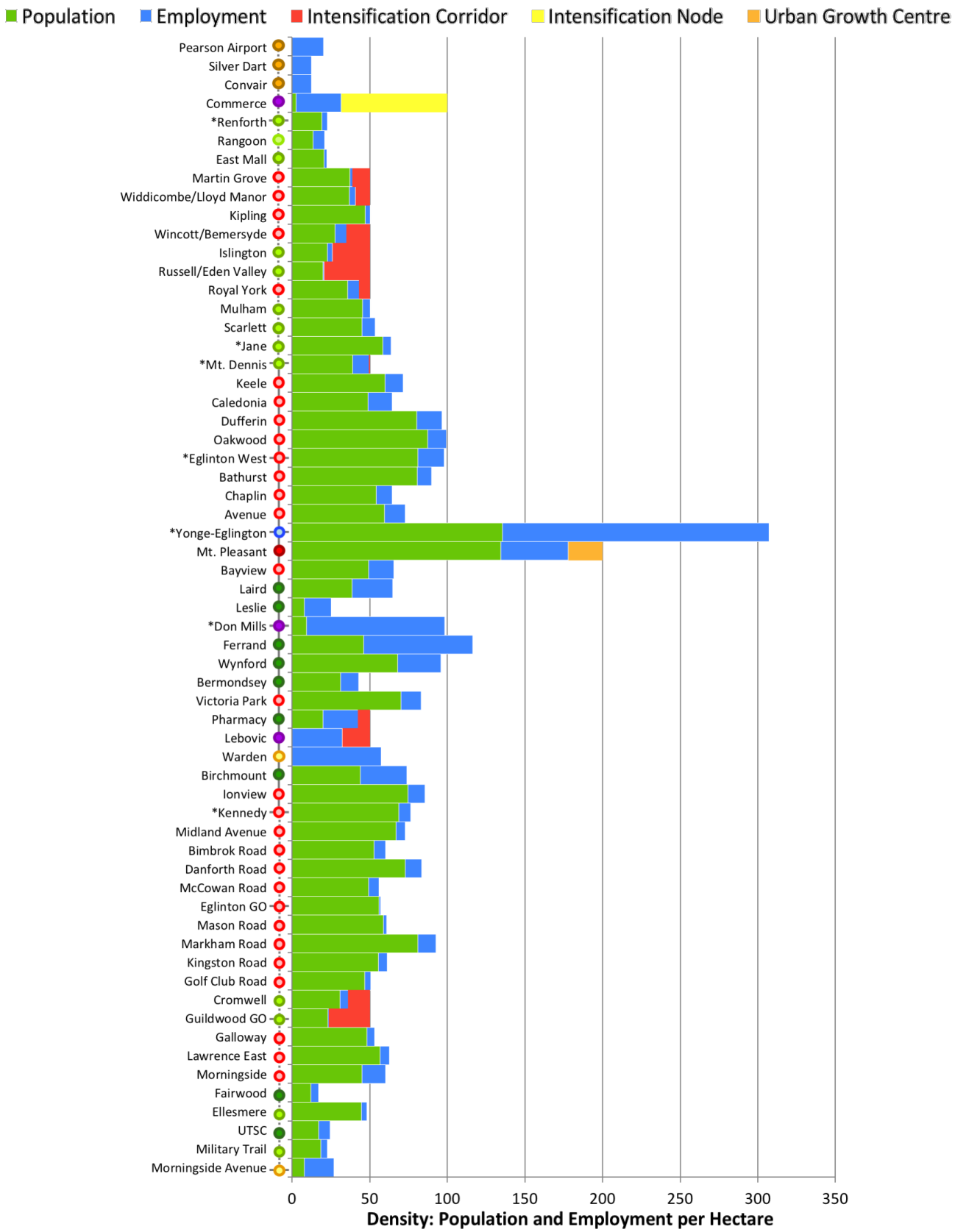
Eglinton Crosstown LRT Phases 1, 2 and 3



The Eglinton Crosstown LRT is a 42km LRT line in the City of Toronto. The first phase of the line is presently under construction and on schedule to become operational in 2021. Phase 1 is approximately 18km in length, running from the future Mt. Dennis GO / SmartTrack station in the west, Eglinton West and Yonge-Eglinton stations on the Line 1 Subway, and Kennedy station on the Line 2 subway in the east. 10km of Phase 1 will run underground, from Keele to Laird stations. Phase 2 is proposed to be approximately 14km and travel west to the Lester B. Pearson International Airport. Phase 3 is proposed to be 11km and travel east to Morningside station on the Sheppard East LRT. While station names and locations may change over time, for the present study we have identified 62 stations across all three phases.



Eglinton Crosstown LRT Phases 1, 2 and 3



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Eglinton Crosstown LRT Phases 1, 2 and 3

The entire Eglinton Crosstown LRT features a range of station types along its corridor. Among all phases, the line is predominately urban, with 53% of its stations in the urban category. These stations are higher density, feature a mixing of land uses and neighbourhood amenities, and a pedestrian-friendly built environment. The remainder of the line is more suburban, with 37% of stations exhibiting lower densities, segregated land uses, and a greater orientation to the personal automobile. Outside of these stations, the Crosstown LRT also connects several *Suburban Centres*, *Outer Suburban Industrial Parks*, and three stations near the Pearson Airport.

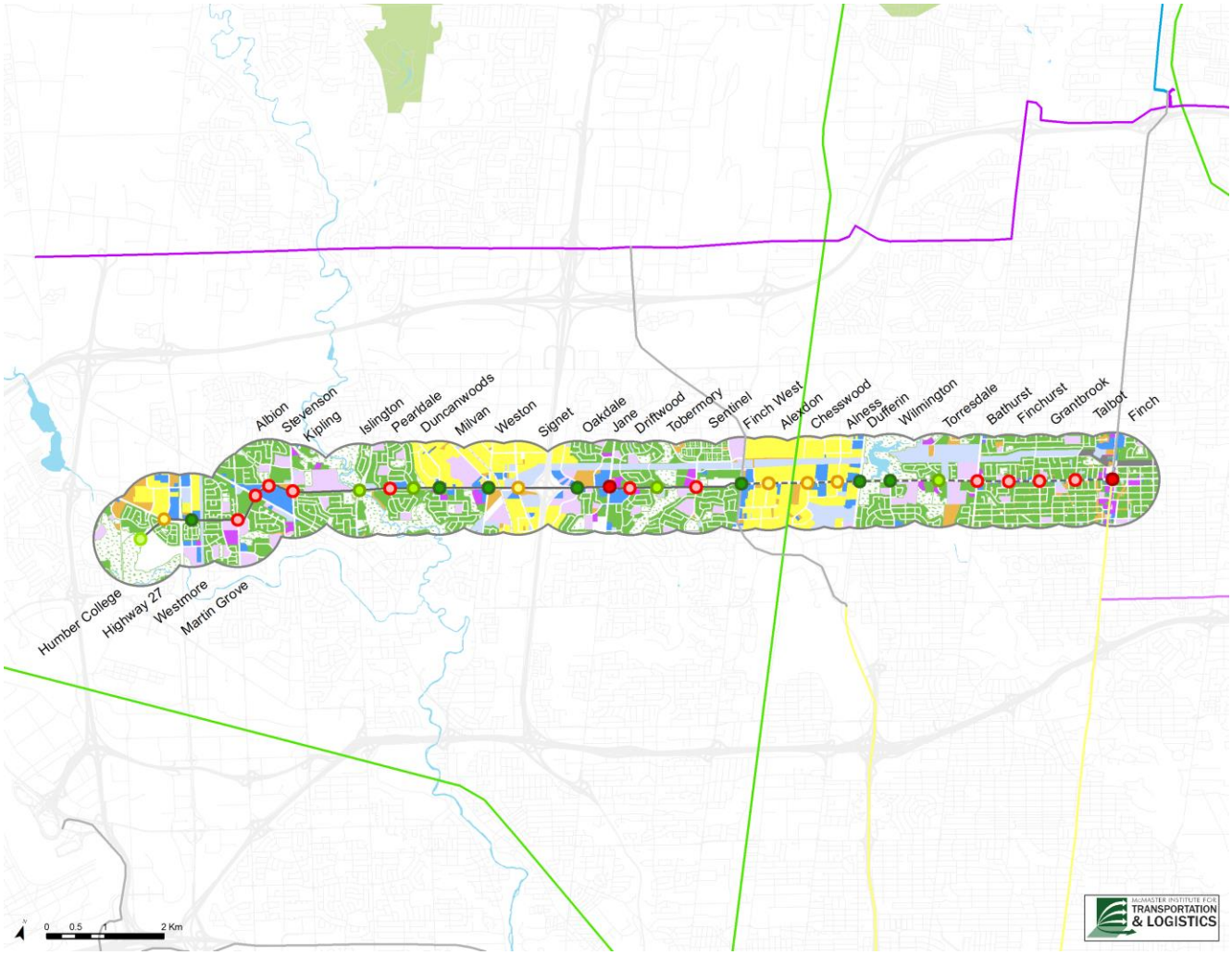
Across project phases, Phase 1 of the Eglinton Crosstown LRT traverses a corridor that is medium- to high-density in terms of population and employment. Phase 3 is less dense, with Phase 2 lower still. The distribution of station types is also not equal across each segment. Of the urban stations, 40% are located along Phase 1 and another 40% along Phase 3. In contrast, Phase 2 is more suburban in character, with 41% of its stations classified as low-density, *Outer Suburban Neighbourhoods* and another 6% as *Exurban Neighbourhoods*.

In terms of transit-oriented intensification, it is clear that Phase 2 could benefit most from supportive policy and planning. Here only 5 stations feature densities greater than 50 people and jobs per hectare. Some stations are designated as within an intensification corridor, and Commerce station is within an intensification node. However, many stations along both Phases 2 and 3 do not have any intensification designation.

Furthermore, while a large number of stations are urban and transit-oriented, groups of more suburban stations along all three phases could benefit from policies and plans that promote higher-density, mixed-use development and improve the pedestrian environment. Stations such as Ferrand and Wynford already feature high densities but are categorized as *Suburban Neighbourhoods*. In this case, this is due to a lack of pedestrian accessibility attributable to large commercial and industrial parcels and a more suburban street design.

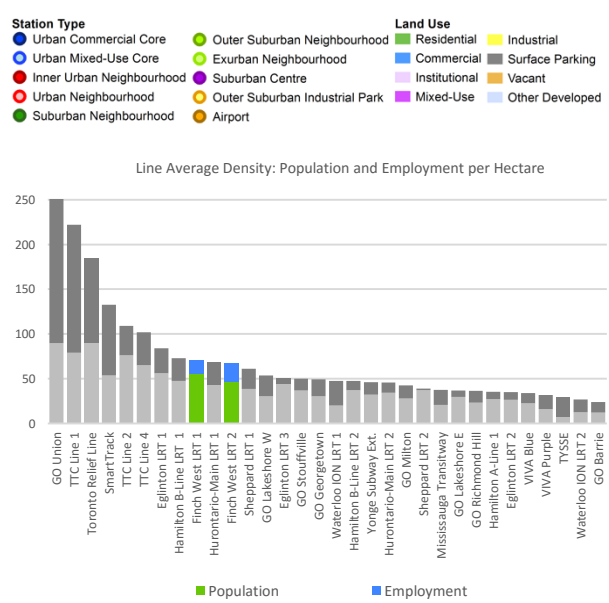
2%	Urban Mixed-Use Core
2%	Inner Urban Neighbourhood
49%	Urban Neighbourhood
15%	Suburban Neighbourhood
20%	Outer Suburban Neighbourhood
2%	Exurban Neighbourhood
5%	Suburban Centre
2%	Outer Suburban Industrial Park
5%	Airport

Finch West LRT Phases 1 and 2



The Finch West LRT is a proposed LRT line in the City of Toronto. Phase 1 of the line is to extend from Finch West station on the Toronto-York Spadina Subway Extension and travel west towards Humber College. As of 2015, Phase 1 is scheduled to start construction in 2016-2017 for an opening in 2021. This segment is approximately 11km in length with 20 stations. The plan for the line is to operate in a separate right of way in the centre of the street, with a tunneled station where it meets Finch West station.

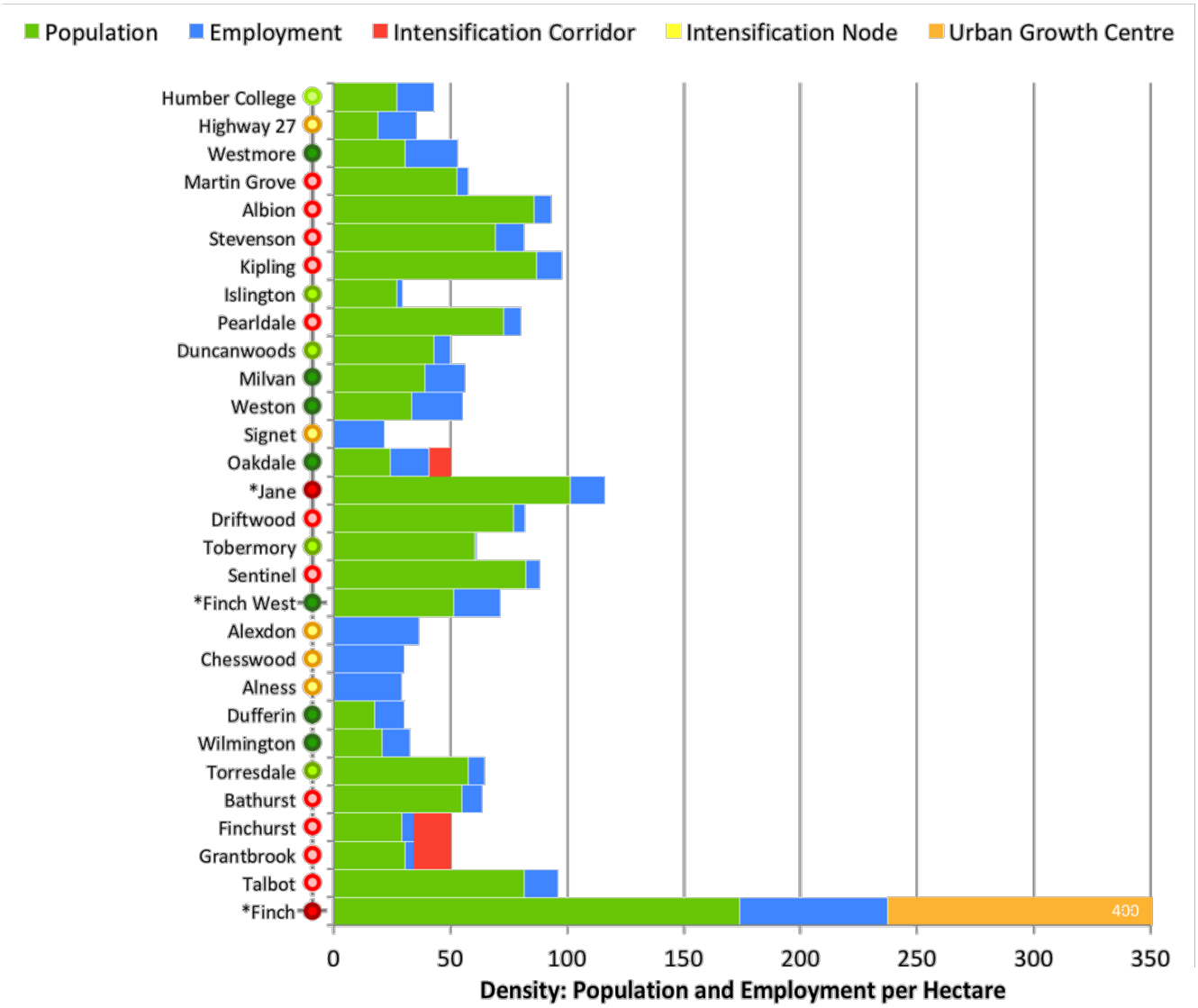
A proposed second phase would continue the line west from Finch West station, connecting it to Finch station on the Line 1 subway. It remains unclear if or when this segment will be built.



Finch West LRT Phases 1 and 2

Phase 1 of the Finch West LRT will operate in a medium-density corridor. This segment is primarily urban, but is interspersed with *Suburban*, *Outer Suburban*, and *Exurban Neighbourhoods*. This highlights several key areas for promoting transit-oriented intensification that increases population and employment densities, promotes a mixing of land uses, and increases their pedestrian orientation. Phase 2 is similar, with some urban and suburban stations. *Outer Suburban Industrial Parks* may present an opportunity for transit-oriented land use change. For intensification, the vast majority of stations along both phases do not feature any intensification designation, suggesting that there may be a role for strengthened corridor land use planning.

7%	Inner Urban Neighbourhood
37%	Urban Neighbourhood
23%	Suburban Neighbourhood
13%	Outer Suburban Neighbourhood
3%	Exurban Neighbourhood
17%	Outer Suburban Industrial Park



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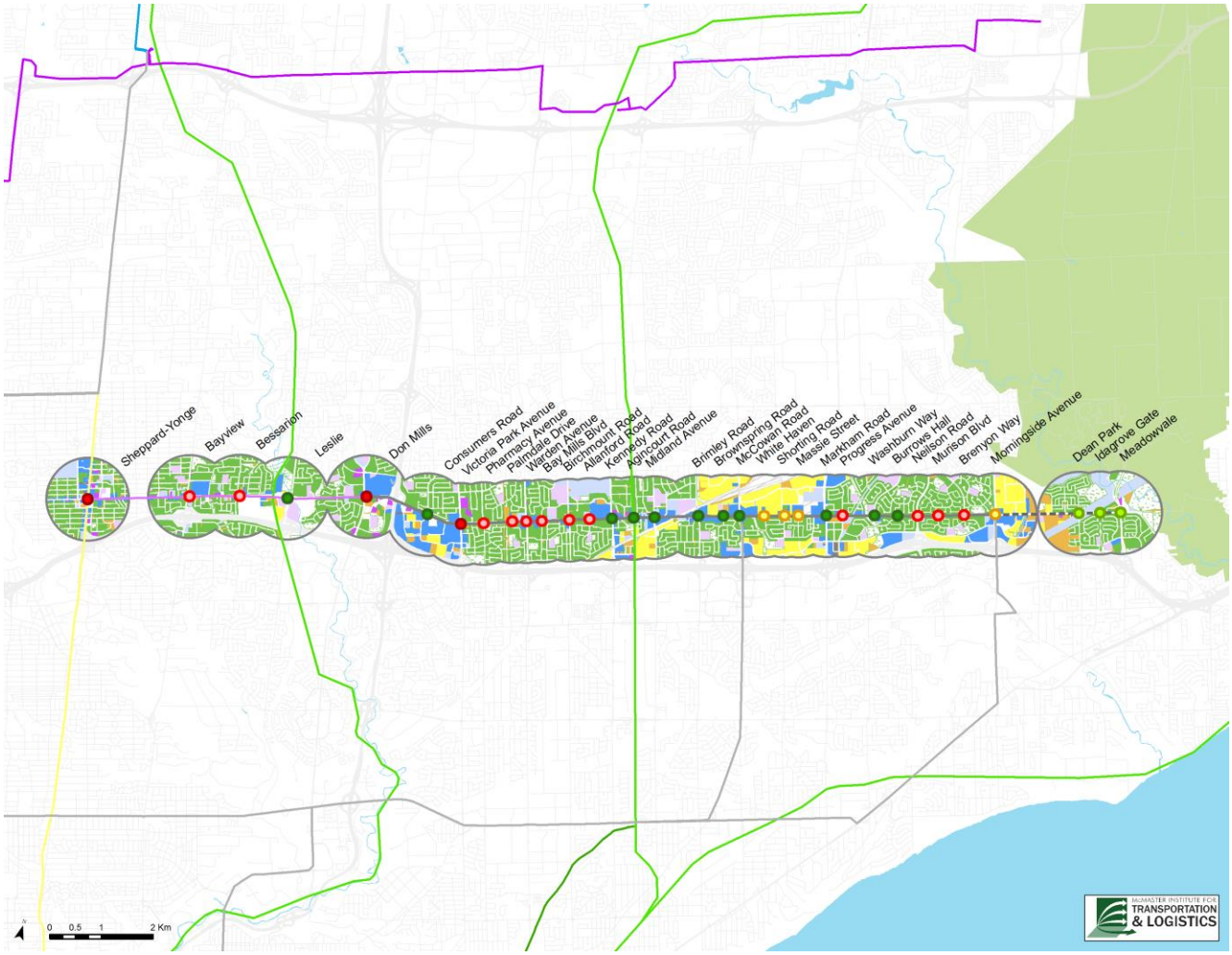
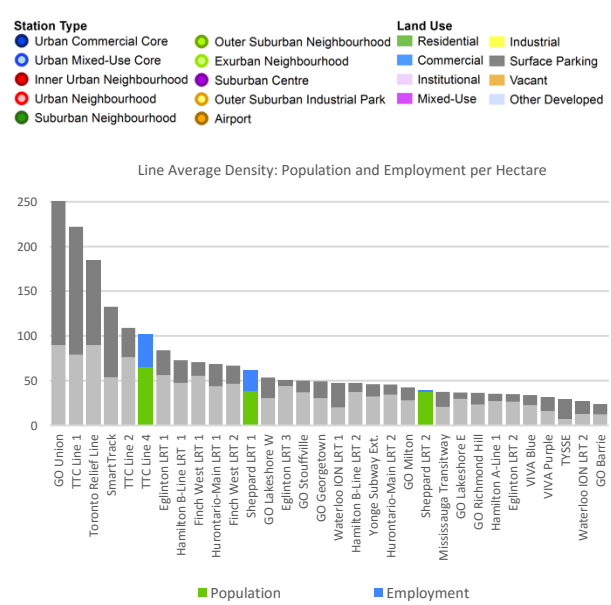
Sheppard East LRT Phases 1 and 2 and TTC Line 4



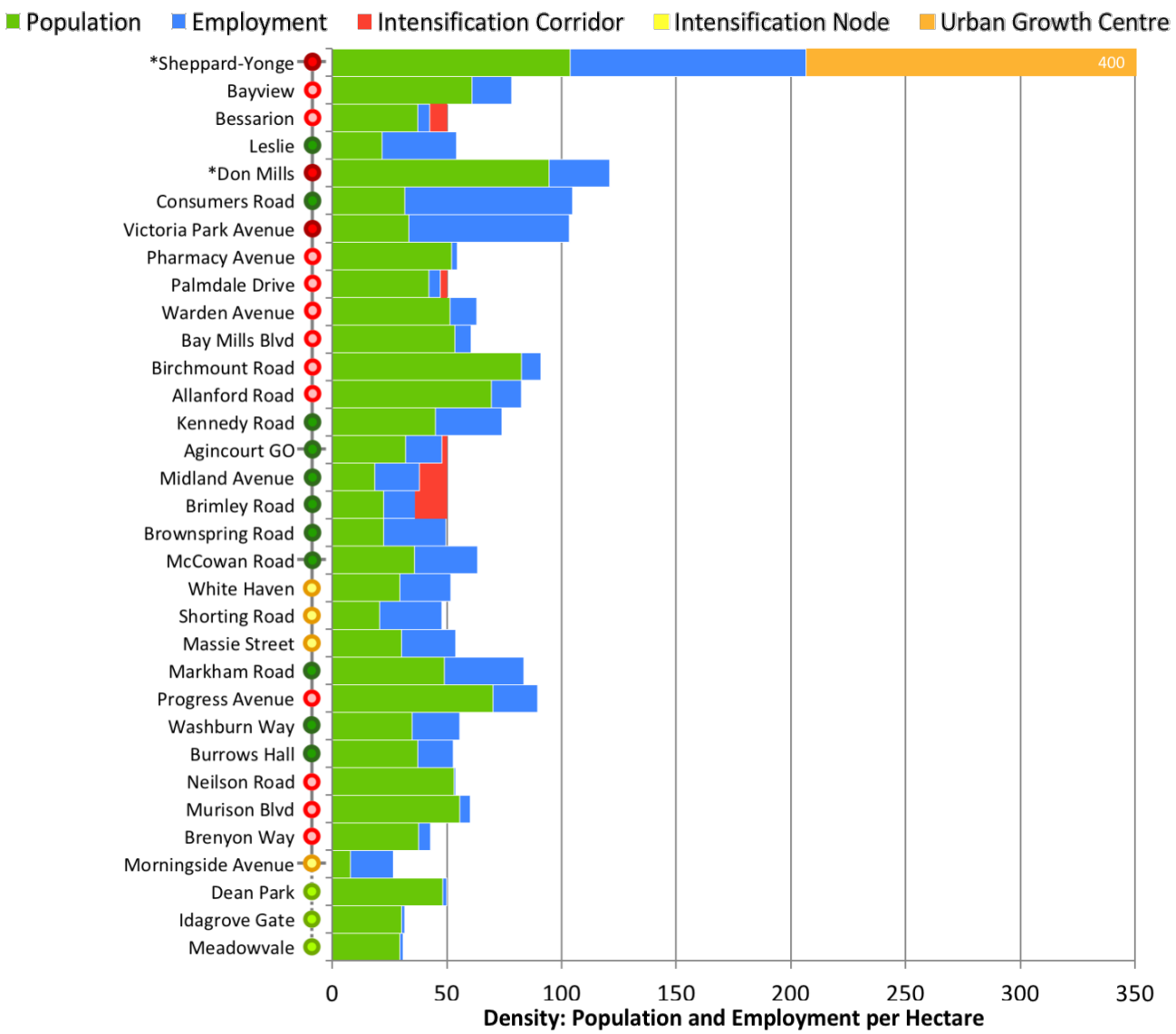
The Sheppard East LRT is a proposed 15km LRT line in the City of Toronto. The line is split into two phases; the first from Don Mills to Morningside Avenue, with a second phase proposed that consists of an additional three stations further east. The project is to begin construction in 2021 after the completion of the Finch West LRT for an opening in 2024. When finished it will connect with GO Transit at the Agincourt station and the existing 5.5km TTC Line 4 subway at Don Mills station. Between Don Mills station and Consumers Road station, the LRT will run in a tunnel which allows a direct connection to the subway line. The Line 4 subway opened in 2002 with 5 stations and connects to the Line 1 subway at Sheppard-Yonge.



Sheppard East LRT Phases 1 and 2 and TTC Line 4

The Sheppard corridor varies in density from station to station. On the Line 4 subway, densities range from low at Bessarion station to high at Don Mills and Sheppard-Yonge stations. Along the LRT portion of the corridor, stations are predominately *Urban Neighbourhoods*, characterized by medium-density development with some elements of TOD. Farther east, stations become more suburban in character. Here while medium-density, pedestrian accessibility is lower due to cul-de-sac street designs and some stations feature high levels of industrial land use. Many stations are within an intensification corridor, though some *Suburban* stations and could benefit from transit-oriented intensification in the future.

9%	Inner Urban Neighbourhood
37%	Urban Neighbourhood
33%	Suburban Neighbourhood
9%	Outer Suburban Neighbourhood
12%	Outer Suburban Industrial Park



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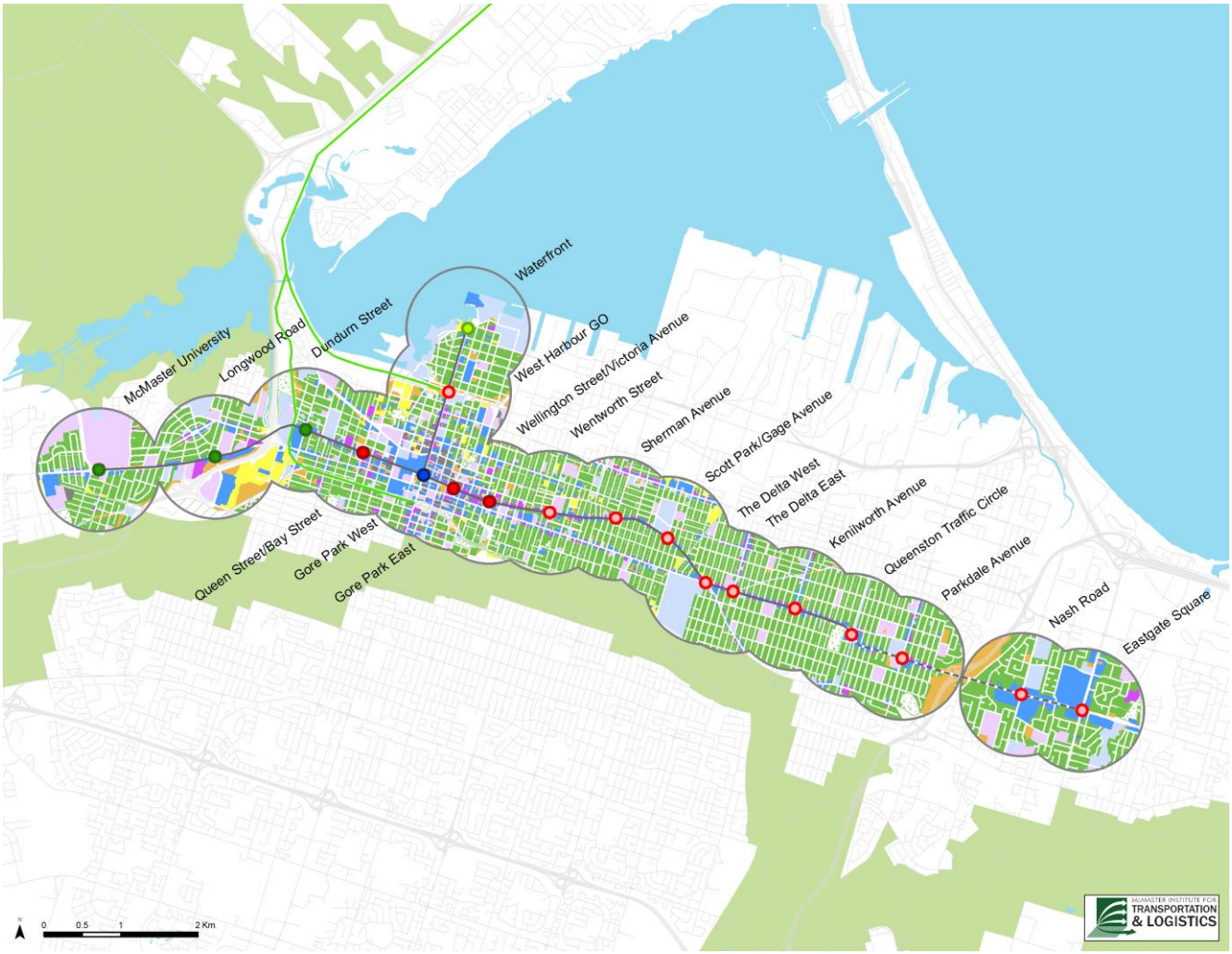
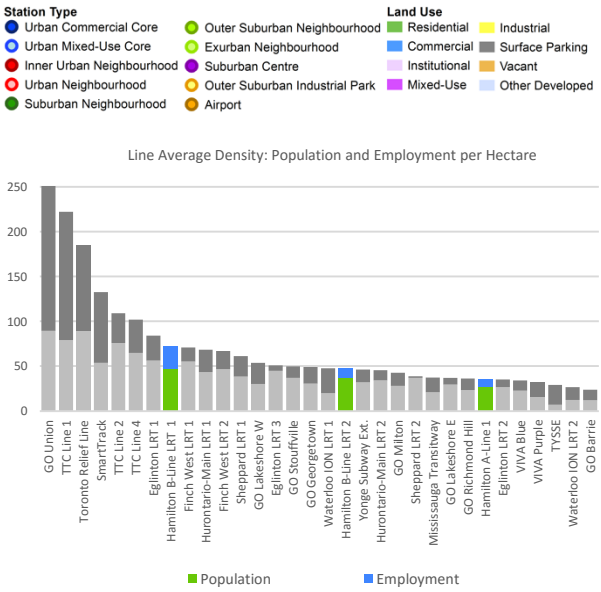
Hamilton A-Line and B-Line LRT



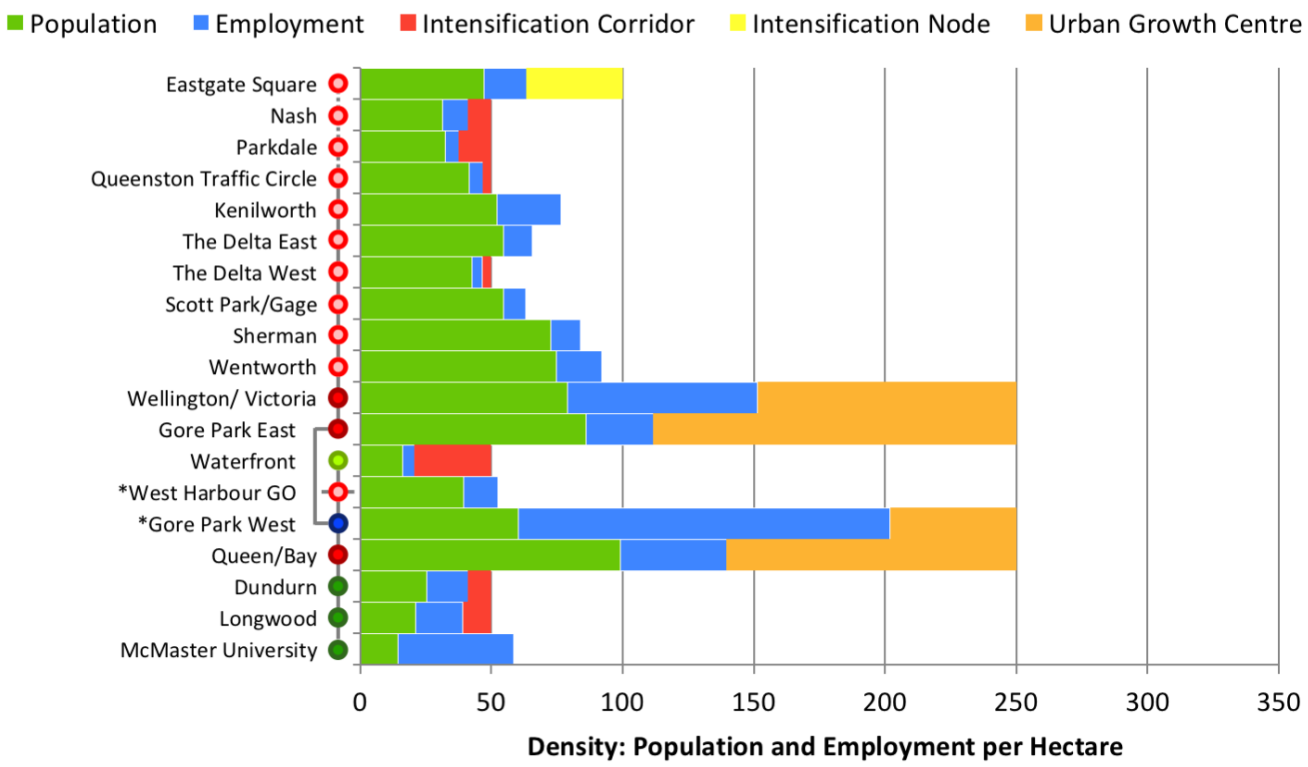
The B-Line LRT is a 14km light rail line in the City of Hamilton. The A-Line is a 2km spur, connecting the B-Line with the West Harbour GO station and the waterfront. In the future this line may travel further south to the Hamilton Mountain and the city's airport. As of 2015, Phase 1 of the B-Line and the A-Line are funded for construction with operations beginning in 2024. Both lines are to run in a dedicated right-of-way, offering rapid transit service to a number of important destinations, such as McMaster University, the McMaster Innovation Park, downtown Hamilton, and Tim Hortons Field. Among all the transit lines in the present study, the B-Line Phase 1 is among the highest-density projects in the region. Phase 2 and the A-Line spur are generally lower, but the A-Line's density in the present study is limited by Hamilton Harbour.



Hamilton A-Line and B-Line LRT

With the A-Line and B-Line LRTs running through the historic urban core and dense inner-city suburbs, the nature of the built environment is quite transit-oriented already. The majority of stations are *Inner Urban* and *Urban Neighbourhoods*, with three *Suburban Neighbourhoods* near McMaster University and one *Outer Suburban Neighbourhood* around the Waterfront station. The downtown core is a high density *Urban Commercial Core* station, the only one in the present study outside of the City of Toronto. In general, this means the corridor features medium- to high-densities, good pedestrian accessibility attributable to a grid street pattern, mixing of land uses, and good transit access to people and jobs. In terms of intensification, the entire corridor is within a designated intensification corridor, and several stations are within the city's downtown Urban Growth Centre. In general, the biggest opportunity for growth is in the downtown core, where a number of large parcels presently used for surface parking lots permit larger-scale implementations of TOD. This type of development should help the downtown core reach its targeted density levels and further anchor movements along the lines in the future.

5%	Urban Commercial Core
16%	Inner Urban Neighbourhood
58%	Urban Neighbourhood
16%	Suburban Neighbourhood
5%	Outer Suburban Neighbourhood



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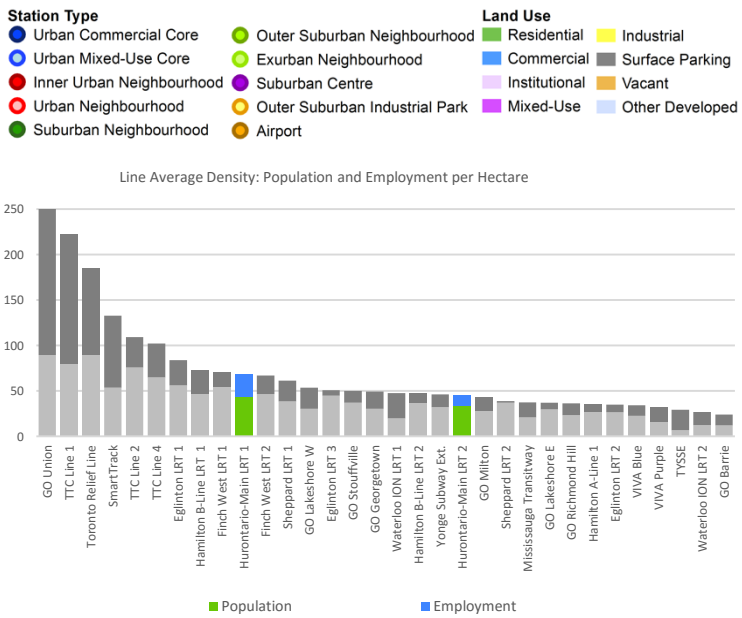
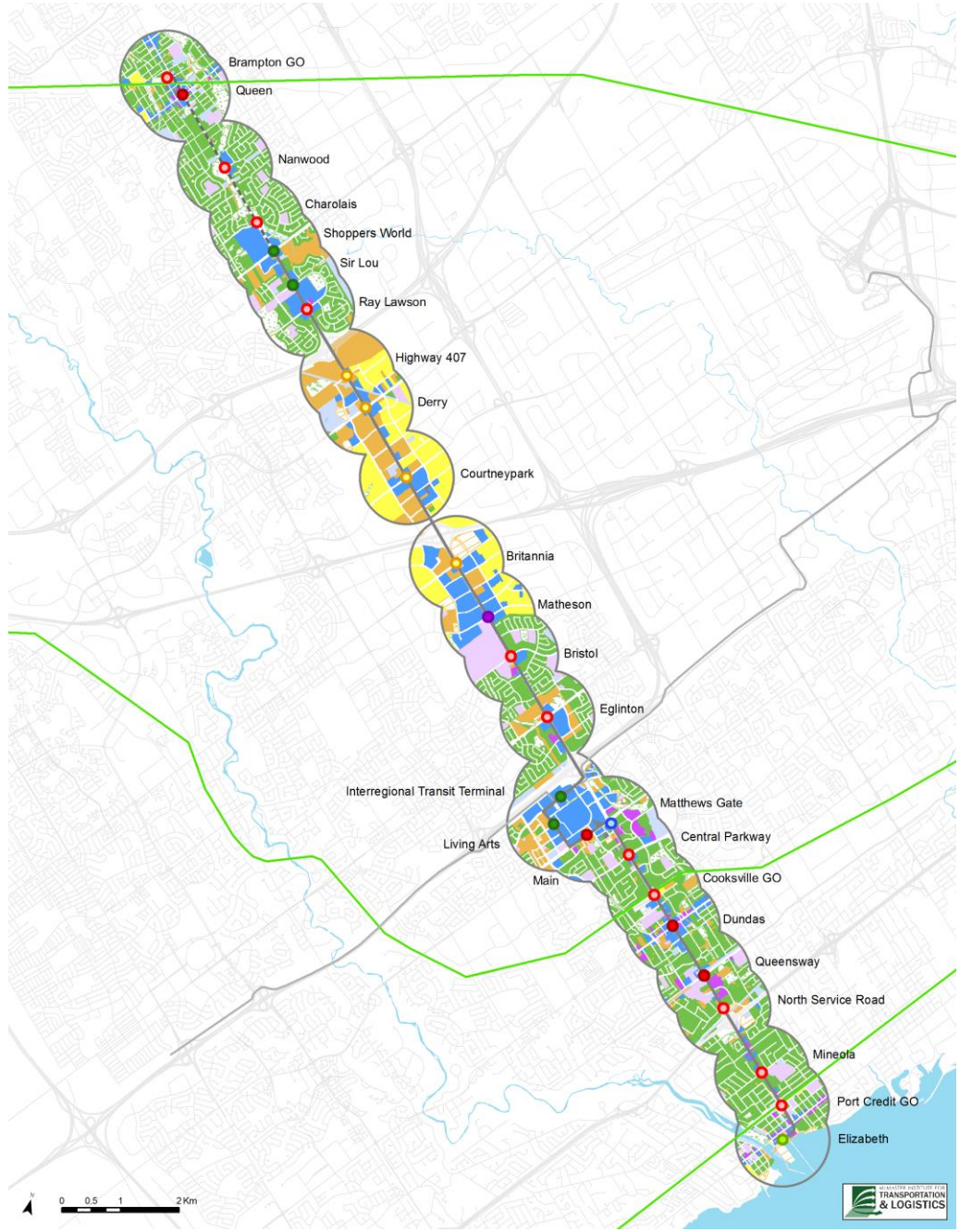
Hurontario-Main LRT Phases 1 and 2

The Hurontario-Main LRT is a 23km light rail line planned to run from Elizabeth station in Port Credit to Shoppers World in Mississauga, and potentially to downtown Brampton and the nearby GO CRT station. Phase 1 of the line is within the City of Mississauga and is funded and in the early stages of procurement with construction beginning in 2018 and operations beginning in 2022. Until recently the entire project was to be completed at once. However, the 3.5km segment of the line north of Shoppers World was rejected by the City of Brampton in late 2015. As such, this segment is designated as a potential Phase 2. In both cases the line would operate in a separate right of way. Compared to other projects, Phase 1 of the line is relatively high density and Phase 2 is medium relative to others.

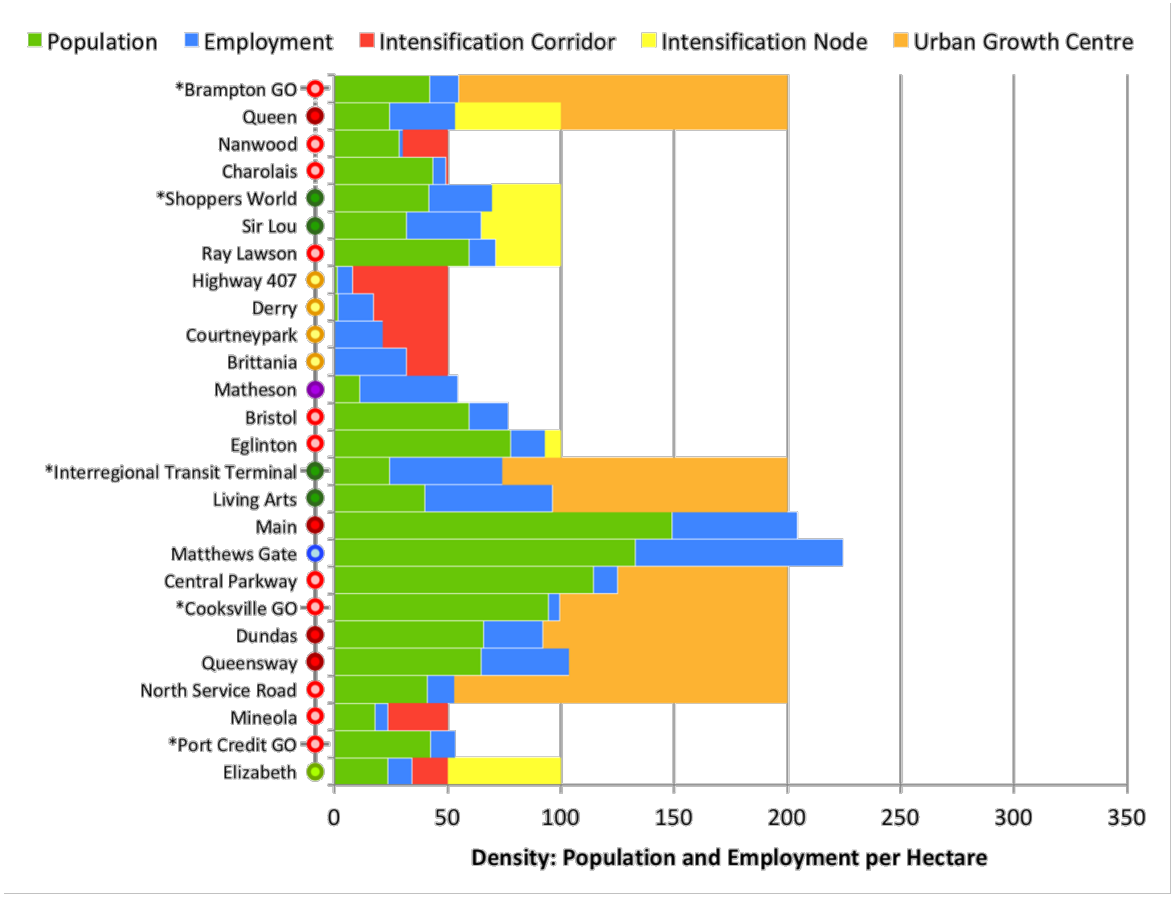




Hurontario-Main LRT Phases 1 and 2

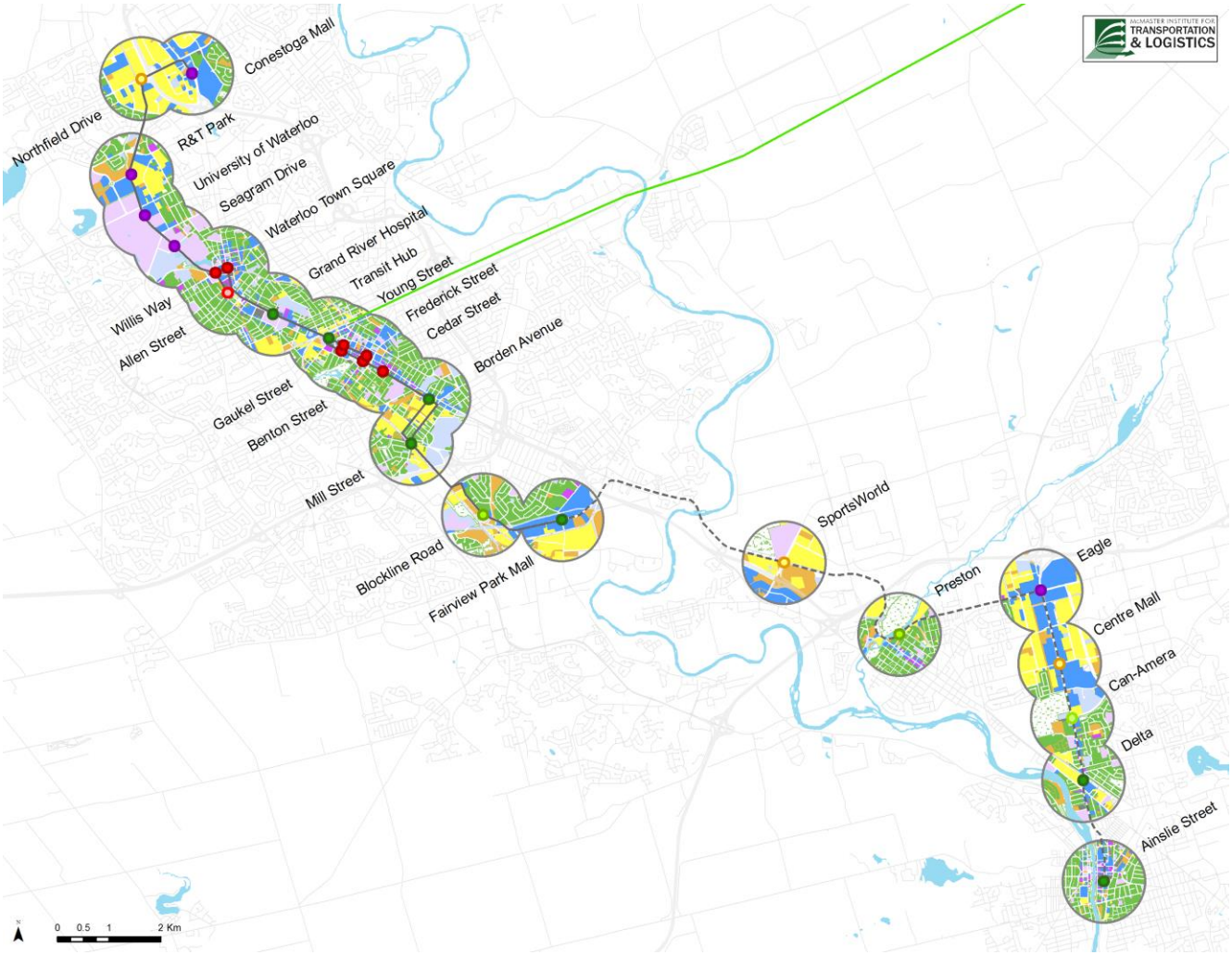
4%	Urban Mixed-use Core
15%	Inner Urban Neighbourhood
42%	Urban Neighbourhood
15%	Suburban Neighbourhood
4%	Outer Suburban Neighbourhood
4%	Suburban Centre
15%	Outer Suburban Industrial Park

A large number of *Urban* stations point to a corridor that is already broadly reflective of TOD. Such stations feature a mixing of land uses, medium- to high-densities, good levels of pedestrian accessibility, and high levels of access to people and jobs. However, there is opportunity for intensification in the future, as many stations do not yet meet their density targets. This is particularly the case for Elizabeth stations and those with high proportions of low-density industrial development. The two high-density *Suburban Neighbourhood* stations in the central corridor point to a need to increase the quality of the pedestrian environment around these stops.

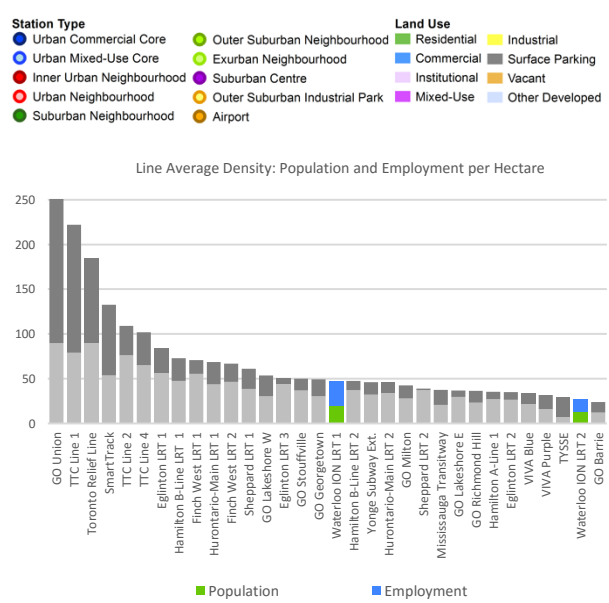


* Indicates station is identified by Metrolinx as a Mobility Hub. All route alignments, station locations, and names are conceptual.

Waterloo ION LRT Phases 1 and 2



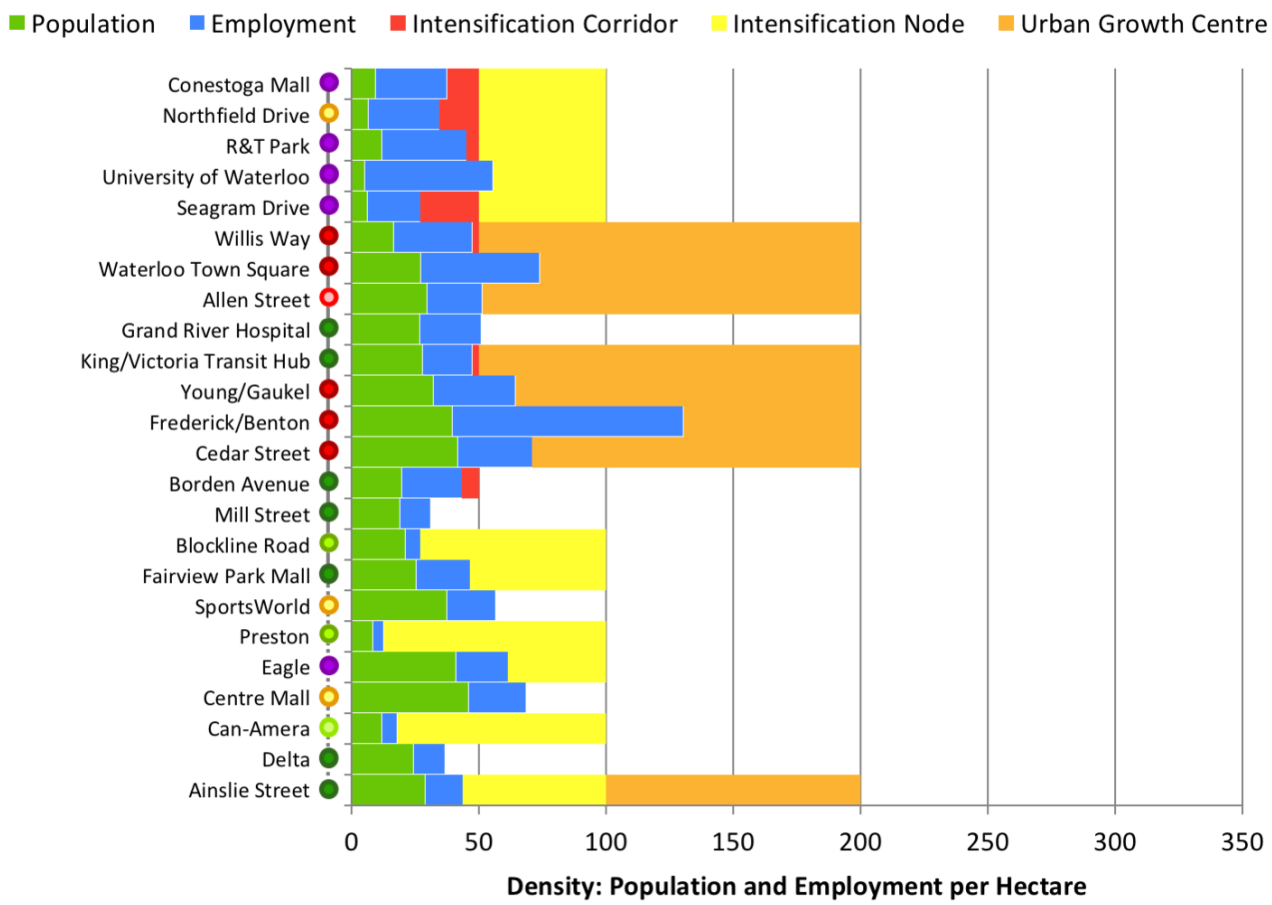
The ION LRT is a new LRT line in the Region of Waterloo. Phase 1 of the line runs from Conestoga Mall in the north to Fairview Park Mall in the south, via the University of Waterloo, the Research and Technology Park of the University of Waterloo and Laurier, and downtown Kitchener-Waterloo, which offers a connection to the GO CRT network. Phase 1 is approximately 19km in length and under construction with service scheduled to begin in late 2017. Phase 2 of the project is proposed to run from Fairview Park to downtown Cambridge. Prior to the construction of LRT along Phase 2, the Region of Waterloo will run an adapted BRT line along a parallel route. In both phases, the LRT will operate on a mix of off-street and on-street track. However, on-street segments maintain a separate right-of-way for light rail vehicles.



Waterloo ION LRT Phases 1 and 2

The Waterloo ION LRT connects many medium-density stations. The bulk of stations along Phase 1 are *Inner Urban* and *Urban Neighbourhoods*, with a large number of *Suburban Centre* stations in the northern segment of the corridor around the University of Waterloo. This suggests that Phase 1 will operate in a relatively transit-oriented corridor. Outside of downtown Kitchener-Waterloo however, Phase 1 becomes more suburban, and this continues along Phase 2 into downtown Cambridge. To intensify station areas, a large number of stations along both Phases 1 and 2 are located within intensification corridors and nodes and urban growth centres. Most stations do not yet meet their targeted level of population and employment densities. However, Kitchener and Waterloo are both very active in station area TOD planning and view the promotion of TOD as a way to achieve the maximum possible return on investment for the project.

21%	Inner Urban Neighbourhood
4%	Urban Neighbourhood
29%	Suburban Neighbourhood
8%	Outer Suburban Neighbourhood
4%	Exurban Neighbourhood
21%	Suburban Centre
13%	Outer Suburban Industrial Park



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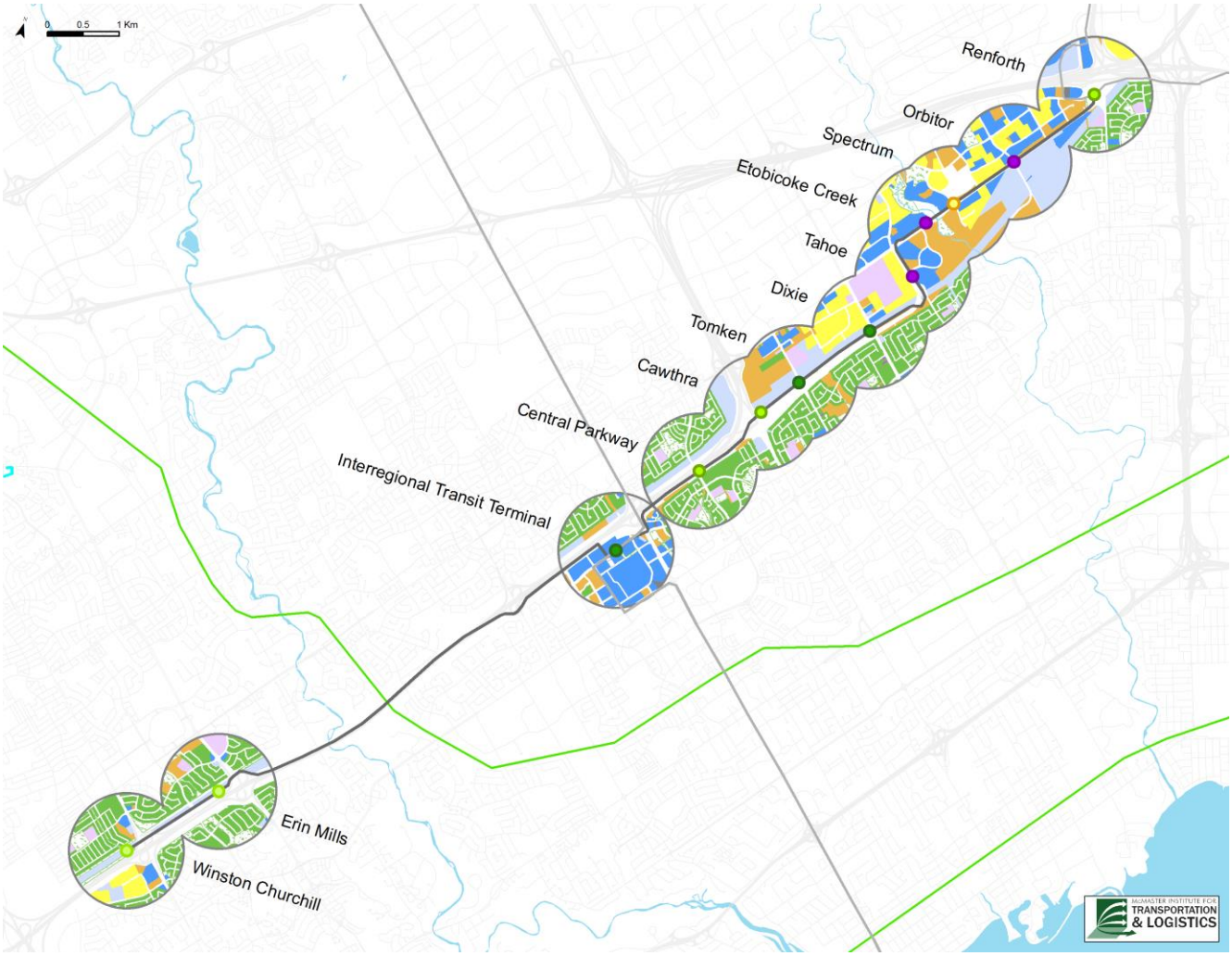
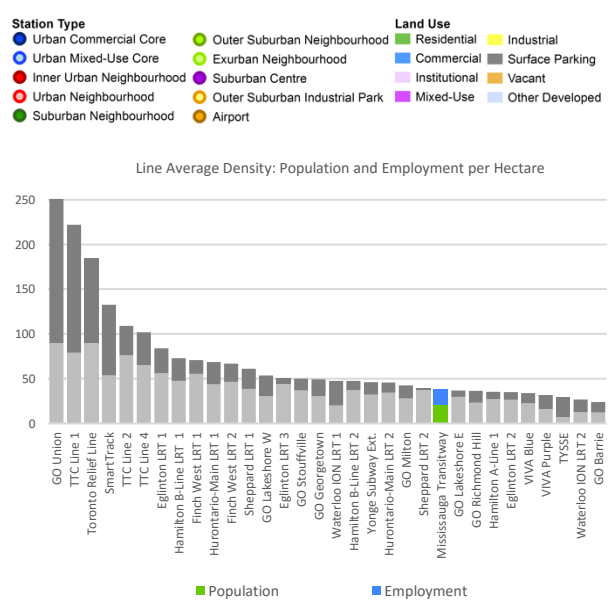
Mississauga Transitway



The Mississauga Transitway is a BRT service that is under construction in the City of Mississauga. The line travels from Winston Churchill station in the west to Renforth Gateway in the west, where it can connect to the proposed Eglinton Crosstown LRT Phase 2. The line will eventually interface with Phase 1 of the Hurontario-Main LRT at the Interregional Transit Terminal. As of writing, 8 of the line's 12 stations are open, from Erin Mills to Etobicoke Creek. The remaining stations are expected to open in 2017. Operationally, the line runs in a dedicated transitway with the segment from Erin Mills to the Interregional Transit Terminal making use of a dedicated shoulder lane on Highway 403. GO Transit's bus operations will also make use of the Transitway for limited-stop service for interregional trips.



Mississauga Transitway

Compared to other projects, the Transitway is low- to medium-density overall. In general, stations are suburban in character, split between *Suburban*, *Outer Suburban*, and *Exurban Neighbourhoods* oriented to population, and *Suburban Centres* and *Outer Suburban Industrial Parks* oriented to employment. The Interregional Transit terminal is a high-density station in central Mississauga, but its *Suburban Neighbourhood* designation points to a built environment that can benefit from pedestrian improvements. The eastern portion of the corridor, while lower-density at present, is within a designated intensification node. However, the western segment of the line des not feature any intensification designation, highlighting areas for potential intervention to promote transit-oriented intensification in the future.

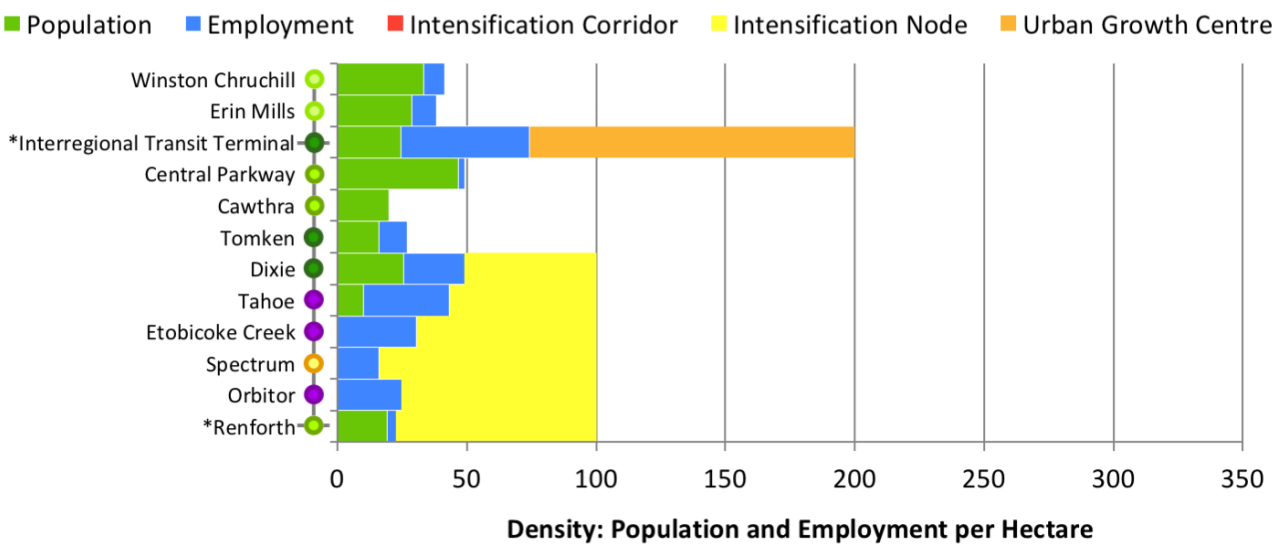
25% Suburban Neighbourhood

25% Outer Suburban Neighbourhood

17% Exurban Neighbourhood

25% Suburban Centre

8% Outer Suburban Industrial Park



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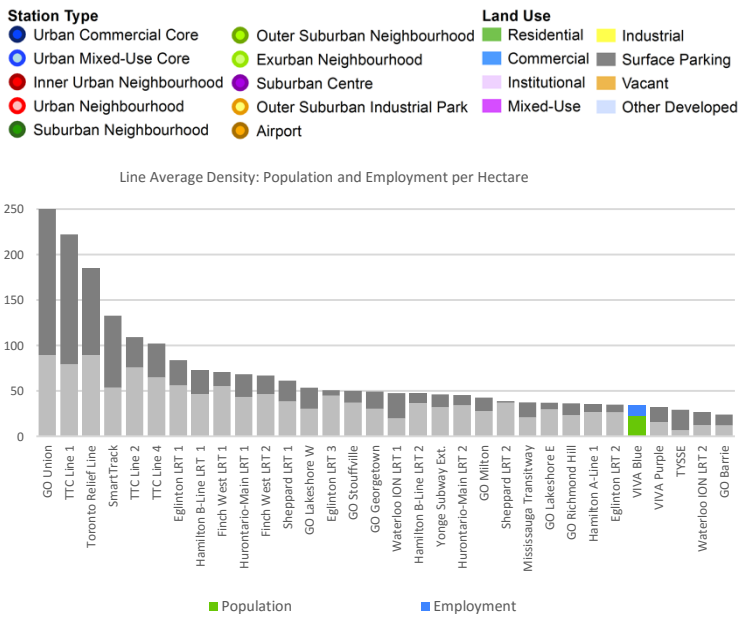
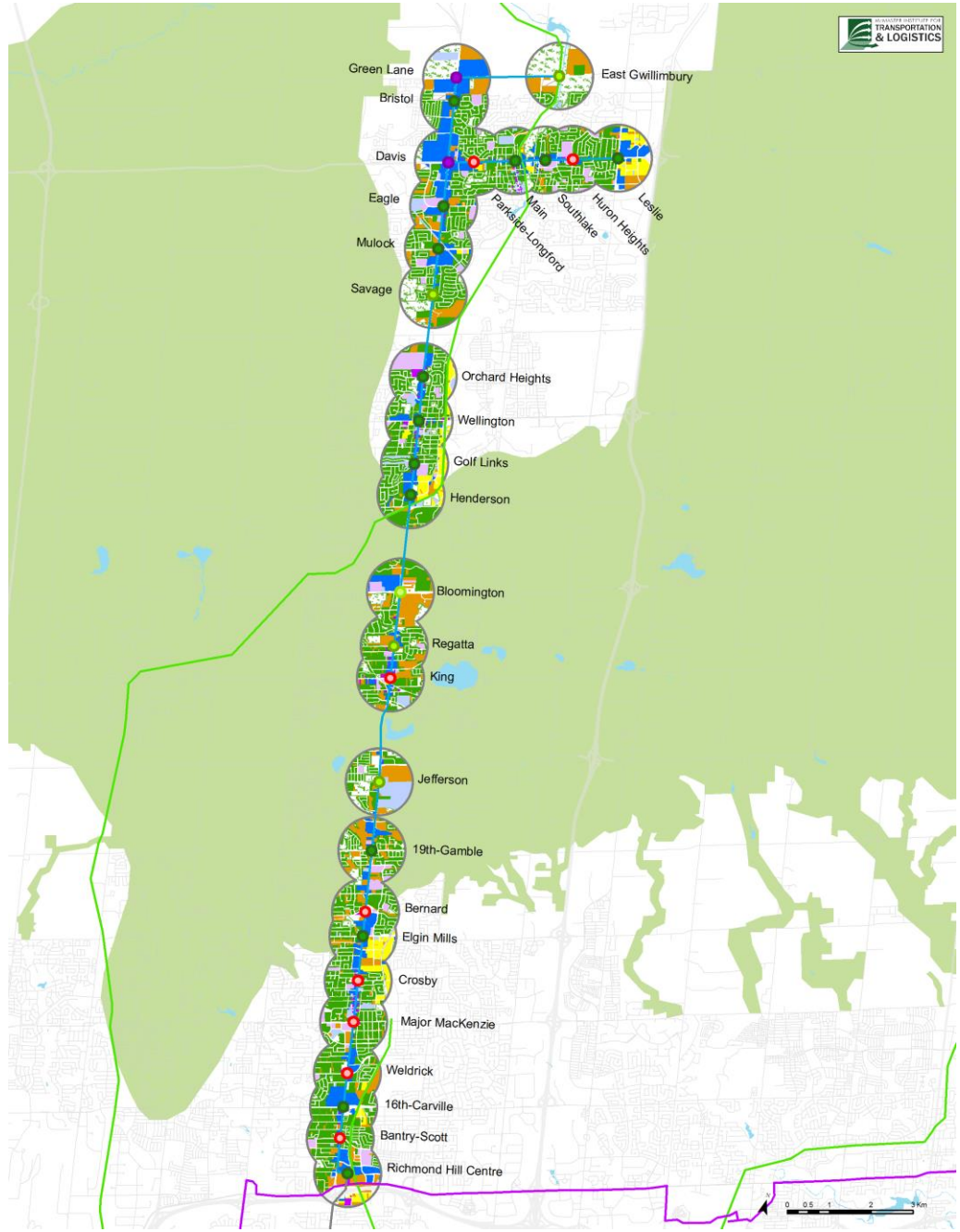
York VIVA Blue Rapidway

York Region's VIVA transit system opened in 2005, beginning service with buses operating in mixed traffic. This type of operation is a precursor to the VIVA NEXT Rapidways project, which will see the Purple and Blue VIVA lines incrementally upgraded to full BRT service through the construction of segregated bus lanes throughout York region. The Blue Line corridor features a diverse set of station types. The line is predominately suburban in nature, with 65% of its stations either *Suburban*, *Outer Suburban* or *Exurban Neighbourhoods*. The southern portion of the line features Urban Neighbourhood stations that are higher density, amenity-rich, and pedestrian friendly. South of Richmond Hill Centre, the Blue Line connects to the Finch Subway, but this segment may eventually be replaced by the Yonge North subway.

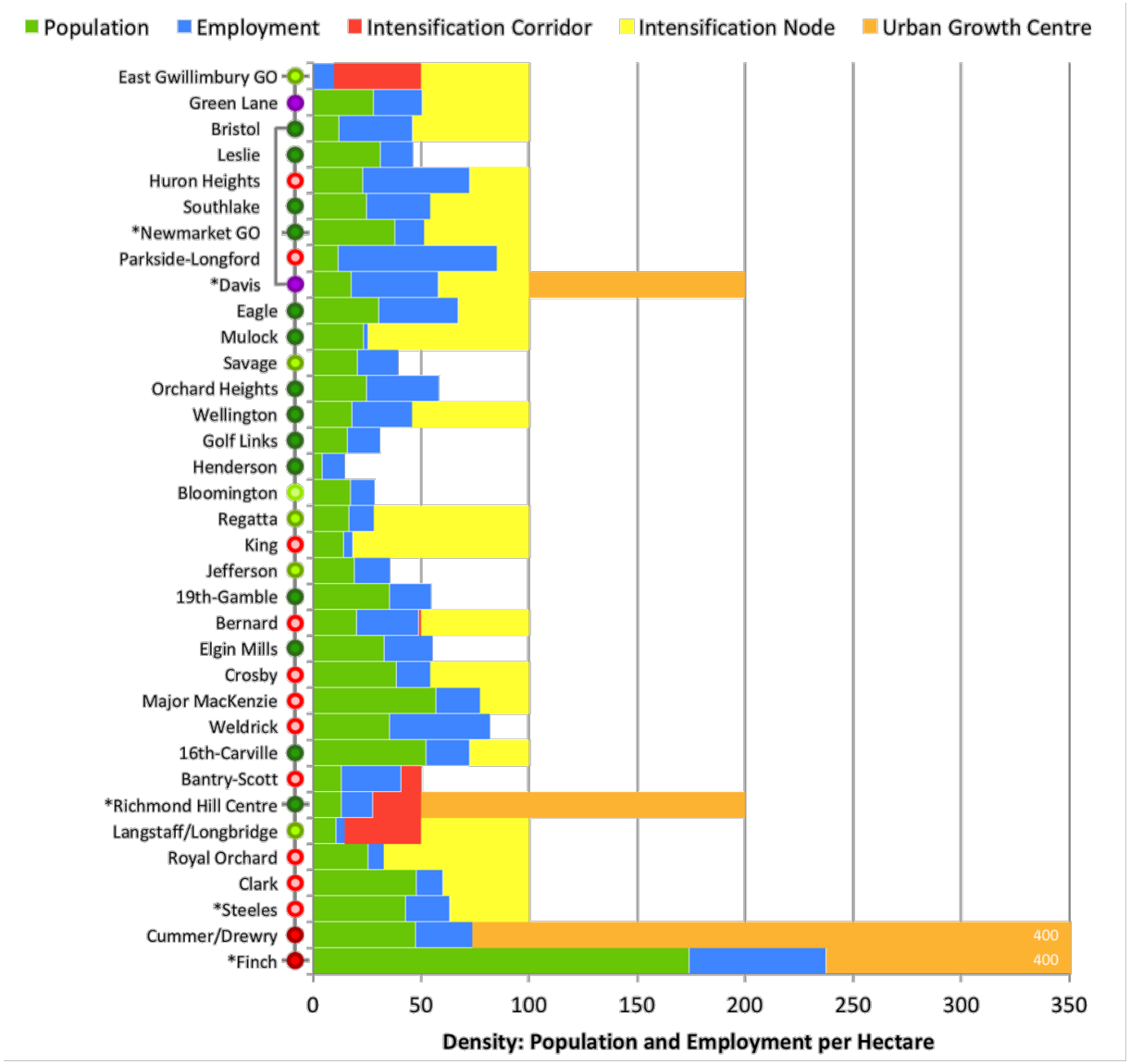




York VIVA Blue Rapidway

1%	Inner Urban Neighbourhood
28%	Urban Neighbourhood
48%	Suburban Neighbourhood
14%	Outer Suburban Neighbourhood
3%	Exurban Neighbourhood
7%	Suburban Centre
1%	Outer Suburban Industrial Park

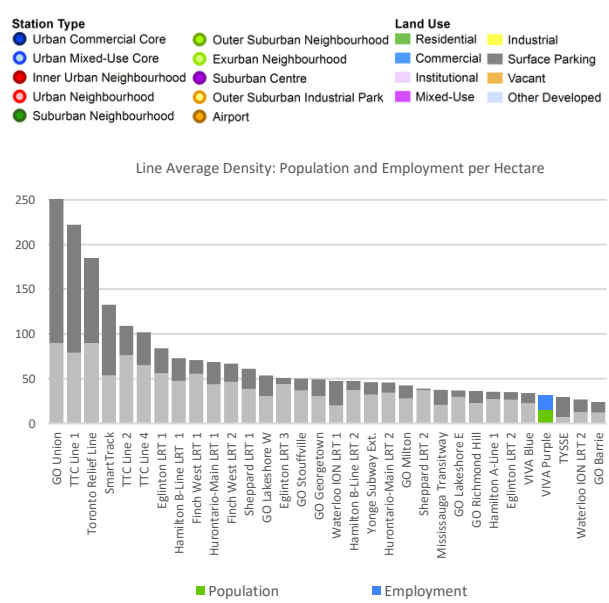
There is significant potential for intensification along the VIVA Blue BRT line. While the line is generally suburban and lower-density relative to others in the study, many stations are designated as within an intensification corridor or node, with some servicing the Richmond Hill and Newmarket Urban Growth Centres. Others are designated as key Mobility Hubs by Metrolinx. However, many other stations do not have any intensification designation. Overall, TOD planning will be required to increase the provision of TOD inputs in terms of densities, land use mix, and pedestrian friendliness, and TOD outcomes in terms of transit use.



* Indicates station is identified by Metrolinx as a Mobility Hub. All route alignments, station locations, and names are conceptual. South of Richmond Hill Centre, the Blue Line operates on stations that may become part of the Yonge North subway extension. For the purposes of this project, we assume these stations are shared

York VIVA Purple Rapidway

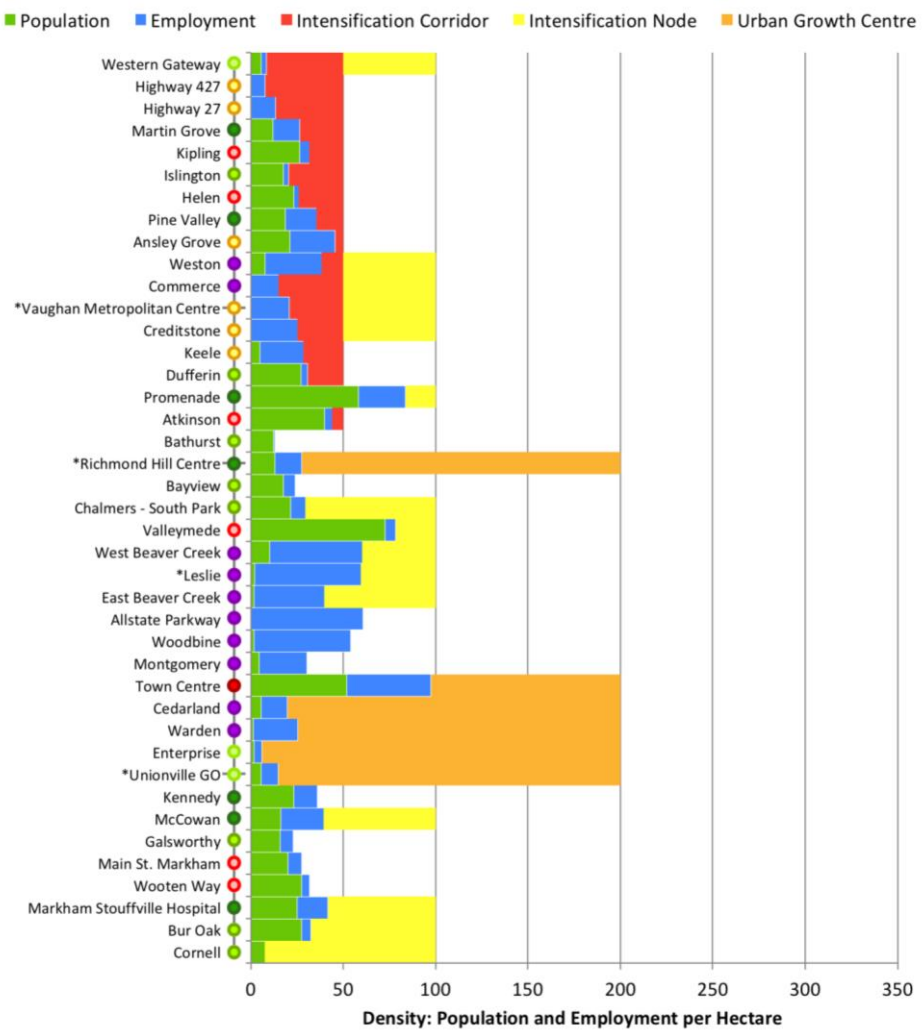
York Region's VIVA transit system opened in 2005, beginning service with buses operating in mixed traffic. This type of operation is a precursor to the VIVA NEXT Rapidways project, which will see the Purple and Blue VIVA lines incrementally upgraded to full BRT service through the construction of segregated bus lanes throughout York region. A section of the VIVA Purple line is already open from Richmond Hill Centre station to Warden station in the east, and the remaining Rapidways will be implemented in a staged process into the 2020s. The entire Purple Line project is approximately 43km in length from Western Gateway to Cornell station and connects with two GO lines, the TYSSE subway, and the proposed Yonge North subway extension. In terms of overall density, the line is low, reflective of its generally suburban character.



York VIVA Purple Rapidway

Among individual station contexts, the Purple line corridor is at present varied in the types of stations it travels through. East of Richmond Hill Centre features a large number of *Suburban Centre* stations oriented to employment uses, which are important regional destinations. This is followed by residential suburban development further east. The portion of the line west of Richmond Hill Centre roughly mirrors that of the east, with a large number of *Outer Suburban Industrial Parks* followed my more suburban residential development. As shown below, the density of individual stations is low outside of the central part of the corridor. Many stations are within designated intensification corridors and nodes and two Urban Growth Centres, which provides ample opportunity to promote more transit-oriented intensification to support BRT as the system build-out continues.

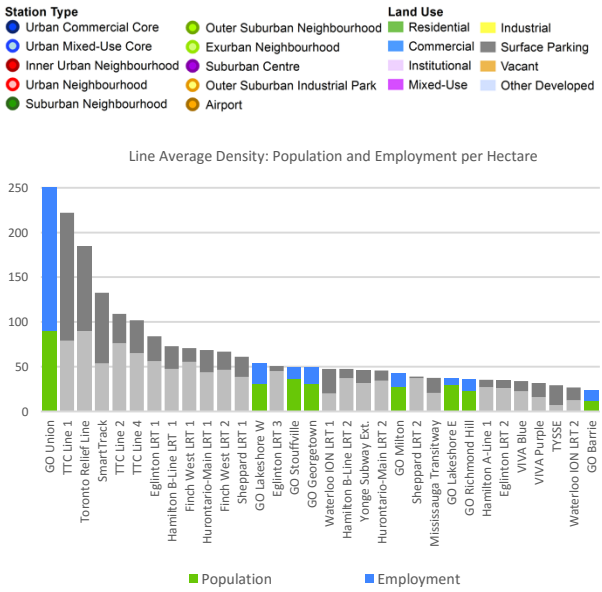
2%	Inner Urban Neighbourhood
15%	Urban Neighbourhood
17%	Suburban Neighbourhood
20%	Outer Suburban Neighbourhood
7%	Exurban Neighbourhood
24%	Suburban Centre
12%	Outer Suburban Industrial Park



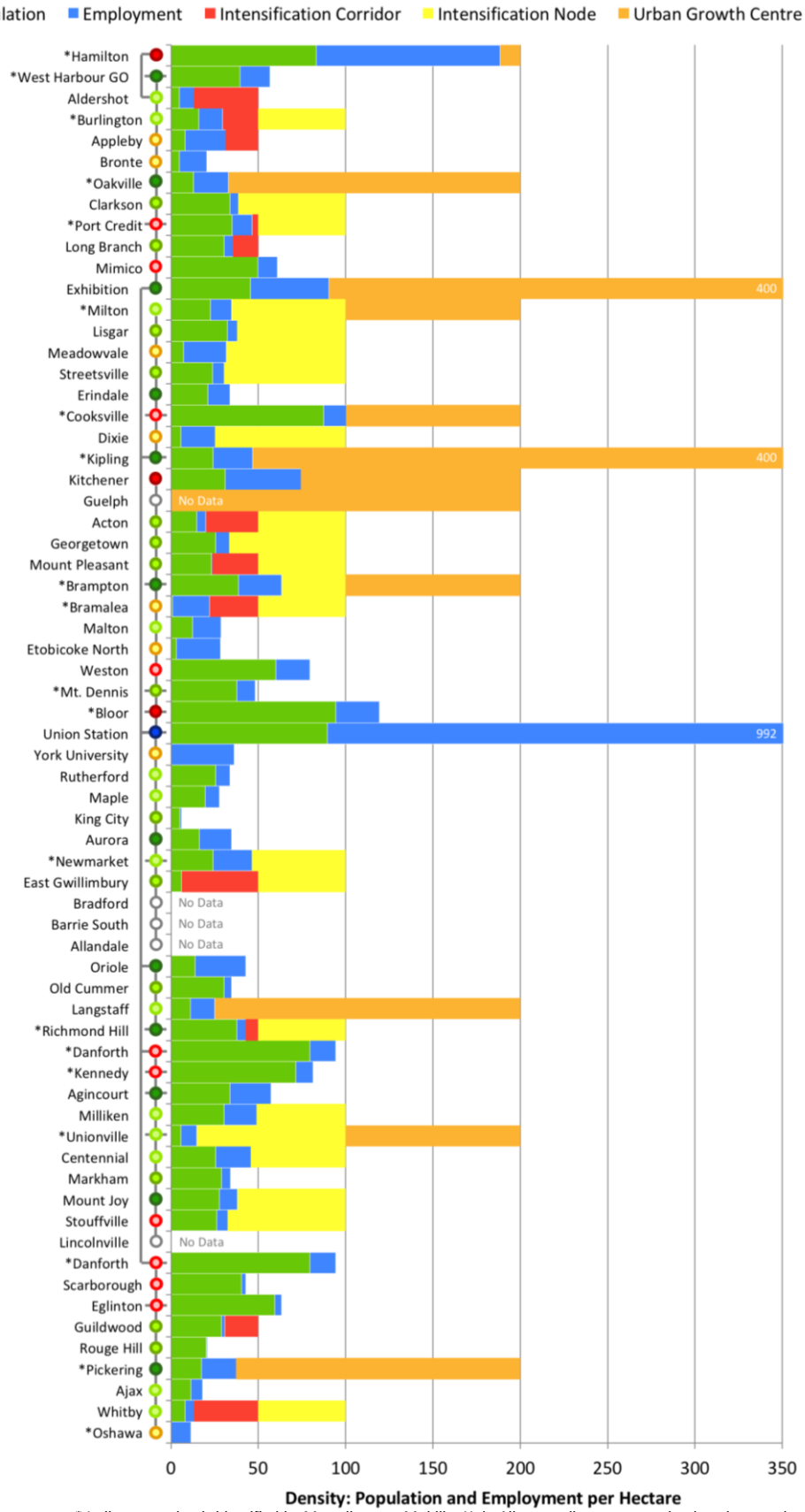
* Indicates station is identified by Metrolinx as a Mobility Hub. All route alignments, station locations, and names are conceptual.

GO Transit Lines

GO Transit operates a large network of CRT lines in the Greater Golden Horseshoe. The system began operations along the Lakeshore East and West lines in 1967 and has grown to encompass 452km of track across 7 lines. The network is geographically diverse, spanning the cities of Hamilton and Waterloo in the west to Barrie in the North, Oshawa in the east, and Toronto in the centre. Recent expansions have been the new West Harbour station in Hamilton and an increase in service levels across many lines to feature two-way and all-day service at 15 minute intervals. Future plans for the GO network include electrification and the move towards the GO's Regional Express Rail model of all-day rapid transit. Another key initiative is the renovation of Union Station to accommodate more passengers and an improved customer experience.



GO Transit Lines



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GO Transit Lines

In line with its geographically diverse service area, individual GO lines and stations show significant variance in terms of their levels of TOD. Of the lines, the Lakeshore West, Georgetown, and Stouffville lines are medium-density, while the Milton, Richmond Hill, Lakeshore East, and Barrie lines are medium- to low-density. For TOD, individual stations along these lines show dramatic variation in their station area contexts. Union Station, which is the shared terminus of all 7 lines, is a very high density *Urban Commercial Core*. Others are *Urban* in character, featuring characteristics associated with TOD. These stations tend to be located in the City of Toronto and developed areas in other regional municipalities.

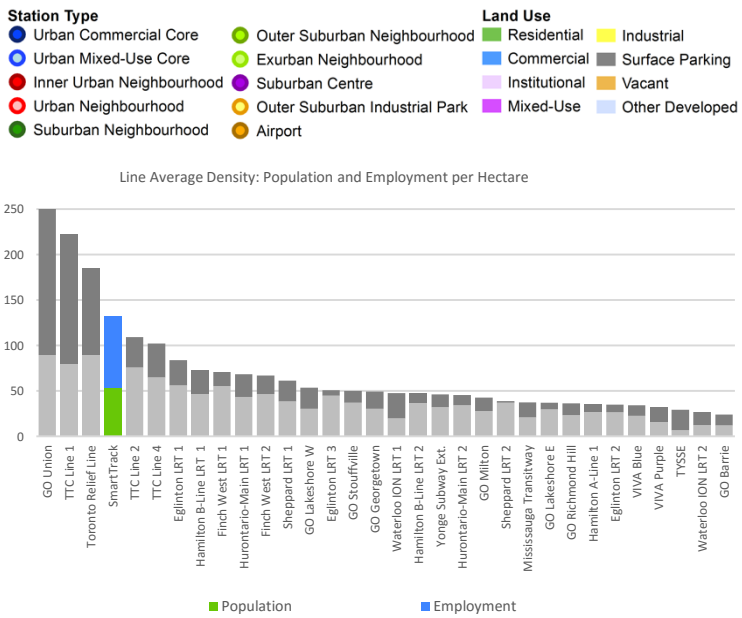
However, the predominant station types for all lines are *Suburban*, *Outer Suburban*, and *Exurban Neighbourhoods*, as well as a large number of *Outer Suburban Industrial Parks*. In many ways this is expected as GO Transit began its service on existing freight rail lines which tend to service more suburban areas of the region and a number of industrial parks. As well, the operation of most GO stations is oriented to park-and-ride commuter flows that arrive to the station largely by car rather than on foot. Because of this, the built environment around such stations features large parking lots.

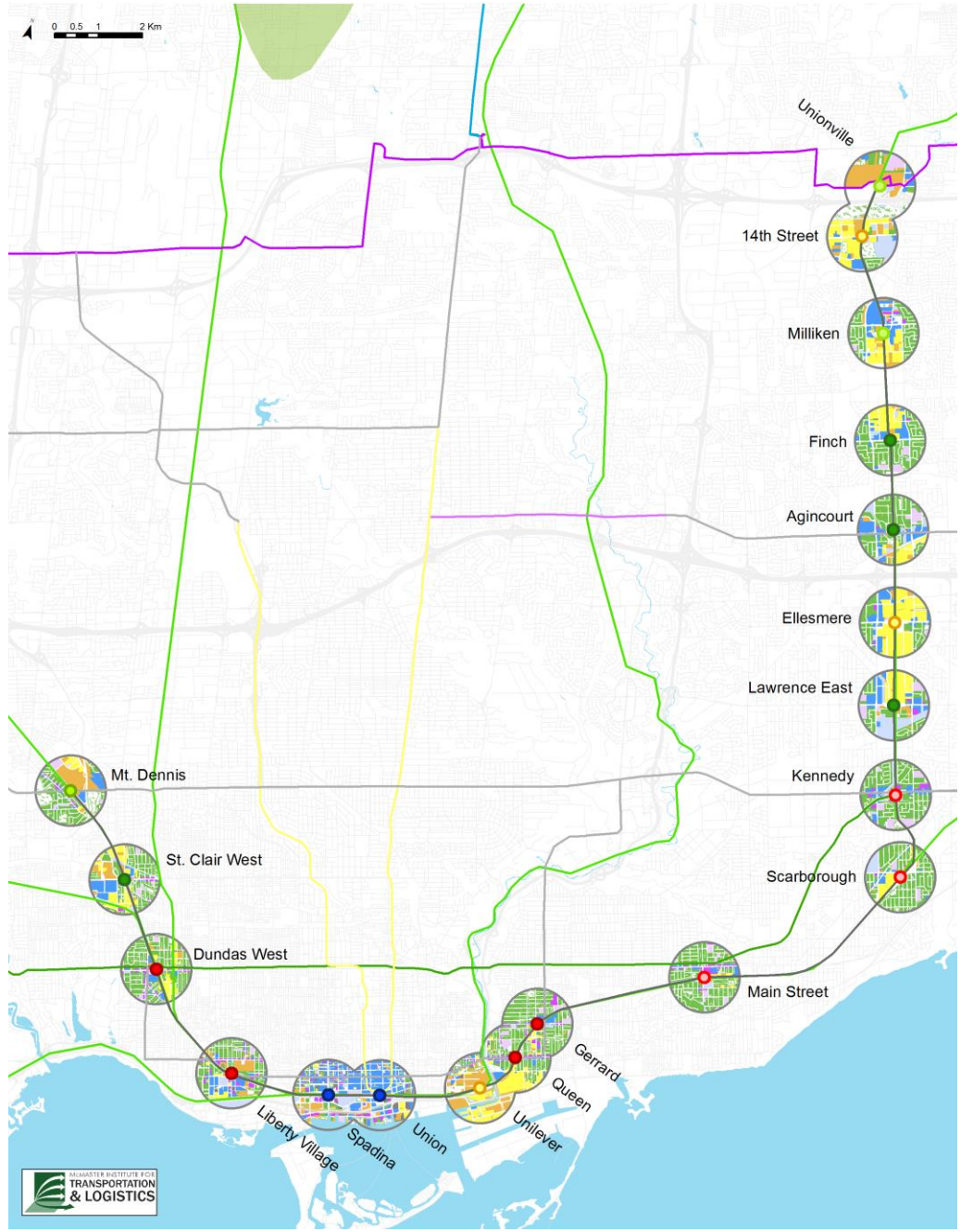
This model has worked well for attracting riders to the GO network. However, looking forward, future plans call for significant intensification around these stations. A large number are located within designated intensification corridors and nodes and others are within important regional Urban Growth Centres. Others are designated as Mobility Hubs by Metrolinx as they are located at the nexus of several different existing and future rapid transit lines. In that sense, the suburban and park-and-ride character of many stations offers an opportunity for larger-scale implementations of TOD.

2%	Urban Commercial Core
5%	Inner Urban Neighbourhood
17%	Urban Neighbourhood
18%	Suburban Neighbourhood
23%	Outer Suburban Neighbourhood
22%	Exurban Neighbourhood
13%	Outer Suburban Industrial Park

SmartTrack

SmartTrack is a 41km CRT line in the City of Toronto proposed by Toronto mayor John Tory. The project would use existing GO Transit route alignments on the Georgetown and Stouffville lines to connect Mt. Dennis and Unionville to Toronto's Union Station, but with more frequent service and the addition of several new stations. Originally a link from Mt. Dennis to the Pearson Airport was included in the proposal, but this has since been eliminated due to feasibility issues. Together the project has 19 stations. Like the Toronto Relief Line, SmartTrack is proposed as a solution for relieving crowding on the Yonge portion of the Line 1 subway. The operational characteristics of the proposal share many aspects with GO Transit's plans for electrification and increased service as part of the Regional Express Rail project.

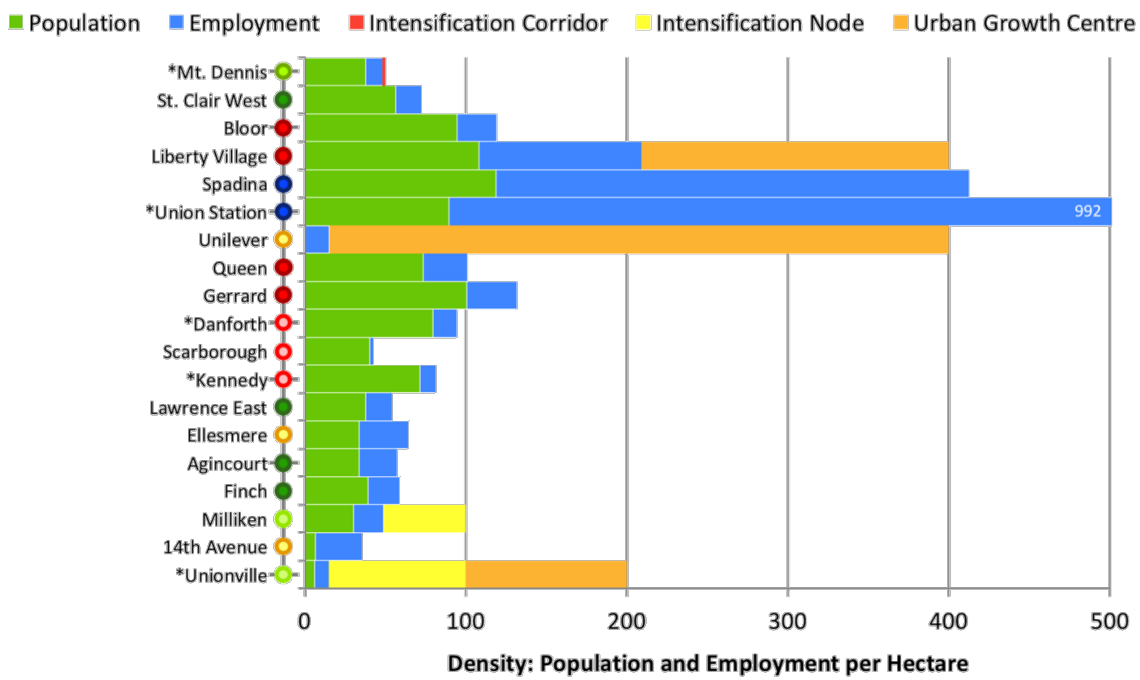




SmartTrack

11%	Urban Commercial Core
21%	Inner Urban Neighbourhood
16%	Urban Neighbourhood
21%	Suburban Neighbourhood
5%	Outer Suburban Neighbourhood
11%	Exurban Neighbourhood
16%	Outer Suburban Industrial Park

Stations along the proposed SmartTrack alignment vary significantly in their degree of transit-orientation. The central portion of the corridor, from Bloor to Kennedy, is very urban and features stations high in TOD. One exception is the area around Unilever station, which is part of Toronto's Port Lands and presently undeveloped. Outside of the central corridor, the eastern portion of the line in particular services a number of stations that are *Suburban* in character. While densities are medium to low, and several stations have intensification designations, this portion of the line can benefit from plans that increase transit-oriented intensification.



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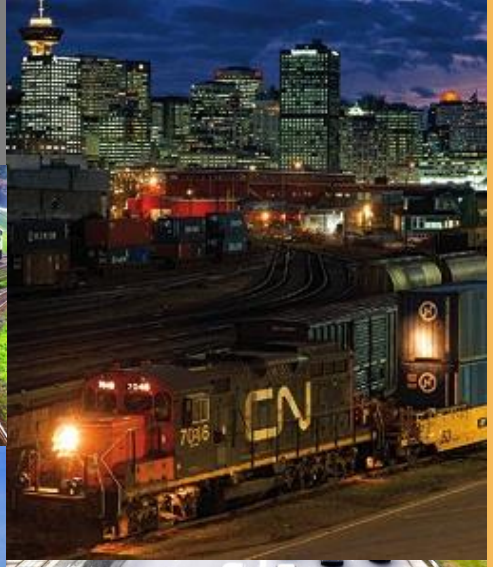

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